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Institutional policy for managing a startup incubator at UNAH-Campus Comayagua: Proposal from the ARS

Política institucional para gestionar una Incubadora de startup en UNAH-Campus Comayagua: Propuesta desde el ARS

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ABSTRACT

Introduction: in response to an increasingly competitive global environment, universities have taken on a fundamental role in promoting entrepreneurship. Within this context, university incubators are essential platforms for the creation of startups. However, the National Autonomous University of Honduras (UNAH)-Comayagua Campus lacks an institutional policy that would enable it to effectively manage an incubator of this type and foster student and community entrepreneurship in the central region of the country.

Methodology: a quantitative approach was adopted and a survey was used as the main method for data collection, which was applied to twenty key managers on campus. For this purpose, Social Network Analysis was used with Pajek software, which allowed interactions to be visualized and specific metrics to be calculated.

Results: spearman's correlation test yielded a coefficient of 0,679, indicating a moderate positive correlation between institutional management and incubator performance. The p-value of 0,022 ($p < 0,05$) confirmed that this relationship is statistically significant, thus rejecting the null hypothesis. The analysis of the current internal network revealed a weak and fragmented structure, with interconnection limited to a small group of agents. In contrast, an ideal network model was proposed that integrates all relevant internal and external agents, such as department heads, the research area, financial institutions, and city halls.

Conclusions: this study demonstrates that an institutional policy that prioritizes network inclusion and cohesion is essential to enhance the success of university incubators. The implementation of Social Network Analysis was crucial to identify structural deficiencies and provide a theoretical and practical framework to strengthen entrepreneurship initiatives.

Keywords: business management, educational management, educational policy, higher education, social networks.

JEL Classification: L26, M13

RESUMEN

Introducción: en respuesta a un entorno global cada vez más competitivo, las universidades han adoptado un papel fundamental en la promoción del emprendimiento. Dentro de este contexto, las incubadoras universitarias se presentan como plataformas esenciales para la creación de startups. Sin embargo, la Universidad Nacional Autónoma de Honduras (UNAH)-Campus de Comayagua carece de una política institucional que le permita gestionar eficazmente una incubadora de este tipo y fomente el emprendimiento estudiantil y comunitario en la región central del país.

Metodología: se adoptó un enfoque cuantitativo y se utilizó una encuesta como método principal para la recopilación de datos, la cual se aplicó a veinte gestores clave del campus. Para ello, se empleó el Análisis de Redes Sociales con el software Pajek, lo que permitió visualizar las interacciones y calcular métricas específicas.

Resultados: la prueba de correlación de Spearman arrojó un coeficiente de 0,679, lo cual indica una correlación positiva moderada entre la gestión institucional y el desempeño de la incubadora. El p-valor de 0,022 ($p < 0,05$) confirmó que esta relación es estadísticamente significativa, por lo que se rechazó la hipótesis nula. El análisis de la red interna actual reveló una estructura débil y fragmentada, con una interconexión limitada a un pequeño grupo de agentes. En contraste, se propuso un modelo de red ideal que integra a todos los agentes internos y externos relevantes, como las jefaturas de carrera, el área de investigación, instituciones financieras y alcaldías.

Conclusiones: este estudio demuestra que una política institucional que prioriza la inclusión y la cohesión de la red es fundamental para potenciar el éxito de las incubadoras universitarias. La implementación del Análisis de Redes Sociales fue crucial para identificar las deficiencias estructurales y ofrecer un marco teórico y práctico para fortalecer las iniciativas de emprendimiento.

Palabras clave: administración de empresas, educación superior, gestión de la educación, política educacional, redes sociales.

Clasificación JEL: L26, M13

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INTRODUCTION

Specialized literature establishes a causal link between economic development and entrepreneurial activity, attributing to Schumpeter the theoretical foundations that position entrepreneurship as a central driver of growth (Schumpeter & Swedberg, 2021). By reconstructing the conceptual genealogy, its structural imperative becomes evident: entrepreneurial orientation operates by fostering entities that catalyze economic expansion, accelerate technological innovation, adjust productive supply to social demands, penetrate markets, and revitalize production systems (Schumpeter, 2013). This innovative dynamic constitutes, in essence, a process of permanent structural transformation.

Similarly, Hietschold et al. (2023) conceptualize the entrepreneurial phenomenon as a dual expression: a driver of material progress and a manifestation of social change. Under this logic, higher education institutions (HEIs) assume a leading role in training professionals with the capacity to co-construct alternatives for regional and national development. Therefore, the work of these institutions transcends mere technical instruction by promoting socioeconomic co-responsibility through sustained interactions with agents of transformation, based on the pedagogical principle that entrepreneurial spirit can be deliberately cultivated (Lyu et al., 2024; Rosário & Raimundo, 2024). It is, therefore, a liberating educational practice that empowers the transformative agency of individuals.

Thus, a significant portion of the literature on entrepreneurship and entrepreneurship education argues that higher education must achieve a new model that goes beyond the traditional functional triad (teaching, research, and outreach) by incorporating the promotion of student entrepreneurship as a fourth strategic dimension (Talukder et al., 2024; Zhou et al., 2024). This drive to create new organizations acts as a catalyst for economic impact, constituting dynamic capital that revitalizes national productive systems. University entrepreneurship emerges as a vital component for socioeconomic development, functioning as a renewing fluid that oxygenates established economic structures (Chatterjee et al., 2021; Si et al., 2023).

Similarly, Rosienkiewicz et al. (2024) argue that current management dynamics require public, private, and social organizations to adopt innovative strategies in complex environments. This transformation involves replacing traditional models with intelligent, proactive, and decentralized structures, where human talent competencies become the cornerstone of organizational success. As Acevedo-Duque et al. (2021) postulate, building adaptive organizations requires, first and foremost, human capital with the critical capacity to respond to emerging business demands. This approach is directly linked to the training of transformative agents in higher education.

Complementing this perspective, Schebesch et al. (2024) emphasize that university-business interaction generates multidimensional synergies: from updating scientific and innovative policies to designing processes for effective knowledge transfer. This symbiosis facilitates the valorization of academic knowledge in productive contexts, fostering the creation of ecosystems where research translates into tangible solutions to social challenges. This articulation represents, in essence, a mechanism of cognitive democratization that broadens the social impact of academia (Do Adro & Fernandes, 2022).

Consequently, university entrepreneurship refers to efforts made in the academic sphere to encourage the creation of emerging companies, especially technology-based ones, known as startups. According to Listyaningsih et al. (2024), this type of entrepreneurship is driven by the resources and knowledge generated in universities. That is why its success depends on a collaborative ecosystem that involves both internal agents, such as professors and students, and external partners from the productive sector and governance (Borrero & Yousafzai, 2024; Carpenter & Wilson, 2022).

In this sense, the synergy between these social and educational agents is crucial for the development of entrepreneurial skills and the transformation of innovative ideas into successful business initiatives. Figure 1, based on the author's initial theoretical and practical approaches, shows how universities are involved in promoting university entrepreneurship.

The implementation of business incubators is emerging as a strategic factor for the entrepreneurial ecosystem. Ferreiro Seoane et al. (2017) document that, in the European context of the 1980s, the European Commission and universities articulated synergies through spin-off incubators, strategically promoting innovation centers that facilitated the commercialization of products and services derived from academic research. This institutionalized model represents a fundamental precursor to university-business co-creation.

Figure 1.
Promoting entrepreneurship at university

Source: own elaboration
Note: the figure appears in its original language

Janqui Guzmán (2020a) conceptualizes University Business Incubators (UBIs) as catalytic devices for the gestation of technology-based microenterprises based on scientific results. The author emphasizes the growing structural relevance of these innovative organizations in contemporary competitive economies (Janqui Guzmán, 2020b). This dynamic highlights the axiological link between higher education and sustainable development, where universities operate as critical platforms for accelerating the implementation of the Sustainable Development Goals (SDGs).

Along these lines, Ramos Torres (2020) highlights the progressive recognition of the link between higher education and the 2030 Agenda, emphasizing the leading role of HEIs in achieving the SDGs. As the author points out, the regulatory framework identifies specific university functions in nine goals (SDGs 2, 3, 4, 7, 8, 9, 13, 14, 17), with global progress being observed in their multisectoral implementation (Ramos Torres, 2020). This articulation transforms universities into agents of democratization of knowledge for sustainability.

The Constitution of the Republic of Honduras (Constitución Politica De La República De Honduras De 1982, 1982) establishes in Article 160 that the National Autonomous University of Honduras (UNAH) is an autonomous state institution with legal personality, holding exclusive authority over the organization, direction, and development of professional higher education. This constitutional mandate gives it a threefold mission: 1) to generate scientific, humanistic, and technological research; 2) to democratize access to cultural knowledge; and 3) to critically analyze national issues.

Significantly, the law requires it to strategically plan its participation in the structural transformation of Honduran society, with its operational framework defined by specific legislation and organic statutes (National Constituent Assembly, 1982). According to this constitutional mandate, it is the highest seat of learning that is called upon to contribute to the analysis of the problems afflicting Honduran society and to provide solutions. Currently, the main problems at the national level are unemployment, poverty, and the migration of young Hondurans.

Janqui Guzmán (2020a) establishes a management model for incubators based on performance criteria, articulating four core dimensions of resources. The first dimension corresponds to human resources, highlighting the attributes of the founding, management, and operational teams, emphasizing that their unique talents and skills constitute intellectual capital that is crucial for institutional effectiveness. These elements form the relational basis for knowledge transfer and the creation of collaborative networks.

The second dimension consists of technological resources, understood as specialized tangible and intangible assets that include laboratory infrastructure, advanced equipment, and specific technical capabilities. These tools bridge the gap between basic research and market applications, serving as a critical platform for innovative processes.

Thirdly, financial resources encompass all monetary and non-monetary support aimed at overcoming commercialization gaps. This component acts as a structural lubricant for entrepreneurial sustainability, enabling the transition from academic prototypes to viable business models. Finally, organizational resources encompass governance systems, coordination mechanisms, and institutional routines that establish the invisible architecture for value creation. These associative capacities include both formal planning structures and informal collaboration dynamics, which are constitutive of organizational culture (Janqui Guzmán, 2020a).

Specifically, this study is based on dimension 1, which allows us to analyze, through mapping, the interactions of the social networks of internal human resources decision-makers at UNAH-Campus Comayagua to manage the university startup incubator. Therefore, based on previous systematic literature reviews, an exhaustive analysis of the available sources was carried out with the aim of answering the following research question:

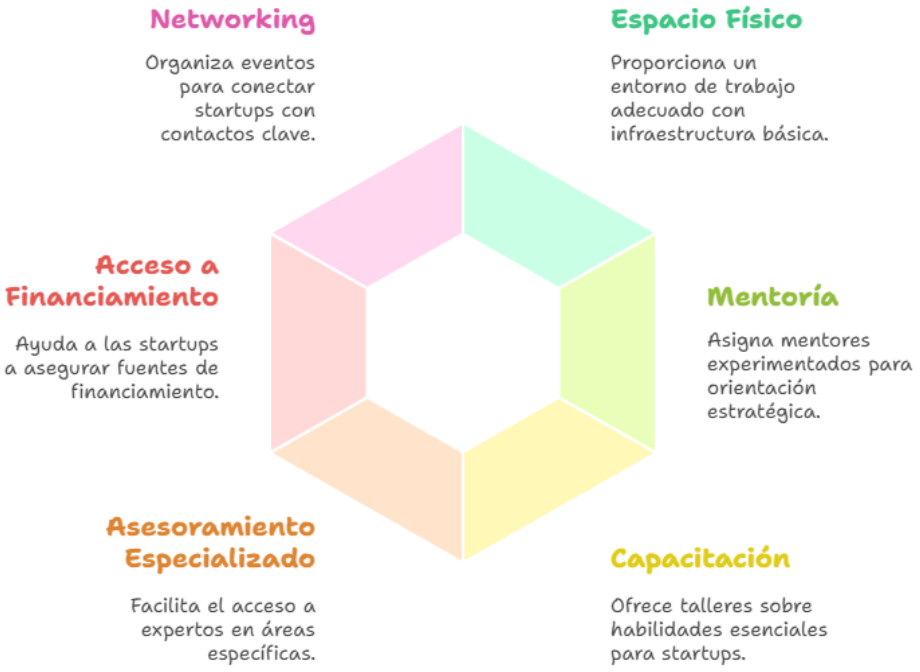
What are the internal agents and their interrelationships that influence the institutional management of a university startup incubator at UNAH-Campus Comayagua?

THEORETICAL FRAMEWORK

The concept of commercially oriented entrepreneurship emerged in the 16th century with the work of Fray Tomás de Mercado (1525-1575), whose book Suma de tratos y contratos established the ethical foundations of commercial activity, integrating a moral praxis oriented toward distributive justice (Mercado et al., 1977). This historical background reveals the inherent tension between economic logic and social responsibility that persists in contemporary theory. While Avila Angulo (2021) acknowledges the antiquity of the phenomenon, he highlights its academic institutionalization in the 1980s, when it expanded from the administrative sciences to incorporate psychosocial, anthropological, and sociological perspectives. Precisely, this disciplinary and conceptual integration led to the configuration of an interdisciplinary field of study.

For their part, Gouvea et al. (2021) conceptualize the creative entrepreneur through a paradoxical dialectic: while exhibiting individualistic and meritocratic traits, they simultaneously develop a cosmopolitan openness to diversity and future horizons. This typology goes beyond economic materialism by pursuing post-materialistic values such as the search for complex challenges, social co-responsibility, and the creation of horizontal markets, which reconfigure the traditional notion of business success (Juliana et al., 2021).

Figure 2.
Components of a program to promote startups in higher education



Source: own elaboration
Note: the figure appears in its original language

In this regard, it is important to mention that, consequently, university entrepreneurship refers to efforts made in the academic sphere to encourage the creation of emerging companies, especially those with a technological base, known as startups (Santoso et al., 2023). In this regard, it is important to mention what Kulkarni et al. (2024) say about institutional policies, as these can cover key areas such as resource allocation, project selection criteria, financial and training support, and the creation of strategic alliances with external entities. A solid and well-structured institutional policy has the potential to create an environment conducive to innovation and entrepreneurship, fostering efficient and synergistic cooperation between students, teachers, researchers, mentors, and networks of contacts (Figure 2).

The origins of incubators can be traced back to the US university context in 1942, where they initially provided physical spaces for the development of student initiatives (Miner et al., 2012). This model was institutionalized in 1959 with the first formal incubator, expanding globally during the 1980s under various conceptual modalities (business incubators, innovation centers). In Spain, this phenomenon developed late but rapidly, as evidenced by exponential growth over the last 15 years (Mecha-López & Velasco-Gail, 2023). At the same time, Bain & Cummings (2021) contextualize the rise of startups in the post-war conversion of industrial spaces abandoned after World War II, establishing themselves as mechanisms for economic revitalization through shared resources.

Janqui Guzmán (2020a) redefines incubators as catalytic devices for added value, emphasizing their triple function: 1) acceleration of startups through integrated resources, 2) articulation of scientific research with business creation (especially in UBIs), and 3) generation of ecosystems for advanced management practices. This conceptualization transcends the initial physical model toward a strategic framework for systemic innovation.

Geographical and institutional proximity to universities generates multifaceted competitive advantages (Schebesch et al., 2024). Specialized human resources stand out, where the availability of students and graduates constitutes a pool of disciplinary talent for incubated entrepreneurs (Lutfiani et al., 2024). According to Díaz Guerra et al. (2025), these links materialize the transfer of institutionalized cognitive capital, transforming academic knowledge into entrepreneurial capabilities.

Furthermore, according to Rosienkiewicz et al. (2024), the incubation process of an enterprise is strengthened when the startup receives support from an incubator that makes intensive use of networked relational links. Consequently, the current management of incubators is perceived as a process that facilitates the generation of value by assisted ventures through participation in interconnected internal and external network systems, which provides them with ample opportunities for commercial relationships.

Thus, Bergmann et al. (2024) identify that contemporary incubators transcend their basic function of providing physical infrastructure (workspaces, meeting rooms), articulating an ecosystem of strategic services that includes: collaborative network management, business plan advice, access to financing, provision of specialized equipment, and marketing and finance mentoring. This model operates as a comprehensive development platform that enhances business viability through multidimensional interventions (Díaz Guerra et al., 2025).

Thus, Janqui Guzmán (2020b) conceptualizes startups as high-impact emerging organizations characterized by their ability to innovate systemically and scale in volatile contexts. In the academic sphere, these ventures often germinate from R&D projects, where incubators function as pedagogical devices that transform scientific knowledge into viable businesses through material resources, specialized support, and the development of entrepreneurial skills (Anubhav et al., 2024).

Shao et al. (2024) analyze the diversity of management models in university incubators through entrepreneurial education, as this explains how to encourage internal assets (human, technological, organizational) to generate sustainable competitive advantages. This theoretical framework provides an understanding of how HEIs optimize their distinctive capabilities to respond to the specific needs of startups and institutional objectives (Gaspar Pacheco et al., 2024).

This structural and functional diversity allows us to understand the key aspects involved in the process of creating spin-offs within universities with an entrepreneurial inclination. There are different management models for university incubators, depending on the objectives and needs of the startups, with three main concepts standing out:

1) Autonomous Model, where the incubator operates independently within the university with its own team and budget.

2) Integrated Model, where the incubator is directly linked to the university's faculties and administration.
3) Public-Private Partnership Model, which involves partnerships with the private and government sectors to access funding and support networks.

Currently, there are various types of incubators: open, closed, specialized, generalist, virtual, face-to-face, sectoral, technological, for-profit, and non-profit, both university and private, among many other variants nuanced by the search for sustainability (Bonfanti et al., 2025). On the other hand, Janqui Guzmán (2020a) provides a series of business incubator management models that emphasize the coordination of procedures, dimensions, and indicators, factors that influence design and durability, among other elements. Figure 3 shows the diversity of models that characterize university startups today.

Figure 3.
Current models and characteristics of university startups

Source: own elaboration
Note: the figure appears in its original language

In this scenario, Janqui Guzmán (2020a) posits that an effective entrepreneurial university policy requires endogenous linkages that facilitate the successful incubation of startups. This model is based on five critical factors: 1) specialized talent in the management team, 2) selection criteria focused on technological innovation, 3) access to diverse financing, 4) tripartite university-business-government platforms, and 5) agile technology commercialization mechanisms. Figure 4 shows how these and other elements form a synergistic framework where institutional coordination enhances the socioeconomic impact of academic ventures, producing a cycle of success when management is efficient and sustainable.

In parallel, Acevedo-Duque et al. (2021) emphasize that contemporary management must adopt an anthropocentric approach to organizational development, prioritizing the strengthening of human capacities that simultaneously satisfy individual fulfillment and collective well-being. This perspective recognizes that organizations are social constructs where human talent operates as the ontological foundation for institutional evolution (Acevedo-Duque et al., 2021). Consequently, entrepreneurial students emerge as epistemic protagonists, whose profile reflects the transformative identity of the entrepreneurial university, thus materializing a constitutive isomorphism between individual agency and institutional project.

Figure 4.
University incubator management cycle

Source: own elaboration
Note: the figure appears in its original language

Finally, a fundamental part of the theoretical framework of this document is based on network theory or social capital theory, concepts that are used interchangeably in economic literature but allow for a better understanding of the relational dynamics of university incubators (Wu et al., 2025). This theory argues that relationships, beyond their contractual and economic nature, are deeply influenced by key social dimensions that must be considered when examining relational links (Nicholls-Nixon et al., 2022).

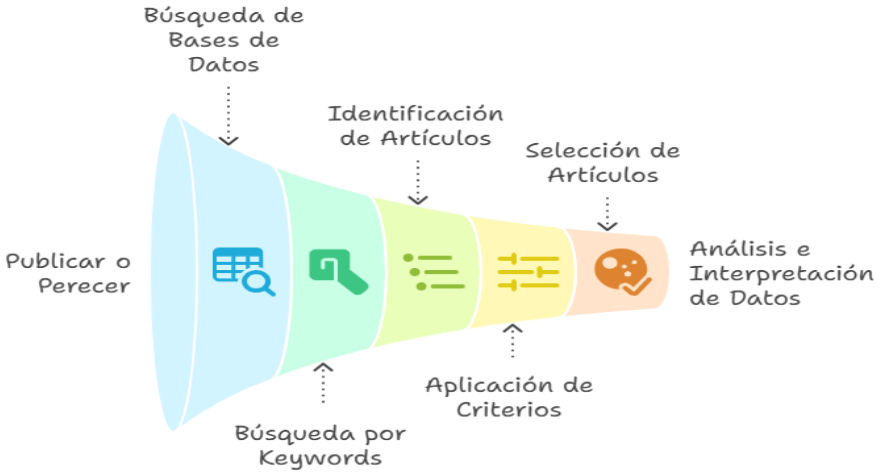
Sustained interaction between economic units generates synergistic networks that catalyze opportunities for value creation through the accumulation of social capital. This relational dynamic operates under a principle of positive feedback: the greater the density and depth of interconnections, the greater the potential for collaborative innovation and systemic competitive advantages. In this regard, Benabdellah & Diani (2025) argue that the strategic management of these networks, based on practices that foster cooperation and institutional trust, constitutes a structural pillar for the development and competitiveness of contemporary enterprises, transforming social connections into tangible economic assets.

In the field of higher education, the teaching staff emerges as a catalytic agent for the formation of entrepreneurial skills. Ruiz-Campo et al. (2023) demonstrate that pedagogical investment in innovative methodologies generates dual dividends: it increases academic performance while strengthening student commitment to entrepreneurial culture. This work goes beyond technical instruction by building relational capital that anticipates future business networks, positioning teachers as articulating nodes between theory and transformative practice (Ruiz-Campo et al., 2023).

METHODOLOGY

To ensure substantive and methodologically valid data, a rigorous review is initially carried out, ranging from critical mapping of specialized literature to the final selection of articles using predefined inclusion/exclusion criteria. Figure 5 summarizes this methodological process, highlighting the epistemological traceability in the analysis of social networks of university managers and their articulation with academic startup incubators. This exercise serves as a conceptual validation device that connects theoretical frameworks with institutional realities.

Figure 5.
Outline of the literature review



Source: own elaboration
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Subsequently, a dialogic data collection instrument was developed and implemented among key agents at UNAH-Campus Comayagua, focusing on those with institutional mediation roles. In this second phase, the study adopted a quantitative exploratory approach, with a non-experimental cross-sectional design. The objective was to understand the interrelationships and dynamics between 20 agents, who are internal managers at UNAH-Campus Comayagua.

Applying non-probabilistic convenience sampling, the questionnaire survey technique was used, which has been a fundamental method of business network research since its inception, as it is an instrument that allows participants to express their opinions through assumptions and responses, which are then evaluated through quantitative analysis. This data collection technique is based on a set of questions organized in an online questionnaire.

In the context of this research, 20 internal decision-makers from UNAH-Campus Comayagua were selected as the target sample and surveyed to collect data. The internal agents had to meet the following criteria:

- Be a decision-maker.
- Be knowledgeable about and enforce UNAH higher education regulations.
- Be committed to the mission of promoting entrepreneurship at UNAH-Campus Comayagua.
- Generate proposals for the network of agents.

The methodological instrument implemented consisted of a structured questionnaire, a modality that Hernández-Sampieri and Mendoza (2020) conceptualize as a system of coherent and technically articulated questions designed to generate valid empirical inputs in rigorous research processes. In the present study, this device was configured using 18 closed-ended questions, applied specifically to internal agents with decision-making capacity at UNAH-Campus Comayagua. Its quantitative design was aimed at quantifying management patterns, aligning institutional strategies, and diagnosing organizational capacities in the university entrepreneurial ecosystem.

The questionnaire included a Likert scale, which is an instrument that measures participants' attitudes using an ordinal scale with multiple response levels, generally five, ranging from one extreme negative to one extreme positive. After administering the questionnaire to the 20 internal agents at UNAH-Campus Comayagua, Cronbach's alpha reliability coefficient was calculated to assess the internal consistency of the instrument. The results obtained were as follows:

Reliability stadistics

Cronbach's alpha	N of elements
0,904	18

A Cronbach's alpha of 0,904 indicates a high level of internal consistency among the 18 items in the questionnaire. According to generally accepted standards in social research, a Cronbach's alpha value greater than 0,70 is considered acceptable, and a value greater than 0,90, as in this case, reflects excellent reliability. This means that the questionnaire items consistently measure the construct for which they were designed, providing a solid basis for subsequent analysis. This high level of reliability reinforces the validity of the data obtained and ensures that the conclusions drawn from this study are accurate and reproducible.

Data collection was channeled to strategic agents at UNAH-Campus Comayagua, selected based on criteria of institutional influence and executive capacity to implement policies related to university startup incubators. These key actors, identified as subjects with operational decision-making power, received a digital link to the structured questionnaire in Google Forms. This instrument formalized the relationship between the independent variable (Institutional Management) and the dependent variable (University Startup Incubator), following correlational designs aligned with Hernández-Sampieri and Mendoza (2020). Rigorous methodological protocols were incorporated, including explicit instructions for reflective reading of items, seeking to safeguard internal validity by minimizing cognitive biases in responses.

Subsequently, the Shapiro-Wilk test was applied as a fundamental statistical procedure to evaluate distributional normality in small samples (table 1). This methodological choice responds to the parametric assumptions required for subsequent inferential analyses, constituting an indispensable epistemological filter to guarantee the robustness of the conclusions.

Table 1.
Shapiro-Wilk test

Variable	Sig.	Stadistic
Institutional Management	0,200*	0,940
University Incubator	0,004	0,844

Source: own elaboration based on SPSS

The Shapiro-Wilk test for the variable "Institutional Management" showed a statistic of 0,940 with a significance of 0,525, indicating that the data for this variable follow a normal distribution. On the other hand, the normality test for the variable "University Incubator" yielded a statistic of 0,844 with a significance of 0,035, indicating a significant deviation from normality.

The results of the normality test suggest that, while the data for the "Institutional Management" variable follow a normal distribution, the data for the "University Incubator" variable do not. These differences in the normality of the distributions are taken into account in order to opt for the non-parametric method due to the lack of normality in the data. In addition to the above, Social Network Analysis (SNA) was selected as the methodological tool, as it allows for mapping and analyzing the interaction structures between the different agents involved in the university incubation ecosystem (Anugerah et al., 2022; Díaz Guerra et al., 2023).

This methodology is particularly useful for visualizing the connections between agents and evaluating the nature and quality of their interactions, which is essential for unraveling how university startup incubators can act as catalysts for student entrepreneurship. The implementation of the ARS was carried out using Pajek software, a well-established tool in the field of sociometry and complex network analysis (Buchnea & Elsahn, 2022).

Pajek software not only facilitates network visualization but also provides a robust set of metrics that allow critical aspects of networks to be measured, such as centrality, intermediation, and cohesion. These metrics are fundamental for analyzing structural relationships within the network and for understanding the degree of influence and connectivity of each agent in the university incubator network.

To evaluate the relationship between institutional management (independent variable) and university incubator performance (dependent variable) at UNAH-Campus Comayagua, two statistically testable hypotheses were established:

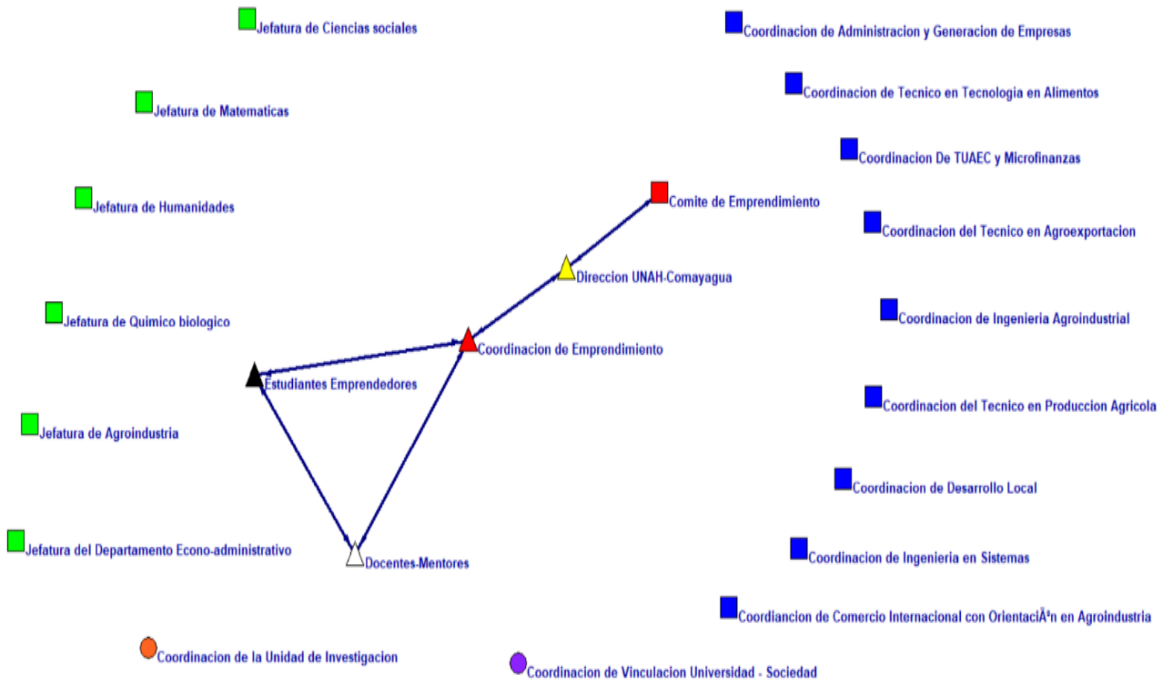
- Null hypothesis (H_0): no significant association is identified between institutional management processes and the operating results of the university incubator in the specific context of UNAH-Campus Comayagua.
- Alternative hypothesis (H_1): there is a statistically significant correlation between the quality of institutional management and the level of performance demonstrated by the university incubator at UNAH-Campus Comayagua.

RESULTS

Current internal configuration of the UNAH-Campus Comayagua

The network in figure 6 reflects the current situation within the university incubator at UNAH-Campus Comayagua, where only a limited set of agents are interconnected: campus management, entrepreneurship committee, entrepreneurship coordination, mentor teachers, and student entrepreneurs. This scenario reveals a weak network structure, characterized by low density and cohesion. This has resulted in significant fragmentation of the ecosystem.

Figure 6.
Current internal network of UNAH-Campus Comayagua



Source: own elaboration using Pajek software
Note: the figure appears in its original language

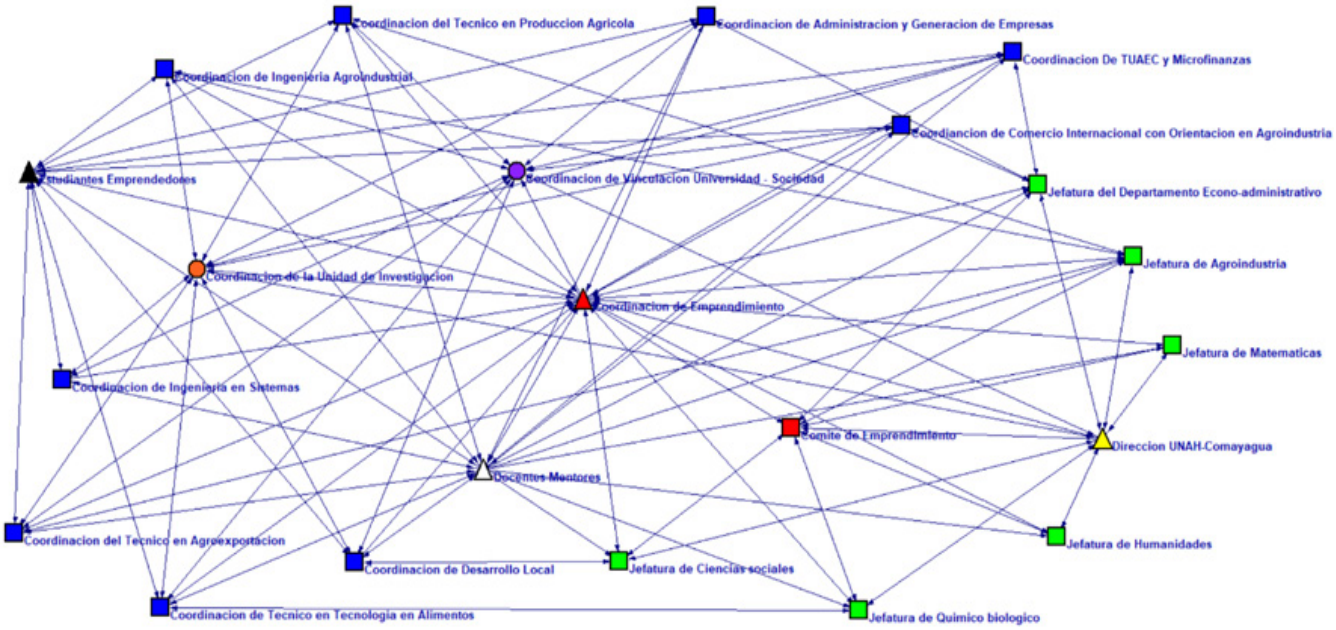
Most key agents, such as Career Heads, Career Coordinators, the Outreach Committee, and the Research Area, remain isolated, severely restricting collaboration and knowledge circulation. This disconnect not only limits the incubator's responsiveness but also prevents the development of an environment conducive to innovation.

Implications: the current configuration of the internal network reveals structural deficiencies that limit the effective management of a university incubator. The exclusion of essential actors reveals a gap in institutional policies, which do not promote inclusive participation or optimal use of available resources. This scenario suggests an urgent need for reconfiguration to strengthen the network and improve its responsiveness to the challenges of entrepreneurship.

Ideal internal configuration of the UNAH-Campus Comayagua

The network in figure 7 proposes an ideal scenario where all relevant internal agents are integrated, including those not connected in the network in figure 4. In addition to the actors mentioned above, the Career Heads, Career Coordinators, the Liaison Committee, and the Research Area are incorporated. This design results in a more cohesive and dense network, with greater centrality of key actors, facilitating a more fluid exchange of information and robust interdisciplinary collaboration. This model promotes an environment in which startups can benefit from stronger institutional support, facilitating the convergence of resources and knowledge that are fundamental to entrepreneurial success.

Figure 7.
Ideal network of the UNAH-Campus Comayagua to manage a startup incubator

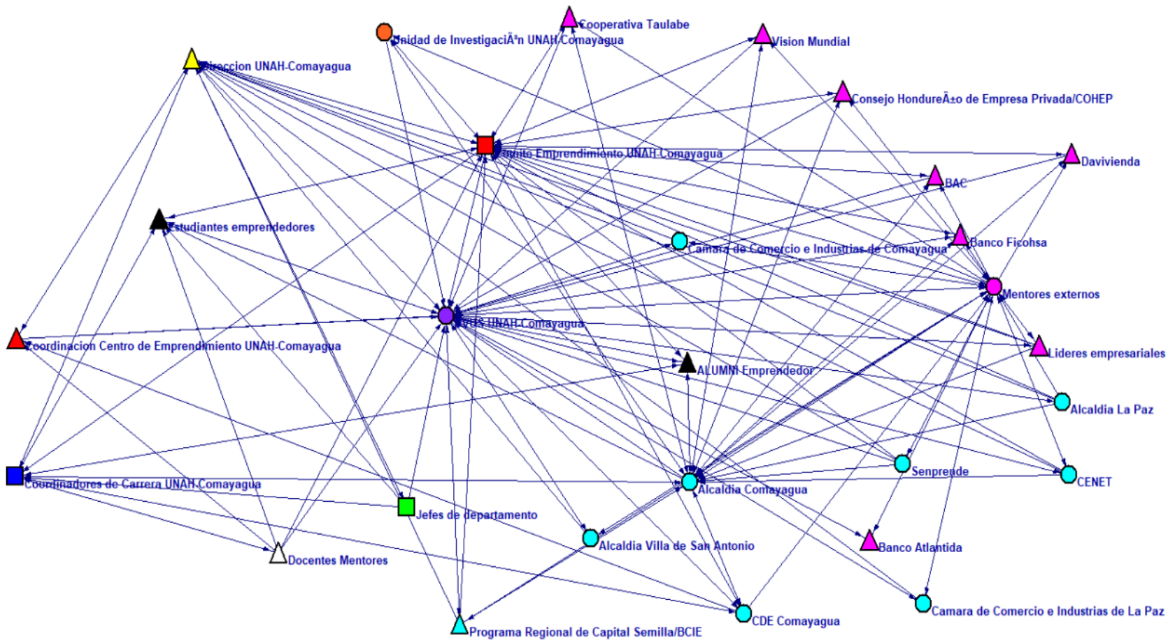


Source: own elaboration using Pajek software
Note: the figure appears in its original language

Implications: by proposing more comprehensive internal integration, the network shown in figure 7 offers a viable solution to the limitations observed in the current configuration. This model suggests that institutional policies should prioritize the inclusion of all relevant actors to maximize the incubator's potential. Strengthening these internal relationships is crucial to developing a more dynamic and resilient entrepreneurial ecosystem capable of responding effectively to the needs and challenges of university entrepreneurship.

The network in figure 8 broadens the focus of the ideal scenario by incorporating, in addition to the internal agents mentioned in network 7, a series of key external agents, such as financial institutions, city halls, business development centers, and NGOs. This mixed network, which combines internal and external actors, has the highest density and cohesion among the three configurations analyzed. This scenario not only optimizes interactions within the university but also extends the incubator's reach to a broader environment, facilitating the generation of synergies and access to resources crucial for the scalability of startups. The inclusion of external agents allows for the maximum exploitation of opportunities for financing, advice, and cooperation, creating a more robust and resilient ecosystem.

Figure 8.
Expanded network for effective management of UNAH-Campus Comayagua



Source: own elaboration using Pajek software
Note: the figure appears in its original language

Implications: the network shown in figure 8 represents the most comprehensive and effective model for managing a university startup incubator at UNAH-Campus Comayagua. By integrating internal and external actors, a highly connected and resource-rich environment is created, which enhances the capabilities of startups and prepares them to face market challenges. This ideal scenario suggests that institutional policies should focus on creating and maintaining mixed networks that maximize collaboration and value generation both inside and outside the university.

Correlation Analysis: Spearman's Rho

To examine the relationship between the variables "Institutional Management" and "University Incubator," Spearman's correlation was used due to the lack of normality in one of the variables, as indicated by the normality tests described above. The results of Spearman's correlation are presented below:

Table 2.
Spearman's correlation

Variable	Institutional Management	University Incubator
Institutional Management	1,000	0,679*
University Incubator	0,679*	1,000
Sig. (bilateral)	-	0,022
N	11	11

Note: * the correlation is significant at the 0,05 level (bilateral)
Source: own elaboration based on SPSS.

The analysis reveals a Spearman correlation coefficient (= 0,679; *p* = 0,022) that shows a moderate-strong positive association between institutional management and the performance of the university incubator at UNAH-Campus Comayagua. The statistical significance (*p* < 0,05) allows us to reject the null hypothesis (H_0) and validate the alternative hypothesis (H_1), confirming that this relationship is not attributable to chance. This quantitative result corroborates that the quality of university governance operates as a determining variable in the effectiveness of academic entrepreneurship structures.

DISCUSSION

The current situation reflected in Figure 6 highlights a series of critical structural limitations within the university incubator network at UNAH-Campus Comayagua. The restricted interconnection to a small group of key agents, such as campus management, the committee, and entrepreneurship coordination, as well as mentor teachers and student entrepreneurs, reveals a network structure with low density and cohesion.

This fragmentation within the ecosystem prevents information flows and collaboration from reaching other important agents, such as department heads and coordinators, the Outreach Committee, and the Research Area. This result coincides with the findings of Boucher et al. (2025), who point out that the dual relationship between ecosystem and entrepreneurship means that fragmentation constitutes a problem not only for a node but for the entire network. Similarly, these findings reaffirm the arguments put forward by Roundy & Asllani (2024), who maintain that without an adequate university entrepreneurship model, fragmentation between academics and professionals can occur, hence the importance of multi-level integration of external agents.

Therefore, this current structural disconnect significantly limits the university incubator's ability to respond to emerging entrepreneurial challenges. The lack of integration of key actors in the incubation process highlights shortcomings in institutional policies, but also underscores the absence of a strategy to promote inclusive participation and maximize the use of existing resources.

It is therefore essential to reconfigure the internal network to increase its density and cohesion, which could strengthen collaboration, improve the circulation of knowledge, and create a more conducive environment for innovation and the success of incubated startups. Furthermore, this transformation is the basis for adopting a framework for integration into the region's entrepreneurial ecosystem, which, according to Maritz et al. (2022), is essential for university startups in terms of sustainability.

Figure 7 presents an idealized view of an internal network within the university startup incubator, in which all relevant agents are integrated, including those that were previously disconnected, such as the Career Heads, Career Coordinators, the Outreach Committee, and the Research Area. This cohesive and dense network is crucial because it allows key actors to have greater centrality, which facilitates a more fluid exchange of information and promotes effective interdisciplinary collaboration.

The inclusion of these agents strengthens the entrepreneurial ecosystem, enabling startups to benefit from more robust institutional support that converges resources and knowledge essential to their success. As suggested by Spigel (2022), this inclusion may allow for a transition from more basic forms of management and the nested presentation of successful ventures to a cohesive network that fosters comprehensive development.

The network model proposed in Figure 7 suggests that restructuring the internal network is a viable solution to the deficiencies observed in the current configuration. This more comprehensive integration not only addresses the lack of connection between agents but also suggests that institutional policies should prioritize the inclusion and collaboration of all relevant actors to maximize the potential of the university incubator. By strengthening these internal relationships, a more dynamic and resilient entrepreneurial environment is fostered, capable of adapting and responding effectively to the challenges of university entrepreneurship (Anubhav et al., 2024).

The institutional policy suggested in this context is to prioritize the inclusion of all relevant actors in the internal network of the university incubator. This implies a strategic approach to interdisciplinary integration and collaboration to optimize the flow of information and the use of resources, with the aim of strengthening the entrepreneurial ecosystem within the university.

The network described in figure 8 represents an advanced approach to the management of university startup incubators, integrating internal agents with key external actors, such as financial institutions, city halls, business development centers, and NGOs. This mixed network configuration is the densest and most cohesive of all the options analyzed, which not only optimizes interactions within the university but also extends the incubator's influence to a broader context. In doing so, valuable synergies are generated, and access to crucial resources that are critical to the scalability of startups is facilitated (Rosienkiewicz et al., 2024).

The inclusion of these external agents is a strategic step that maximizes opportunities for funding, advice, and cooperation. Furthermore, this configuration creates a robust and resilient ecosystem, prepared to face market challenges and sustain the long-term growth of startups. This type of mixed network allows the incubator to not only

support entrepreneurs within the university but also connect them to a broader environment full of opportunities and resources.

CONCLUSIONS

This study has shown that the current structure of the internal network of the university incubator at UNAH-Campus Comayagua has significant limitations in terms of density and cohesion, which prevent optimal management of university entrepreneurship. The fragmentation of the network, with a concentration of interconnection in a small number of key agents, restricts information flows and limits the participation of other actors.

The proposed reconfiguration, based on an integrative approach that expands the network to include all relevant actors, is shown to be a necessary strategy to overcome the identified deficiencies. By increasing the centrality and interconnection between agents, not only is knowledge exchange optimized, but an environment conducive to interdisciplinary collaboration and innovation is also fostered, which are essential elements for the success of incubated startups.

Furthermore, the incorporation of external agents such as financial institutions and business development centers into the proposed mixed network amplifies the incubator's potential by generating strategic synergies that facilitate access to financial resources, specialized advice, and cooperation opportunities. This integration not only strengthens the entrepreneurial ecosystem within the university, but also extends its influence and capabilities to a broader environment, positioning the incubator as a key player in regional economic development.

In conclusion, this work highlights the importance of an institutional policy that prioritizes inclusion, cohesion, and density in the internal networks of the university incubator as an effective way to enhance the success of incubated ventures. An important consideration to highlight is that entrepreneurs have a different psychological profile from other individuals, while social entrepreneurs show an even greater difference, based on sensitivity and creativity.

The application of a social network analysis (SNA) approach has made it possible to accurately identify critical areas requiring intervention, offering a restructuring proposal that, if implemented, could significantly transform the impact of the incubator at UNAH-Campus Comayagua and its contribution to the entrepreneurial ecosystem in Honduras. This research not only provides a solid theoretical and practical framework for the management of university incubators but also establishes a basis for future research that could explore the application of similar models in other academic and geographical contexts.

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