The role of incubators in enhancing innovation and competitiveness of Algerian startups

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Abstract:

This study examines the role of business incubators in developing the innovation capabilities and competitiveness of Algerian startups. It aims to identify the most effective support systems and services that contribute to startups' growth in terms of innovation and market positioning. A quantitative methodology was used through an official questionnaire targeting entrepreneurs, incubator managers, and ecosystem stakeholders. The study involved descriptive statistics, and Chi-square (χ^2) tests. Results show a strong positive relationship between incubation support and startup performance. Incubators play a vital role in fostering innovation and enhancing competitiveness. The analysis reveals strategic gaps requiring targeted adjustments. These findings support the enhancement of incubation policies and practices in Algeria.

Keywords: business incubators, Startup, Innovation, Competitiveness, Algeria.

Jel Classification Codes : L26, O32, O33, L25, O55.

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1. Introduction:

With the increasing economic transformations in the world, entrepreneurship has become a necessary requirement backed by efficient institutional platforms for fostering sustainable development and innovative job opportunities. Business incubators are one of the most powerful mechanisms that facilitate the building of capabilities of start-ups through a conducive environment made up of mentorship, training, financing, and access to business networks (Grimaldi & Grandi, 2005, p. 112). Existing studies have established that incubators are a significant enabler of innovation and enabling startups development, especially in developing economies with structural shortcomings in the entrepreneurship support system (Mian, 1997, p. 258).

In Algeria, business incubators have gained greater popularity over the past decade, particularly following the issuance of Executive Decree No. 20-254 of September 15, 2020, which established the National Committee for the attribution of the "Innovative Project" and "Business Incubator" qualification (Djekidel et al., 2021, p. 7). Nonetheless, their efficiency in achieving the goals is doubtful, particularly with regards to issues like governance, unskilled human resources, and the duplications of the roles of actors in the national entrepreneurial system (Aernoudt, 2004, p. 137).

1.1 .Research Problematic :

In this work, we aim to learn about the impact of business incubators on incubated firms in Algeria, our research issue is summarized below: To what extent do business incubators in Algeria effectively contribute to strengthening the innovation capacity and competitiveness of the startups they support ؟

The problem can be attributed to four subsequent sub-questions:

Q1: What types of services (support, training, funding, networking, etc.) are offered by incubators to startups in Algeria؟

Q2: What are the perceived effects of these services on the innovation capabilities of incubated startups؟

Q3: To what extent does incubator support enhance the competitiveness of startups in the local and/or international market؟

Q4: What are the main obstacles or limitations faced by incubators in their mission to support innovation and competitiveness among startups؟

Based on the literature review conducted, we consider the following hypotheses to be tested as follows:

Main Hypothesis H0: Business incubators in Algeria have significant impact on the innovation capabilities or competitiveness of the startups they support.

Secondary Hypotheses:

H1: The support services provided by incubators (such as training, mentoring, and consulting) have a significant effect on improving the innovation capabilities of startups.

H2: Financial support and access to resources offered by incubators positively influence the development of innovative products or services within incubated startups.

H3: Incubation has a positive impact on the competitiveness of startups, particularly in terms of market access, business growth, and differentiation.

H4: Constraints related to governance, human resources, or lack of coordination limit the effectiveness of incubators in enhancing innovation and competitiveness among startups.

1.2 .Research Aims:

The aim of this study is to analyze the effectiveness of Algerian business incubators in developing the innovation and competitiveness capability of their incubated start-ups. Founded on this general purpose, the study is targeting the following specific objectives:

-Identify the various services provided by incubators to start-ups (training, mentoring, financing, networking, etc.).

-Describe the role played by these services to the innovation processes of incubated start-ups.

-Assess the extent to which incubator support helps in start-ups' competitiveness at both domestic and international levels.

-Determine the most crucial obstacles or constraints hindering the incubators' operations towards their development role, whether governance-, human resource, or coordination-related among entrepreneurship ecosystems' actors.

1.3 .Importance of the study:

This study has theoretical and practical implications. Theoretically, it adds to the business incubation literature by uncovering the Algerian case, which is comparatively under-researched. It offers evidence about the contribution of incubators to startup development, innovation, and competitiveness. Practically, it offers recommendations to policymakers and incubator managers concerning how to improve support practices, develop the entrepreneurial ecosystem, and promote sustainable economic development through job creation and innovation.

1.4 .Previous studies:

Several studies have explored the role of business incubators in fostering innovation and enhancing startup competitiveness in the Algerian context. We cite the following as illustrative examples:

The study of El Cheikh, Meziane & Benantar (2023, pp. 108–117), this article published in the Revue Académique de Développement Économique et Social (RADES) ,in their paper "Business University Incubators in Algeria: A New Mechanism for the Promotion of Start-ups: The M'sila University Incubator Model", stress the importance of the M'sila University incubator as a tool for the promotion of project holders from the academic

community. The study confirms its effectiveness in prototyping, patenting activities, and entrepreneurial education.

The study of Gherbi (2023, pp. 53–65), the article published in the International Journal of Entrepreneurship and Project Management. This author shows that « The Role of Business Incubators in Supporting Entrepreneurship in Algeria: The Valley Business Incubator as a Model », demonstrates that the Valley University incubator significantly contributes to promoting entrepreneurship among students, with observable effects on startup creation.

The study of Guessouri (2022, pp. 76–89), the article published in the Scientific Journal of the University of Tlemcen This author shows that « Technological Business Incubators and Their Role in Supporting Creativity and Innovation in Algerian Startups». shows that technological incubators enhance innovation within the Algerian economy, despite structural limitations that continue to pose challenges.

The study of Kouider & Abderrahman (2025), the article published in Al-Ijtihad: Revue Algérienne d'Économie et de Management. This author shows that « The Role of Business Incubators in Supporting Startups in Algeria: A Case Study of the Business Incubator at the University of Djelfa». provide recent empirical evidence (using SPSS analysis) confirming the positive impact of university-based incubators on the development of local startups.

This study builds on the findings above by further exploring the impact of incubator support services on improving innovation capability and competitiveness of Algerian startups. Using a quantitative approach and interacting with a broader stakeholder group in the ecosystem (entrepreneurs, incubator managers, stakeholders), this study aims to bridge the gaps identified in the previous research and to provide practical recommendations on how incubation policy and practice should be improved in Algeria.

2. Literature review :

2.1. Business incubator

2.1.1 Definition of a business incubator

It is a comprehensive system that considers every small project as if it were a newborn requiring exceptional care and comprehensive attention. Therefore, it needs an incubator to nurture it from its inception, protecting it from surrounding risks, providing it with energy for sustainability, and gradually pushing it to become strong, capable of growth, and well-prepared for the future, equipped with success mechanisms and activities (نبيل جواد، 2007، ص:116).

According to this, a business incubator can be defined as an organization or facility that provides support, resources, and services to help nurture and grow early-stage or startup businesses. The primary goal of a business incubator is to accelerate the development and success of these new enterprises by offering a range of

services and infrastructure.

2.1.2 History of Business incubators

The contemporary history of entrepreneurial support began in the late 1950s in the United States. Entrepreneurial support was developed through private and public initiatives with the aim of promoting territorial economic development by addressing the shortcomings of emerging and developing businesses. The evolving needs of project leaders have shaped the actors and practices of support differently. It is possible to distinguish three phases in the contemporary history of support:

- An emergence phase, during which the major need to be addressed was the lack of resources. Pooling a variety of resources under one roof allowed economies of scale. The first generations of support structures responded to this need.
- A professionalization phase that marks a shift in the expectations of project leaders. In a context of liberalization and competitive, technological, and societal transformations, project leaders needed specialized support to compensate for their lack of managerial and marketing skills and, more broadly, to strengthen their learning.
- An acceleration phase, the internet revolution and the development of digitization accompanied a compression of time. New businesses must quickly submit a new offer while trying to be disruptive. This new relationship with time has emphasized the need for support that enables rapid access to new resources, specifically new professional, technological, and financial networks. (Karim MESSEGHEM, 2021, P.08)

2.1.3 Objectives of business incubator

Business incubators play a strategic role in building and maintaining startups, particularly innovative startups. Their fundamental role is reducing startup costs and initial risk, specifically through offering shared infrastructure, counseling, and facilities for business support (Capital, 2024). Incubators aim to maximize the rates of success of new innovative businesses and therefore contribute to developing a strong and dynamic entrepreneurial environment. In this case, they support innovation and new and innovative business ideas with high commercial potential (Allen & McCluskey, 1991; Aernoudt, 2004; Barbero et al., 2014). In addition, incubators indirectly stimulate the development of income and jobs through making successful market entry possible for startups and having them increase their value-added activities. They are also convenient tools for diversifying regional economies, particularly those dominated by traditional industries (OECD, 1999). Incubators then generally adhere to the Triple Helix model, employing synergy among industries, governments, and universities to enhance technology transfer and innovation (Etzkowitz & Leydesdorff, 1995; Meru & Struwig, 2015). All these objectives position incubators ideally in a position of driving economic, social, and technological

performance for start-up ventures.

2.2 Research methodology

2.2.1 Variables of the Study

To analyse the relationship between business incubators and the performance of startups in terms of innovation and competitiveness, we selected the following key variables*:*

- Quality of incubation services provided (training, mentoring, coaching).
- Access to financial resources facilitated by the incubator.
- Support in building networks and strategic partnerships.
- Improvement in the startup's innovation capacity.
- Enhanced competitiveness of the incubated startup.

2.2.2 Methodological Approach

We adopted a quantitative and descriptive approach, aiming to explore and measure the relationships between the independent variables (incubator services) and the dependent variables (innovation and competitiveness of startups). This exploratory research relies on a survey-based strategy to test the proposed hypotheses and gain insights into the real impact of incubators on startups in the Algerian context.

2.2.3 .Sample and data collection

The target population of this study includes 100 startups incubated within university-based and independent incubators across Algeria. A sample of 40 startups was selected, representing 40% of the population, while 60% of the incubated companies did not respond.

The data collection was carried out through a structured questionnaire, distributed electronically and in person over a three-month period. Three waves of email distribution were conducted, with follow-up reminders every 20 days. Out of 87 questionnaires sent electronically, only 27 responses were obtained. Additionally, 13 questionnaires were administered face-to-face, all of which were completed.

Once the data was collected, we moved to the data processing and analysis phase using SPSS (Statistical Package for the Social Sciences) and Microsoft Excel. The following statistical techniques were employed*:*

- Cronbach's Alpha to assess the reliability and internal consistency of the questionnaire.
- Descriptive statistics (frequencies, percentages, charts) to summarize the profile of the surveyed startups.
- Hypothesis testing using the Pearson chi-square test to examine the relationships between incubator services and startup performance outcomes.

3 .The practical aspect *:*

3.1 .Reliability Test of the Questionnaire

This test is utilized to measure the internal consistency of questions related to the same subject. It aims to estimate the reliability of the score on a test. The Cronbach's Alpha value for our questionnaire is presented on the table below:

Table 1: Cronbach's Alpha Test

Cronbach's Alpha Value	Number of Items
,935	17

Source: Established based on analysis by SPSS software.

According to the results presented in the table above, the value of the Cronbach's Alpha coefficient for all the paragraphs of the questionnaire, which consist of 17 items, is 0.935. This indicates that our questionnaire is reliable.

3.2. 3. Empirical results and findings discussion

Table 2: Distribution of study sample Membre

Variable	Category	Frequency	Percentage
Year of creation of your startup	Before 2020	10	25,0
	2020–2022	21	52,5
	After 2022	9	22,5
Sector of activity	ICT	20	50,0
	Agriculture	10	25,0
	Industry	2	5,0
	Services	6	15,0
	Other	2	5,0
Has your startup benefited from incubation support?	Yes	38	95,0
	No	2	5,0
Duration of incubation	Less than 6 months	10	25,0
	6 to 12 months	6	15,0
	More than 12 months	24	60,0
Type of incubator	University incubator	8	20,0
	Private incubator	27	67,5
	Public/state-run	4	10,0
	Other	1	2,5

Source: Established based on analysis by SPSS software.

4. Results and discussion

4.1 The impact of support services provided by incubators (such as training, mentoring, and consulting) is significant in improving the innovation capabilities of startups.

Based on the conceptual model and examining the contribution of support services provided by incubators (such as training, mentoring, and consulting) to the improvement of startups' innovation capabilities, three main hypotheses were formulated, each further developed into several sub-hypotheses.

H1: The support services provided by incubators (such as training, mentoring, and consulting) have a significant effect on improving the innovation capabilities of startups.

H11: raining programs provided by incubators significantly enhance the ability of startups to generate and implement innovative ideas.

H12: Mentoring services offered by incubators positively influence the strategic thinking and innovation planning of incubated startups.

H13: Business consulting and technical advisory provided within incubation programs contribute significantly to improving the product/service innovation of startups.

Testing the first group of hypotheses: Hypotheses on the contribution of support services provided by incubators (such as training, mentoring, and consulting) to the improvement of startups' innovation capabilities. After presenting the first group of hypotheses, we seek to validate or reject the following hypotheses: H11, H12, H13.

The following table shows the results of the chi-square test:

Table 3: Chi-square Tests for the first group of hypotheses

	Value	Ddl	Sig. approx. (two-tailed)
Pearson's Chi-square H11	30,439[a]	3	,000
Pearson's Chi-square H12	8,667[a]	3	,073
Pearson's Chi-square H13	13,1 33[a]	3	,013

Source: Established based on analysis by SPSS software.

The results of the chi-square tests allow us to draw the following conclusions:

For the first test, the chi-square value ($X2$=30.439) is statistically significant (P<0.05), indicating that the raining programs provided by incubators significantly enhance the ability of startups to generate and implement innovative ideas. Hypothesis H11 is validated.

For the second test, the chi-square value ($X2$=8.667) is small and not statistically significant (P>0.05), indicating that the Mentoring services offered by incubators positively influence the strategic thinking and innovation planning of incubated startups. Hypothesis H12 is rejected.

For the third test, the chi-square value (X2=13.133) is statistically significant (P<0.05), indicating that the Mentoring services offered by incubators positively influence the strategic thinking and innovation planning of incubated startups. Hypothesis H13 is validated.

4.2 Financial support and access to resources offered by incubators positively influence the development of innovative products or services within incubated startups.

H2: Financial support and access to resources offered by incubators positively influence the development of innovative products or services within incubated startups.

H21: Access to seed funding provided by incubators significantly facilitates the prototyping and development of innovative products or services in startups.

H22: The availability of physical infrastructure and technological resources (co-working spaces, labs, internet access) within incubators positively contributes to the innovation process in startups.

H23: Incubator support in accessing external funding sources (investors, grants, crowdfunding) enhances the ability of startups to bring innovative offerings to market.

Testing the second group of hypotheses: Hypotheses on the contribution of financial support and access to resources offered by incubators positively influence the development of innovative products or services within incubated startups. After presenting the second group of hypotheses, we seek to validate or reject the following hypotheses: H21, H22, H23. The following table shows the results of the chi-square test:

Table 4: Chi-square Tests for the second group of hypotheses

	value	Ddl	Sig. approx. (two-tailed)
Pearson's Chi-square H21	40,432[a]	3	,000
Pearson's Chi-square H22	11,055[a]	3	,012
Pearson's Chi-square H23	11,652[a]	3	,011

Source: Established based on analysis by SPSS software.

The results of the chi-square tests allow us to draw the following conclusions:

For the first test, the chi-square value (X2=40.432) is statistically significant (P<0.05), indicating that Access to seed funding provided by incubators significantly facilitates the prototyping and development of innovative products or services in startups. Hypothesis H21 is validated.

For the second test, the chi-square value (X2=11.055) is statistically significant (P<0.05), indicating that the availability of physical infrastructure and technological resources (co-working spaces, labs, internet access) within incubators positively contributes to the innovation process in startups. Hypothesis H22 is validated.

The chi-square value for the third test ($X2$=11.652) is statistically significant (P<0.05), indicating that Incubator support in accessing external funding sources (investors, grants, crowdfunding) enhances the ability of startups to bring innovative offerings to market. Hypothesis H23 is validated.

4.3 Incubation has a positive impact on the competitiveness of startups, particularly in terms of market access, business growth, and differentiation.

H3: Incubation has a positive impact on the competitiveness of startups, particularly in terms of market access, business growth, and differentiation.

H31: Incubation support facilitates easier access to local and international markets, thereby improving the market positioning of startups.

H32: Startups that benefit from incubation services experience faster and more sustainable business growth compared to non-incubated startups.

H33: Incubators help startups develop distinctive products, services, or business models, which enhances their competitive advantage.

Testing the third group of hypotheses: Hypotheses on the contribution of the incubators on the competitiveness of startups, particularly in terms of market access, business growth, and differentiation. After presenting the third group of hypotheses, we seek to validate or reject the following hypotheses: H31, H32, H33. The following table shows the results of the chi-square test:

Table 5: Chi-square Tests for the third group of hypotheses

	Value	Ddl	Sig. approx. (two-tailed)
Pearson's Chi-square H31	40,432[a]	3	,000
Pearson's Chi-square H32	11,055[a]	3	,012
Pearson's Chi-square H33	11,652[a]	3	,011

Source: Established based on analysis by SPSS software.

The results of the chi-square tests allow us to draw the following conclusions:

For the first test, the chi-square value ($X2$=40.432) is statistically significant (P<0.05), indicating that Incubation support facilitates easier access to local and international markets, thereby improving the market positioning of startups. Hypothesis H31 is validated.

For the second test, the chi-square value ($X2$=11.055) is statistically significant (P<0.05), indicating that Startups that benefit from incubation services experience faster and more sustainable business growth compared to non-incubated startups. Hypothesis H32 is validated.

The chi-square value for the third test ($X2$=11.652) is statistically significant (P<0.05), indicating that Incubators help startups develop distinctive products, services, or business models, which enhances their competitive advantage. Hypothesis H33 is validated.

4.4 Constraints related to governance, human resources, or lack of coordination limit the effectiveness of incubators in enhancing innovation and competitiveness among startups.

H4: Constraints related to governance, human resources, or lack of coordination limit the effectiveness of incubators in enhancing innovation and competitiveness among startups.

H41: Governance related constraints, such as weak strategic vision or lack of leadership, negatively affect the effectiveness of incubators in supporting innovation among startups.

H42: Limited human resource capacities (lack of qualified staff or experts) reduce the ability of incubators to deliver impactful services that foster startup competitiveness.

H43: Poor coordination between ecosystem actors (universities, funders, and private sector partners) hinders the efficiency of incubator programs in achieving their innovation related objectives.

Testing the fourth group of hypotheses: Hypotheses on the contribution of the network and partnership provided by the incubators to the improvement of the revenue of incubated companies. After presenting the first group of hypotheses, we seek to validate or reject the following hypotheses: H31, H32, H33. The following table shows the results of the chi-square test:

Table 6: Chi-square Tests for the fourth groups of hypotheses.

	Value	ddl	Sig. approx. (two-tailed)
Pearson's Chi-square H41	13,118[a]	3	,023
Pearson's Chi-square H42	13,281[a]	3	,007
Pearson's Chi-square H43	32,942[a]	3	,001

Source: Established based on analysis by SPSS software.

The results of the chi-square tests allow us to draw the following conclusions:

For the first test, the chi-square value ($X2$=13.118) is statistically significant (P<0.05), indicating that the Governance related constraints, such as weak strategic vision or lack of leadership, negatively affect the effectiveness of incubators in supporting innovation among startups. Hypothesis H41 is validated.

For the second test, the chi-square value ($X2$=13.281) is statistically significant (P<0.05), indicating that Limited human resource capacities (lack of qualified staff or experts) reduce the ability of incubators to deliver impactful services that foster startup competitiveness. Hypothesis H42 is validated.

The chi-square value for the third test ($X2$=32.942) is statistically significant (P<0.05), indicating that the Poor coordination between ecosystem actors (universities, funders, and private sector partners) hinders the efficiency of incubator programs in achieving their innovation related objectives. Hypothesis H43 is validated.

5. Conclusion: Results and Recommendations

5.1 Results:

Empirical research, using the chi-square test, validated most of the hypotheses in this work and confirmed on the impact of incubators on innovation and competitiveness of Algerian startups.

To begin with, findings confirm that the excellence of support service provided by incubators, particularly training and technical consulting is highly determinative to enhance startups incubated with innovative capacity. However, mentoring impact on innovative orientation and strategic planning is statistically not significant, and there is a need for reevaluation of these services in terms of content, relevance, or delivery modes.

Secondly, the study emphasizes how the financial and material dimensions of incubation matter to the innovation process. Quality infrastructure, early-stage finance, and outside resources are not just influential in the formation of innovative products or services but also help to ease the startups' passage over the ideation-to-market-span hurdle.

Third, the results show that incubation acts as an engine of competitiveness by enabling market access, business growth, and differentiation for competitive advantage for incubated firms. This supports that incubators play an organizational function within the local entrepreneurial ecosystem.

Finally, the study specifies a range of performance barriers to the incubators, such as internal governance issues, human resource deficiencies, and stakeholder coordination deficits in the ecosystem. These structural barriers require a paradigm shift in strategic management, professionalization of incubator staff, and more networking among public and private stakeholders.

In summary, the empirical findings decide the significant role which can be provided by incubators to facilitate the establishment of innovation and competitiveness of Algerian startups and identify the most significant constraints which need to be addressed to make their sustainable long-term survival possible.

5.2. Recommendation

- Tailor support based on startups' level of maturity.
- Develop innovation in cooperation with universities and FabLabs.
- Include training in design thinking, intellectual property, and prototyping.
- Develop open innovation with large companies.
- Clarify the legal status of incubators and provide appropriate support.
- Subsidize innovation programs, especially in strategic sectors.
- Increase access to finance and offer tax refunds for early-stage investors.
- Utilize incubation services to the maximum (training, mentoring, networking).
- Build an innovative and scalable business model from the incubation phase itself.
- Monitor performance indicators to evaluate impact.

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