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University Incubators as a Mechanism for Supporting Entrepreneurship and Fostering Start-Up Development within the Local Economic Environment :

An Empirical Study at Batna 1 and Constantine 2 Universities

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Abstract:

This study investigates the strategic role of university incubators in supporting entrepreneurship and fostering start-up development within the local economic environment. An empirical study was conducted at Batna 1 and Constantine 2 Universities using a descriptive–analytical approach. Data were collected through a structured questionnaire distributed to a purposive sample of 55 faculty members, representing 93.22% of the total population of 59 professors specializing in entrepreneurship and actively involved with university incubators.

The findings reveal statistically significant evidence confirming that university incubators play a vital role in stimulating entrepreneurial initiatives and enhancing the development of emerging ventures associated with university entrepreneurship centers. Furthermore, the results emphasize the incubators' contribution to creating a dynamic ecosystem that bridges academic research with practical innovation.

Based on these outcomes, the study recommends strengthening institutional integration between incubators and universities to establish an innovation-oriented educational environment conducive to entrepreneurship. It also highlights the need for specialized training programs aimed at developing entrepreneurial and leadership skills, with a strong focus on innovation and digital transformation. Finally, the study advocates for the creation of sustainable financial support mechanisms and professional networking platforms to promote collaboration among entrepreneurs, investors, and experts.

Keywords: *Business Incubators; Entrepreneurship; Start-Ups; Entrepreneurship Center; Universities of Batna 01 and Constantine 02*

Jel Classification Codes: *L26; L53; M13; O32*

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1. Introduction :

In the face of growing economic challenges, the need for innovative mechanisms to support the transition toward a knowledge and innovation-based economy has become increasingly urgent. Entrepreneurship is recognized as à key driver of this transformation, as it enables the creation of innovative projects that can evolve into start-up enterprises capable of generating wealth and stimulating local economic growth. However, the success of entrepreneurial initiatives does not rely solely on the novelty of ideas; it also depends on a comprehensive support system that fosters an environment conducive to innovation and experimentation. Within this context, university incubators emerge as functional institutions situated at the intersection of academic knowledge and economic dynamism.

Today, university incubators have evolved far beyond their traditional role of offering consultations or technical support. They have become strategic platforms aimed at empowering students and young entrepreneurs to refine their ideas and transform them into viable business models. This is achieved through the provision of training programs, mentorship, technological infrastructure, and support in accessing funding resources services that are critical for enhancing the competitiveness and sustainability of start-ups. In Algeria, university incubators have emerged as key tools adopted by public policy to activate the national entrepreneurship ecosystem, in line with a strategic vision aimed at diversifying the economy and reducing reliance on the hydrocarbon sector. The regulatory framework, especially Executive Decree No. 20-254, has formalized the incubator model, supported by institutional structures such as the National Committee for the Award of the "Start-Up" and "Business Incubator" labels.

Against this backdrop, the present study seeks to examine how university incubators specifically those at the Universities of Batna 01 and Constantine 02 contribute to fostering entrepreneurship and supporting the development of start-ups within the local economic environment. The study focuses on analyzing the roles of these incubators, assessing their effectiveness, and investigating their impact on promoting a culture of entrepreneurship and innovation in academic settings.

1.1 Research Problem

Despite noticeable progress in supporting entrepreneurship within Algerian universities, the effectiveness of university incubators in transforming entrepreneurial ideas into sustainable start-ups remains a subject of debate particularly in light of challenges related to funding, mentorship, and integration with the local economic environment. Accordingly, the central research question of this study is formulated as follows: To what extent do university incubators at the Universities of Batna 01 and Constantine 02 contribute to supporting entrepreneurship and developing start-ups within the local economic environment?

This central question is further divided into the following sub-questions:

- What are the strategic roles played by university incubators in fostering entrepreneurship?

- How do university incubators contribute to the transformation of entrepreneurial projects into effective and sustainable start-ups?

- How effective is the support provided by university incubators during the start-up establishment and development phases?

- What is the nature of the relationship between university incubators and the surrounding economic environment, and how does this influence the success of entrepreneurial initiatives?

1.2 Research Hypotheses

The study is based on the following hypotheses:

H1: There are statistically significant indicators of the contribution of business incubators to enhancing entrepreneurship within the entrepreneurship centers at the Universities of Batna 01 and Constantine 02.

H2: There is a statistically significant positive indicator of the contribution of business incubators to the development of startups affiliated with the entrepreneurship centers at the Universities of Batna 01 and Constantine 02.

1.3 Research Objectives

This study aims to:

- Analyze the role of university incubators as institutional mechanisms for supporting entrepreneurship within the academic environment;

- Evaluate the contribution of incubators to the development of start-ups in terms of effectiveness and sustainability;

- Explore the relationship between university incubators and the local economic environment in fostering entrepreneurship;

- Provide practical recommendations to enhance the efficiency of university incubators and improve their capacity to support entrepreneurial projects.

1.4 Significance of the Study

This study derives its significance from its focus on a contemporary and vital topic that intersects with the imperatives of economic development based on innovation and knowledge. By concentrating on university incubators as a strategic mechanism for supporting entrepreneurship within academic environments, the research addresses a critical dimension of the national innovation ecosystem. The study also gains importance from the specific Algerian context, which is undergoing economic transformations that call for the activation of new tools to support the development of start-ups beyond the boundaries of traditional assistance models. In this regard, the research seeks to fill a gap in the local literature by offering an in-depth empirical analysis of the experiences of the Universities of Batna 01 and Constantine 02 in incubating entrepreneurial projects.

1.5 Methodology

This study adopts a descriptive-analytical approach, in which the theoretical component will be addressed through a review of relevant scholarly literature on entrepreneurship, university incubators, and start-up development. The theoretical analysis is complemented by a field study

conducted at the Universities of Batna 01 and Constantine 02, where a structured questionnaire serves as the primary data collection tool. The collected data will be analyzed using appropriate statistical techniques to test the research hypotheses and interpret the findings.

2. Theoretical Framework of the Study

This section addresses the theoretical foundations of the study's key variables, namely: business incubators, entrepreneurship, and start-ups within the local economic environment.

2.1 The Nature of Start-up Enterprises

This part aims to clarify the concept of start-ups, their defining characteristics, and their lifecycle stages, as outlined below:

2.1.1 Definition of Start-ups

Definitions of start-ups (Startups) vary depending on the theoretical perspective adopted. Eric Ries, for instance, views a start-up as an organizational structure designed to develop an innovative product or service in a context marked by high uncertainty highlighting its exploratory nature and experimental inclination. From a functional standpoint, Dorf and Blank define a start-up as a temporary organization in pursuit of a scalable and repeatable business model capable of achieving profitability. This model typically begins with initial hypotheses that are gradually tested through experimentation and validation. Meanwhile, Bob Walsh describes a start-up as an independent entity unaffiliated with existing organizations typically comprising a small team of between one and eight individuals working collaboratively to develop innovative solutions that meet specific market needs (Ben Lakhdar & al, 2020, pp. 27, 28)

Despite the growing importance of the start-up concept in innovation and development policies, the Algerian legal framework still lacks a comprehensive and precise definition of such enterprises. However, Memorandum No. 708, issued by the Ministry of Commerce on October 24, 2019, offers a preliminary characterization, identifying start-ups as firms operating in high-tech fields such as computer programming, data analytics, internet services, and industrial digital engineering (Legal-Doctrine, 2020).

A more specific operational definition is provided by Executive Decree No. 20-254 of September 15, 2020, which outlines a set of eligibility criteria for a company to obtain legal recognition as a start-up. These criteria include: an age not exceeding eight years, a business model centered on innovation whether in products, processes, or services at least 50% of the capital held by individuals or investment funds, a maximum annual turnover threshold as defined by the national committee, a workforce not exceeding 250 employees, and high growth potential enabling rapid expansion (Legal-Doctrine, 2020).

In light of these perspectives, a composite definition of a start-up can be proposed: A start-up is a temporary entrepreneurial entity characterized by high innovation, operating in a high-risk and uncertain environment, aiming to develop new solutions or products with measurable economic and social impact, and possessing the potential for rapid scaling in domestic or international markets.

2.1.2 Characteristics of Start-ups

Start-up enterprises are distinguished by a set of unique features that fundamentally differentiate them from traditional business models. Their distinctiveness is reflected in their dynamic nature and their strong ambition for rapid growth (Merbah, 2021, p. 428). The key characteristics include:

- Recent establishment: Start-ups typically emerge in the early stages of organizational development, making them more vulnerable to market volatility and fluctuating success factors;

- High scalability: They often adopt flexible and innovative business models that enable them to penetrate markets efficiently, both locally and internationally;

- Technology-driven orientation: Most start-ups rely on advanced technologies and digital tools, providing continuous adaptability and renewal;

- High-risk, high-reward profile: Although relatively fragile, start-ups offer the potential for exceptional returns if successful, which makes them attractive to investors seeking high-yield opportunities.

2.1.3 Lifecycle of Start-ups

Start-ups evolve through successive stages, each requiring tailored strategies. Paul Graham proposed a five-stage model that maps out the typical trajectory of a start-up from ideation to maturity:

- Ideation Stage: This initial phase involves generating entrepreneurial ideas, conducting market analysis, and identifying gaps and opportunities for innovative solutions (Bahiri & Karfis, 2023, p. 196).

- Launch Stage: The start-up enters the market for the first time with its product or service, focusing on market-fit testing and securing initial funding (Bessouih & al, 2021, p. 408).

- Growth Stage: The enterprise aims to expand its customer base, increase market share, and boost revenues to achieve financial stability (Hannach & Boufengour, 2021, p. 101).

- Decline Stage: The firm may encounter organizational, competitive, or financial challenges that hinder performance, necessitating a strategic review or pivot (Mazouz & Khellout, 2021, p. 68) (Meziane & Ammarouche, 2021, p. 33).

- Maturity and Sustainability Stage: In this phase, operations are optimized, product and service portfolios are expanded, and stable profits are realized, all while maintaining competitive advantage (Al-Moumen & Karmia, 2021, p. 17).

2.2 The Concept of Entrepreneurship

This section explores the meaning and significance of entrepreneurship as follows:

2.2.1 The Concept of Entrepreneurship

Entrepreneurship is a dynamic activity rooted in the ability to identify and exploit economic opportunities through the creation of new ventures or the innovative restructuring of existing

businesses. It involves the strategic integration of financial, human, and technological resources to generate economic value and deliver tangible social outcomes.

From a theoretical perspective, Joseph Schumpeter defined entrepreneurship as the core of innovation within an economic system. He viewed the entrepreneur as the primary agent of change introducing new products or improving production methods which in turn fuels competitive dynamics and revitalizes markets (Schumpeter, 1934). In contrast, Israel Kirzner offered a more discovery-oriented perspective, portraying the entrepreneur as someone who identifies gaps and inefficiencies in the market and strategically seizes latent opportunities to generate profits. Thus, entrepreneurship merges innovation with foresight and constitutes a central pillar in enhancing the competitiveness of modern economies by fostering innovation, generating employment, and driving sustainable growth (Kirzner, 1973).

2.2.2 The Importance of Entrepreneurship

Entrepreneurship plays a fundamental role in propelling both economic and social development due to its multidimensional contributions to innovation and economic balance (Mian, 2011). It serves a eu strategic driver of economic progress through the following key mechanisms:

- Fostering Innovation: Entrepreneurship acts as a catalyst for creativity by developing innovative products and services that respond to the rapidly evolving preferences of consumers and the dynamic demands of the market;

- Generating Employment Opportunities: Entrepreneurial ventures create fertile ground for job creation, thereby contributing to reduced unemployment rates and improved income levels particularly among youth and university graduates;

- Stimulating Economic Growth: Start-ups contribute to expanding the productive base and attracting investments, which positively impacts GDP indicators and enhances overall economic stability;

- Enhancing Competitiveness: Entrepreneurs help reshape business ecosystems by introducing innovative solutions and adopting agile management practices, thereby pushing organizations to improve the quality of their offerings;

- Promoting Economic Sustainability: Entrepreneurship supports the diversification of national income sources and reduces dependence on traditional sectors, strengthening the economy's resilience to global crises and structural transformations.

2.3 The Concept of University Business Incubators

This section explores the nature, objectives, and significance of business incubators as follows:

2.3.1 The Concept of Business Incubators

Business incubators constitute a fundamental pillar within entrepreneurial support systems across modern economies. Their definitions vary depending on the institutions and organizations addressing their roles, which reflects the multifaceted nature of their developmental functions.

According to the United Nations Economic and Social Commission for Western Asia (ESCWA), business incubators are defined as integrated systems of advisory, technical, and financial services designed to accompany entrepreneurs during the early stages of their project development. Their primary aim is to minimize costs and mitigate the inherent risks associated with the start-up phase (Obeidat, 2006, p. 60).

Meanwhile, the European Commission describes incubators as structured hubs that provide emerging enterprises with comprehensive infrastructure and support services in management and technology transfer. These services contribute to increasing the likelihood of start-up success and generating positive impacts on local economic growth and job creation (Abdeldaim, 2011, pp. 82, 83). In a more comprehensive view, the National Business Incubation Association (NBIA) in the United States defines a business incubator as a strategic mechanism aimed at accelerating the growth of start-ups by providing a multidimensional support ecosystem. This approach enables incubated ventures to achieve financial independence and sustainable development upon graduation from the incubator (Saleh, 2013, p. 04).

Drawing on these definitional perspectives, business incubators can be comprehensively understood as institutional entities with a developmental mission. They actively support entrepreneurial initiatives by offering a holistic nurturing environment that encompasses advisory, managerial, financial, and technological services. These services collectively contribute to reducing start-up risks, accelerating business growth, and facilitating successful integration into competitive markets.

2.3.2 The Importance of Business Incubators

Business incubators have gained increasing prominence in national strategies aimed at promoting knowledge-based economies and advancing entrepreneurial ecosystems. Their significance stems from their direct role in empowering nascent ventures and guiding them through critical phases of their lifecycle. The key dimensions of their importance include: (Mansouri, 2010, p. 07)

- Translating Knowledge into Economic Value: Incubators serve as a vital link between academic research outputs and the economic sector by supporting the establishment of technology- and innovation-driven start-ups;

- Reducing Unemployment Rates: By fostering entrepreneurial initiatives and enabling individuals to launch their own ventures, incubators contribute to generating new, sustainable employment opportunities;

- Providing Integrated Operational Environments: Business incubators offer fully equipped workspaces and essential administrative and financial services, allowing entrepreneurs to focus on core business development.

- Strategic Advisory and Investment Planning Support: Incubators deliver high-quality consultancy services, including feasibility studies, opportunity assessments, and expert advice in financial, marketing, and organizational domains;

- Assisting in Overcoming Initial Challenges: Incubators play a pivotal role in helping start-ups navigate the obstacles commonly encountered in the foundational stages, thereby increasing their survival and continuity in competitive markets.

2.3.3 Objectives of Business Incubators

Business incubators serve as strategic instruments designed to foster knowledge-based economic development and to promote entrepreneurship through the attainment of interconnected objectives. These objectives focus primarily on supporting start-ups and stimulating both economic and social progress (Cherif Rehan, 2021, p. 7).

A. Objectives Related to Startups

Business incubators aim to empower start-ups by achieving a set of targeted goals that enhance their viability and growth potential. Key objectives include:

- Mitigating Initial Risks: Reducing the financial and operational uncertainties commonly encountered during the early stages of start-up development;

- Accelerating Launch Cycles: Facilitating the establishment and production processes through the provision of infrastructure and essential services;

- Providing Multi-Dimensional Support: Offering integrated administrative, financial, legal, and technical assistance to overcome operational challenges;

- Fostering Innovation: Creating an environment conducive to the development of new products and services by promoting creativity and R&D activities;

- Enhancing Success Rates: Delivering professional mentorship and strategic guidance to improve performance and increase the likelihood of long-term sustainability;

- Facilitating Market Integration: Connecting start-ups with industrial and commercial sectors to boost partnership opportunities and joint growth.

B. Economic and Social Objectives

The impact of business incubators extends to broader economic and social domains, as they contribute to:

- Job Creation: Supporting the development of new employment opportunities, particularly for youth and university graduates, thereby contributing to the reduction of unemployment rates;

- Strengthening the National Economic Fabric: Encouraging the emergence of new industries especially in technology-driven sectors to support economic diversification efforts;

- Improving Living Standards: Promoting entrepreneurial initiatives that lead to increased individual income and enhanced quality of life;

- Systemic Innovation Support: Facilitating the conversion of scientific research outputs into practical economic applications by linking academia with business environments;

- Encouraging Technological Investment: Creating an attractive investment climate for technology-based projects and ventures;

- Promoting an Entrepreneurial Culture: Cultivating entrepreneurial values and a spirit of initiative among young people, which contributes to a more agile, dynamic, and resilient business environment.

2.4 Types of Business Incubators

Business incubators vary in form and function depending on specific organizational and strategic criteria. These diverse typologies enable incubators to adapt effectively to different economic and developmental contexts. The primary classifications include:

A. Based on Geographic Scope

The classification of university incubators based on their geographic scope provides insight into how incubators operate at different territorial levels and the nature of the entrepreneurial ecosystems they aim to develop (Zaitouni, 2017, p. 3)

- Regional Incubators: Focused on leveraging local human and natural resources to drive development in specific areas by fostering start-ups that address local needs;

- International Incubators: Promote cross-border collaboration by supporting globally oriented entrepreneurial projects and encouraging innovation in a competitive global economy.

B. Based on Targeted Sector

A sector-based classification of university incubators illustrates the diverse fields in which they operate and the specialized support they provide to different types of entrepreneurial venture (Jawad & Al-Battat, 2016, pp. 107-110)

- Industrial Incubators: Provide support for manufacturing and production-oriented ventures, including essential logistical and technical services;

- Technology Incubators: Foster environments conducive to the development of software, digital applications, and advanced technologies such as artificial intelligence and smart systems;

- Research-Based Incubators: Focus on commercializing academic research by transforming scientific findings into economically viable projects;

-Service Incubators: Support enterprises operating in service sectors such as tourism, education, and healthcare;

- Agricultural Incubators: Promote agricultural ventures and the adoption of modern agritech to enhance productivity and sustainability.

C. Based on Economic Model

An economic-model classification of incubators distinguishes them according to their financial orientation and the underlying objectives guiding their support for entrepreneurial projects (Abdel-Laoui, 2013)

- For-Profit Incubators: Operate as investment-driven entities offering services to start-ups in exchange for financial returns, often as part of private investment strategies;

- Non-Profit Incubators: Funded by governmental bodies or academic institutions, these incubators aim to support economic and social development without pursuing direct financial gain.

D. Based on Sponsoring Entity

A sponsorship-based classification categorizes incubators according to the institution responsible for their establishment and support, reflecting the strategic goals driving their entrepreneurial initiatives (Al-Fayhan, 2012, p. 44)

- Government Incubators: Established and financed by public authorities to support national policies in innovation, employment, and entrepreneurship;

- Private Incubators: Operated by private investment firms to support promising start-up ventures with the objective of generating returns;

- University Incubators: Serve as bridges between academic research and real-world application, encouraging entrepreneurship within university communities;

- Corporate Incubators: Developed within large companies to foster internal innovation by supporting in-house initiatives for the creation of new products or services.

2.4 The Relationship Between Business Incubators, Entrepreneurship, and Startups

2.4.1 Theoretical Relationship Between Business Incubators and Entrepreneurship

Business incubators play a pivotal role in fostering entrepreneurship by creating an enabling environment that helps reduce the failure rate of entrepreneurial ventures, especially during their formative stages. Incubators do not merely offer tangible support such as office space and equipment; they also provide intangible services including mentorship, strategic guidance, and advisory support critical factors in strengthening entrepreneurs' capacities to overcome market-related challenges (Hackett & Dilts, 2004, p. 59).

Furthermore, the relationship between incubators and entrepreneurship goes beyond institutional support to encompass the creation of communication and networking platforms with investors, customers, and potential business partners. These connections accelerate the transformation of entrepreneurial ideas into viable ventures (Peters & al, 2004).

2.4.2 Theoretical Relationship Between Business Incubators and Startups

Startups represent the primary beneficiaries of business incubation services. According to the literature, incubators fulfill a structural and organizational function in helping these enterprises navigate the "Valley of Death" a critical phase marked by liquidity constraints and high survival risk (Bruneel & al, 2012, p. 112).

Incubators complement startups by offering an integrated package of services such as business development training, mentorship, and access to professional networks. These services significantly enhance the prospects of startups for achieving sustainability and scaling operations (Aernoudt, 2004, p. 129). In addition, various models of incubators such as technology-based and university-affiliated incubators serve as experimental ecosystems that allow startups to innovate within flexible frameworks. This increases their success rates compared to non-incubated firms (Grimaldi & Grandi, 2005, p. 116).

3. Empirical Study of a Sample of University Professors on University Incubators as a Mechanism to Support Entrepreneurship and Develop Startups at Batna 01 and Constantine 02 Universities

To conduct the empirical investigation, it was necessary to define the study population and sample size, validate the research instrument (questionnaire), and analyze the characteristics of the respondents. These aspects are detailed as follows:

3.1 Preliminary Procedures

As an initial step in implementing the empirical component of the study, it was essential to define the target population and sampling strategy, determine the data collection tools, and assess the internal consistency of the research instrument using Cronbach's Alpha coefficient.

3.1.1 Study Population and Sample

The study population comprises university professors at both Batna 01 and Constantine 02 universities, particularly those with a direct ou indirect interest in entrepreneurship, business incubation, and the development of startup enterprises. This also includes faculty members specialized in business administration within the faculties of economics, commercial sciences, and management sciences. For the purpose of empirical analysis, a purposive sample of 55 university professors was selected, representing 93.22% of the total targeted population.

3.1.2 Data Collection Tool

The primary data collection tool employed in this study is a structured questionnaire, selected due to its effectiveness in capturing attitudes and perceptions of the sample toward the research dimensions. The questionnaire was designed and distributed in alignment with the study objectives and the hypotheses under investigation. The questionnaire consists of two main sections: Section One: Demographic information of the respondents, Section Two: A series of statements evaluating the professors' perspectives on the role of university incubators in supporting entrepreneurship and developing startups within the local economic environment. This section is structured around three core axes:

Axis 1: Business Incubators (10 items) This dimension assesses the extent to which university incubators provide an innovation-friendly environment through advisory services, mentorship, and administrative, financial, and technical support for emerging ventures.

Axis 2: Entrepreneurship (10 items) Focuses on measuring the impact of business incubators in fostering entrepreneurial mindsets among students and faculty, and encouraging them to initiate innovative projects.

Axis 3: Startups (10 items) Aims to evaluate the contribution of university incubators in supporting the development, growth, and sustainability of startup enterprises in the local economic context.

The questionnaire was developed based on a review of relevant prior studies and grounded in the appropriate theoretical framework. It underwent expert review by a panel of academic specialists to ensure content and face validity, and revisions were made accordingly before its final distribution. Data were analyzed using SPSS and AMOS statistical software to assess the reliability and validity of the instrument, examine the characteristics of the sample, and test the proposed research hypotheses.

3.1.3 Instrument Reliability: Cronbach's Alpha Coefficient

The reliability of the study instrument was assessed using Cronbach's Alpha coefficient, and the results are presented in Table (1) below:

Dimensions	Number of Items	Cronbach's Alpha
Business Incubators	10	0.822
Entrepreneurship	10	0.760
Startups	10	0.840
Overall Instrument	**30**	**0.805**

The source: Prepared by the researcher based on SPSS 26 outputs.

As indicated in Table 1, the Cronbach's Alpha values for all three dimensions are within acceptable to excellent reliability thresholds. Specifically, the first axis (Business Incubators) yielded a value of 0.822, the second axis (Entrepreneurship) recorded 0.760, and the third axis (Startups) achieved the highest reliability at 0.880. The overall internal consistency for the entire questionnaire was 0.840. These values all exceed the generally accepted minimum threshold of 0.60, indicating a high level of internal consistency among the items in each axis. Consequently, the questionnaire demonstrates strong reliability and is suitable for conducting statistical analysis and deriving meaningful conclusions.

3.2 Descriptive Statistics and Hypothesis Testing

This section presents the descriptive profile of the study sample, descriptive measures of the study variables, and the results of hypothesis testing.

3.2.1 Demographic Characteristics of the Study Sample

The demographic characteristics of the university professors from Batna 01 and Constantine 02 universities were analyzed across four variables: gender, academic rank, age group, and educational level. Table (2) presents the distribution of the sample:

Table (2): Demographic Characteristics of the Respondents

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	28	50.91%
	Female	27	49.09%
Academic Rank	Assistant Professor	24	43.64%
	Associate Professor	19	34.55%
	Full Professor	12	21.82%

Age Group	25–35 years	14	25.45%
	36–45 years	22	40.00%
	Over 45 years	19	34.55%
Educational Level	Master's Degree	18	32.73%
	Doctorate	37	67.27%

The source: Prepared by the researcher based on SPSS 26 outputs.

Table (2) presents the demographic profile of the 55 respondents participating in the study on the role of university incubators in supporting entrepreneurship and fostering start-up development. The gender distribution is nearly even, with males representing 50.91% and females 49.09%, ensuring balanced perspectives across the sample. Regarding academic rank, Assistant Professors constitute the largest group (43.64%), followed by Associate Professors (34.55%) and Full Professors (21.82%). This distribution reflects a diverse mix of academic seniority, which enriches the study with varied professional insights.

The age structure of the respondents shows that the majority fall within the 36–45 age group (40%), followed by those over 45 years (34.55%), while younger academics aged 25–35 represent 25.45%. Such variation indicates a broad spectrum of academic experience across the sample. In terms of educational attainment, respondents holding doctoral degrees account for 67.27%, whereas 32.73% hold master's degrees. This high proportion of doctorate holders underscores the strong academic qualifications of the participants, which adds depth and reliability to the study's findings.

3.2.2 Descriptive Statistics of the Study Dimensions

This section presents the descriptive statistics specifically the mean scores and standard deviations for each dimension of the study.

A. Descriptive Statistics for Respondents' Answers Regarding the Role of Business Incubators

Table (3): Descriptive Analysis of Respondents' Answers – Business Incubators Dimension

Statement	Mean	Std. Deviation	Level of Agreement
Business incubators empower startups by creating an integrated environment that fosters innovation and facilitates the launch of new ideas.	4.22	0.65	Strongly Agree
The role of incubators is pivotal in building a knowledge base that enables entrepreneurs to effectively face market challenges.	4.19	0.58	Agree
Incubators contribute by offering specialized training programs that enhance the commercial and managerial skills necessary for running businesses.	4.36	0.66	Strongly Agree

Incubators help expand professional networks between startups and experts across various industrial sectors.	3.98	0.76	Agree
Incubators provide opportunities for strategic collaboration and fruitful partnerships that drive economic growth for startups.	4.04	0.64	Agree
Incubators offer integrated project management programs that include innovative business plans helping startups to differentiate in competitive markets.	4.26	0.62	Strongly Agree
Incubators facilitate access to financial and human resources through support mechanisms that reduce operational risks.	4.15	0.70	Agree
Incubators enhance startups' capabilities by providing technical and technological support that improves performance and productivity.	4.21	0.65	Strongly Agree
Incubators contribute to developing digital infrastructure and technical resources, enabling startups to keep pace with technological advancements.	4.05	0.59	Agree
Incubator support constitutes a fundamental pillar in building a dynamic entrepreneurship ecosystem that promotes long-term project sustainability and success.	4.14	0.72	Agree
Overall Dimension: Business Incubator Support	**4.16**	**0.66**	**Agree**

The source: Prepared by the researcher based on SPSS 26 outputs.

As shown in Table (3), business incubators play an active role in supporting startups, with an overall mean score of 4.16 and a standard deviation of 0.66, indicating a relatively high level of consensus among respondents regarding the effectiveness of incubators. The highest-rated item was "Providing specialized training programs", with a mean of 4.36, reflecting the critical importance of developing entrepreneurial and managerial skills for project leaders. Other areas with high agreement include "Project management support" (mean = 4.26) and "Technical support" (mean = 4.21), underscoring the incubators' role in risk mitigation and strategic planning. Conversely, the statement regarding "Expanding professional networks" recorded the lowest mean (3.98), suggesting potential challenges in activating networking mechanisms between startups and sectoral experts.

B. Descriptive Analysis of Respondents' Answers Regarding the Entrepreneurship Dimension

Table (4): Descriptive Analysis – Entrepreneurship Dimension

Statement	Mean	Std. Deviation	Level of Agreement
Entrepreneurship contributes to transforming intellectual creativity into investment projects with tangible economic and	4.28	0.58	Strongly Agree

social impact.			
Entrepreneurship enhances the innovation environment by integrating scientific research with technological development and market application.	4.21	0.67	Strongly Agree
Entrepreneurship is a strategic lever that enables synergy between the public and private sectors to drive economic growth.	4.08	0.76	Agree
Entrepreneurship establishes a dynamic system that supports digital transformation and develops innovative business models to meet global challenges.	4.04	0.69	Agree
Entrepreneurship stimulates the development of leadership and innovation capacities within organizations, contributing to long-term sustainability.	3.96	0.78	Agree
Entrepreneurship accelerates industrial and economic renewal through the introduction of knowledge-based products and technologies.	4.41	0.64	Strongly Agree
Government support policies and simplified administrative procedures highlight the role of a conducive entrepreneurial environment in encouraging investment and expanding SMEs.	4.17	0.73	Agree
Entrepreneurship is the cornerstone of building a knowledge economy based on innovation, technology, and the development of human capital.	4.29	0.68	Strongly Agree
Entrepreneurship enhances market competitiveness through data-driven strategies and evidence-based decision-making.	4.32	0.83	Strongly Agree
Entrepreneurship enables integrated interaction between market demands and technological capabilities, promoting efficient resource allocation and inclusive growth.	4.02	0.69	Agree
Overall Dimension: Entrepreneurship	**4.18**	**0.68**	**Agree**

The source: Prepared by the researcher based on SPSS 26 outputs.

Table (4) indicates a high level of consensus among respondents regarding the significance of entrepreneurship, with an overall mean of 4.18 and a standard deviation of 0.68. This reflects a clear recognition of entrepreneurship's role in supporting economic and social development. Respondents emphasized that entrepreneurship is instrumental in transforming creative ideas into viable investment projects and in fostering an environment of innovation through the integration of research and technological development. It also emerged as a strategic driver for collaboration between the public and private sectors, and a facilitator of digital transformation and innovative business models. Moreover, the findings highlight the importance of entrepreneurship in developing leadership competencies within organizations and in accelerating industrial renewal through knowledge-driven innovations. Supportive government policies and streamlined procedures were

also recognized as essential for encouraging investment and expanding the base of small and medium enterprises (SMEs).

C. Descriptive Analysis of Respondents' Answers Regarding the Startups Dimension

Table (5): Descriptive Statistics – Startups Development Dimension

Statement	Mean	Std. Deviation	Level of Agreement
Incubators stimulate startups to explore new markets and develop innovative business models aligned with market requirements.	4.32	0.74	Strongly Agree
Incubators contribute to the development of startups' digital capabilities, accelerating the adoption of modern technologies.	4.21	0.68	Strongly Agree
Incubators serve as strategic platforms to foster collaboration between entrepreneurs and large enterprises across various sectors.	4.24	0.79	Strongly Agree
Incubators provide precise technical guidance that contributes to improving the quality of products and services.	4.08	0.68	Agree
Incubators enhance leadership skills within startups through comprehensive and specialized training programs.	4.16	0.62	Agree
Incubators offer a safe experimental environment that enables startups to test and develop their ideas before market entry.	4.04	0.67	Agree
Incubators improve the prospects of securing future investments by facilitating strategic partnerships with investors and stakeholders.	4.08	0.74	Agree
Incubators provide a supportive framework for improving productivity and operational efficiency through the integration of modern management techniques.	3.98	0.82	Agree
Incubators help transform entrepreneurial ideas into viable projects by providing the necessary technical and financial support.	4.22	0.76	Strongly Agree
Incubators support the development of innovative marketing strategies that help startups build strong brand identities and increase market share.	4.28	0.69	Strongly Agree
Overall Dimension: Startups Development	4.16	0.69	Agree

The source: Prepared by the researcher based on SPSS 26 outputs.

As shown in Table (5), respondents expressed a high level of agreement regarding the role of incubators in supporting startups, with an overall mean of 4.16 and a standard deviation of 0.69. This indicates strong awareness of the importance of business incubators in fostering the sustainability and growth of startups. Participants highlighted the significance of consulting services, reduction of operational costs, infrastructure provision, and training as key success factors for emerging ventures. The role of incubators in facilitating access to funding and integrating startups into the broader industrial ecosystem was also recognized. The results emphasize that incubators play a substantial role in supporting innovation, facilitating technology transfer, and helping startups access markets. Despite this, challenges persist particularly in financing and attracting qualified human resources indicating the need for improved funding mechanisms and more effective talent acquisition strategies.

3.3 Hypotheses Testing

3.3.1 Testing the First Hypothesis

The first hypothesis states: There are statistically significant indicators of the contribution of business incubators to enhancing entrepreneurship within the entrepreneurship centers at the Universities of Batna 01 and Constantine 02, at a significance level of 0.05.

To verify this, the null and alternative hypotheses were formulated as follows:

H_0: There are no statistically significant indicators of the contribution of business incubators to enhancing entrepreneurship within the entrepreneurship centers at the Universities of Batna 01 and Constantine 02 at $\alpha = 0.05$.

H_1: There are statistically significant indicators of the contribution of business incubators to enhancing entrepreneurship within the entrepreneurship centers at the Universities of Batna 01 and Constantine 02 at $\alpha = 0.05$.

Table (6): Regression Analysis Results – Contribution of Business Incubators to Enhancing Entrepreneurship

Source	Sum of Squares	Mean Square	df	F-value	Sig.	R	R^2
Regression	18.327	18.327	1	262.428	0.000	0,655	0,809
Residual	24.228	0.442	53				
Total	42.555		54				

The source: Prepared by the researcher based on SPSS 26 outputs.

The results in Table (6) indicate a strong positive association between the contribution of business incubators and the enhancement of entrepreneurship, as reflected by the correlation coefficient ($R = 0.655$). The coefficient of determination ($R^2 = 0.809$) demonstrates that 80.9% of the variance in entrepreneurship enhancement is explained by the role played by incubators, while the remaining 19.1% is attributable to factors not included in the current model. The regression model exhibits a high level of statistical significance, with an F-value of 41.515 and a p-value of 0.000, both of which confirm that the model provides a robust explanation of the relationship between the variables. These results underscore the substantial contribution of business incubators

to entrepreneurial development and validate the strength and reliability of the model. Accordingly, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that business incubators exert a significant impact on enhancing entrepreneurship within the university environment.

3.3.2 Testing the Second Hypothesis

The second hypothesis posits: There is a statistically significant positive indicator of the contribution of business incubators to the development of startups affiliated with the entrepreneurship centers at the Universities of Batna 01 and Constantine 02. Accordingly, the hypotheses are stated as follows:

H_0: There is no statistically significant positive indicator of the contribution of business incubators to the development of startups affiliated with the entrepreneurship centers at the Universities of Batna 01 and Constantine 02 at $\alpha = 0.05$.

H_1: There is a statistically significant positive indicator of the contribution of business incubators to the development of startups affiliated with the entrepreneurship centers at the Universities of Batna 01 and Constantine 02 at $\alpha = 0.05$.

Table (7): Regression Analysis Results – Contribution of Business Incubators to the Development of Startups

Source	Sum of Squares	Mean Square	df	F-value	Sig.	R	R^2
Regression	21.873	21.873	1	56.414	0.000	0.720	0.848
Residual	20.682	0.388	53				
Total	42.555		54				

The source: Prepared by the researcher based on SPSS 26 outputs.

The results presented in Table (7) confirm the statistical significance of the regression model examining the contribution of business incubators to the development of startups. The F-value indicates that the model is highly significant at the 0.05 level, as supported by the p-value (Sig. = 0.000), which demonstrates that the regression equation provides a meaningful explanation of the relationship between the variables. The correlation coefficient (R = 0.720) reflects a strong and positive association between incubator activities and startup development. More importantly, the coefficient of determination ($R^2 = 0.848$) reveals that 84.8% of the variance in startup development is attributable to the contribution of business incubators. This high explanatory power underscores the effectiveness of incubators in shaping the growth trajectory and performance outcomes of emerging ventures. The remaining 15.2% is explained by factors outside the model. Based on these results, the null hypothesis is rejected, and the alternative hypothesis is accepted, confirming that business incubators exert a significant and substantial impact on the development of startups within the entrepreneurship centers of the universities under study.

4. Conclusion

University-based incubators represent a fundamental pillar in fostering entrepreneurial ecosystems and supporting the development of startups. They offer an enabling environment for innovation and growth by providing a wide range of services, including administrative support, technical consulting, strategic guidance, and access to funding sources and commercial networks. The interactive relationship among incubators, startups, and entrepreneurship reveals that the success of this ecosystem depends on the integration of roles among key stakeholders governments, universities, and investors. In the context of rapid digital and technological transformations, incubators are increasingly required to adopt more advanced and flexible approaches in supporting startups, particularly by incorporating technology into their services and leveraging big data and artificial intelligence to deliver more precise and efficient consulting. Moreover, strengthening cooperation among incubators at both local and international levels will facilitate the exchange of best practices and enhance the effectiveness of support provided. Therefore, developing a robust business incubation system is not merely an economic necessity but a strategic investment in building a knowledge- and innovation-based economy

Recommendations

Based on the findings of this study, the following recommendations are proposed:

- Enhance integration between incubators and universities: Strengthening collaboration between university incubators and academic institutions is essential to create a practical learning environment that fosters entrepreneurship and supports startup development;

- Develop specialized training programs: It is recommended to design and implement targeted training programs that focus on developing entrepreneurial and leadership skills, with a strong emphasis on innovation and modern technologies;

- Provide sustainable financial support: Establish dedicated funding mechanisms for startups within incubators, and offer incentives to attract private investors to support such initiatives;

- Strengthen professional networks: Building effective communication networks among entrepreneurs, investors, and industry experts is crucial for knowledge exchange and collaboration;

- Implement continuous performance evaluation: It is advisable to adopt regular evaluation mechanisms to assess incubator performance, ensure the achievement of strategic objectives, and improve the quality of services provided.

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