

## Incubators in Search of Performance: A Review of Key Performance Models in the Literature

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**ABSTRACT:** Studies on incubators have evolved greatly in recent years. However, it is only recently that researchers have begun to focus their work on the question of the performance of these structures. Various research studies have been carried out to identify indicators of success and to design tools to evaluate and measure the performance of these organizations, but few have examined the background and key success factors of these incubators from a modeling perspective.

Therefore, we believe that a synthesis of the factors and models leading to incubator performance remains a priority, allowing for a better understanding of the links and effects of each factor as a whole. This article, therefore, attempts to remedy this lack, and proposes a synthesis of scientific research work dealing with the question of the determinants of performance of incubation support structures. In this work we have tried to present a review of the main models that emerge from the literature in order to explain how incubators can gain in efficiency.

Based on a methodology that combines the steps of qualitative systemic literature review and snowball methods of article identification, this work has identified three main models based on two main theories: the real options model, the RBV model and the multidimensional model.

**KEYWORDS:** Antecedent, performance model, business incubator, entrepreneurship, literature review.

### 1 INTRODUCTION

It has often been mentioned by authors that business incubation is an activity in its own right and that measuring its success is not obvious. Therefore, it must be noted that conceptual developments, as well as operating models regarding the factors influencing incubator performance are lacking in the scientific literature, and the variables identified in previous research remain for the most part relatively descriptive and do not effectively guide the incubator manager in his or her performance approach.

Ref. [1] raises three key questions that surround research on business start-up assistance structures and are of particular interest to researchers: "Is business start-up assistance effective in increasing the chances of survival and sustainability of newly created businesses? Are the projects and programs achieving their specific objectives? Are the support structures meeting the expectations of stakeholders? From this, it is clear that most of the studies oriented towards the performance of business creation support structures are carried out from an evaluation perspective. In the same sense [2], [3] suggest that there is a gap in the research on incubation insofar as it has not gone beyond the boundaries of a criteria -based evaluation of the performance of these structures. While the development of evaluation criteria and systems is crucial to clearly assess incubator performance, it is important to go beyond these criteria and examine the factors that contribute to its achievement. [4] add that examining the critical success factors and how these factors impact performance and worthy of study.

The incubator performance literature suggests that a deeper understanding of the processes and model of incubation, as well as delineating the types and phases of interventions, may be key to achieving accelerated incubator growth. In contrast to early research that reduced the contribution of structures to the mere provision of basic physical infrastructure, today's incubators need to offer more intangible assistance, including diagnosis of business needs, support for business planning,

introduction of peer and professional networks and mentors, integration of funding agencies, etc. For [5], incubators should be managed like any other business. Thus, the completion of a successful business plan and the recruitment of a professional and competent team are among the conditions for the success of incubators. Improving the productivity and ensuring a high value-added contribution of incubators is one of the most sought-after goals of both theorists and practitioners. Research has highlighted different factors that explain the success of incubators. The majority of these studies use the notion of key success factors.

## 2 METHOD

The purpose of our literature review is to structure research on antecedent or SFC models of incubator performance. The selection of works is based solely on a thematic selection where we have chosen only research that has studied the antecedents of performance in an overall model and not exclusively analyzed variables. Moreover, no restriction on the BDDs was applied.

In other words, in order to broaden our search for articles to include in our study, we will follow the following search protocol:

### STEP 1: DEFINITION OF THE RESEARCH PROTOCOL/IDENTIFICATION OF THE KEY WORDS OF THE RESEARCH

We developed a search string (CR) composed of several sets of keywords and some abbreviations, we also chose not to expand the search string too much and not to put more than four keywords per string in order to expand the search results:

- CR1: ("Success Factor" OR "SFC" OR "Performance factor") AND Incubat\* OR accelerators
- CR2: ("Antecedent" OR "performance Model" OR "Performance factor") AND Incubat\* OR accelerators Incubat\*: changing the extension of the keyword "Incubat\*" has allowed us to identify other search strings. This helps us to obtain other articles on "incubation, incubatee, incubator" or "incubation, incubator, incubated".

### STEP 2: DEFINITION OF SELECTION CRITERIA

In order to guarantee the reliability of the results, it is recommended by [6] to determine the selection criteria. To analyze the relevance of the collected studies, their selection will be based on the following criteria:

- (1) Language and time period: Select studies based on publication period and language. Thus, only articles published in English between 2008 and 2022 were selected;
- (2) Select studies based on the "title", we excluded articles that do not directly address the antecedents of incubator performance or its CSFs;
- (3) Methodology-based selection: only articles based on empirical methodology, quantitatively validated in the field were reviewed;
- (4) Full-text selection (included only antecedent or SSC models of incubator performance).

Similarly, and as noted earlier, no impact factor criteria, or specific journals or databases were applied.

## 3 THE RBV MODEL

The literature reveals numerous studies that have examined incubator resources. This stream of study argues that in order to produce more self-sustaining entities, the incubator "combines" between different types of resources that early - stage start-ups cannot access [7].

Incubator resources are defined as the totality of assets, capabilities, processes, information, and knowledge controlled by the organization that enable it to improve its efficiency and effectiveness [8].

Early incubation studies recognize as incubator resources its affordable and flexible office space to meet the changing space needs of the incubated firms [9], shared office services and meeting rooms [10], fax machines, telephones, presentation facilities, and cafeteria [11], [12].

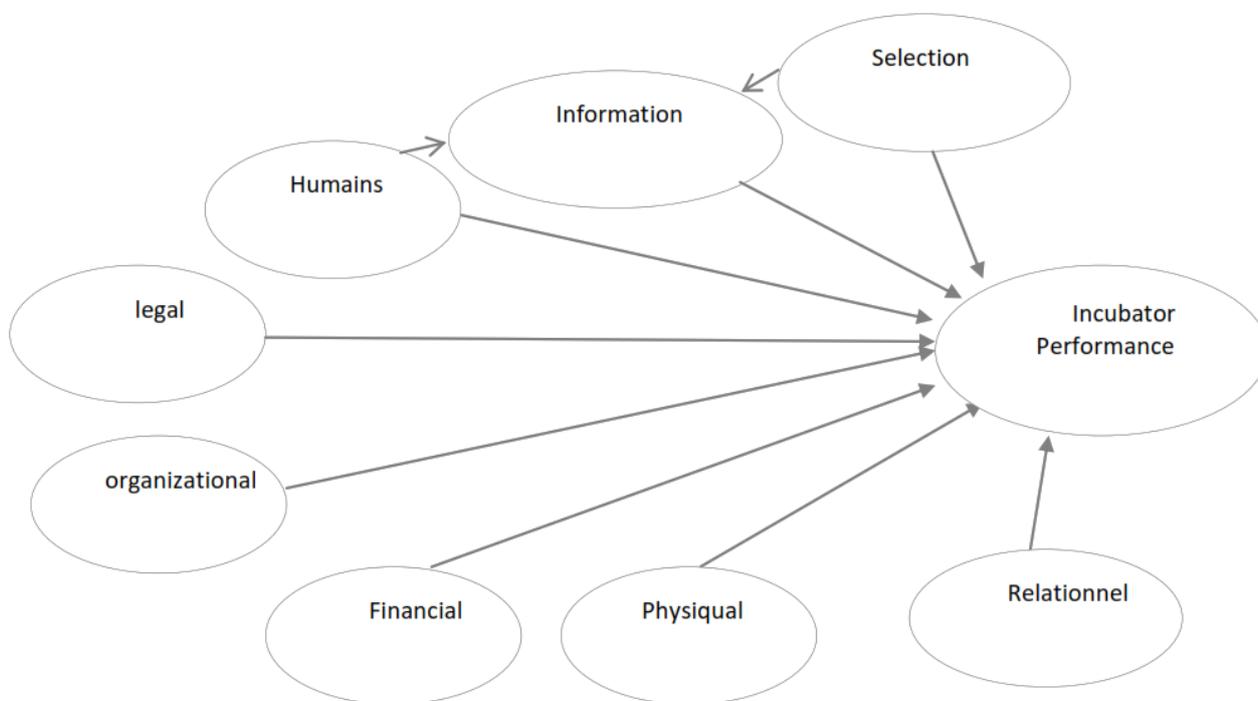
Other studies have focused on intangible resources such as incubator networks [13],; the management team [14], the type and quality of the incubator's linkages with universities [15], the professional services network and the host's initial funding [16], institutional support [9] etc.

Ref. [7] recognized two subcategories of resources: internal and external to the incubator. Economic, environmental, personnel, or operational resources were identified as internal resources. External resources are those outside the incubator, which include clusters of industry innovation networks related to the incubator. These resources include access to lawyers, accountants, consultants, marketing specialists, university contacts, and intellectual property experts.

Ref. [17] recognizes the incubator’s ability to provide access to introductory sources of capital to banks, venture capitalists, and business angels [18]. Studies have shown that partnerships and networking opportunities are other forms of resources that are important to the successful operation of incubators [19]. Thus, when an incubated firm is introduced to one of the incubator’s networks, it maximizes its chances of success [20].

Ref. [21] examines incubator resources by analyzing the contribution of different types of resources of a firm developed by [22]. Thus, incubator resources can be human, organizational, informational, legal, physical, financial, and relational.

Relational resources are considered to be all the incubator’s partners, but also the networking activities that the incubator can foster. He divides this resource into 3 types: (1) Networking activities with the incubator’s direct network of advisors, experts, and laureates, and indirect (direct network contacts). (2) Ties (relational links) with universities and other institutions of higher learning are antecedent to the effectiveness of the incubator. (3) Network with professionals and professional organizations associated with the incubator. Financial resources refer to access to funding and investment resources such as angel investors, venture capitalists, etc.



**Fig. 1. the RBV Model**

Access to legal assistance is related to intellectual property support services, regulatory requirements, business structures and advice.

Organizational resources are defined by the author as "intangible skills and knowledge of employees and managers". Human resources refer to the number of people available within the incubator as well as the intensity of supervision. Informational resources are the training of entrepreneurs and incubated companies.

In addition to these different resources, the author identifies the selection process as an antecedent of the incubator’s effectiveness. In order to assess its importance in building performance, he studies the application of the six criteria for selecting incubatees:

1. Sales profit potential
2. Political/social constraints
3. Growth potential

4. Analysis of competitors
5. Risk distribution
6. Industry restructuring

According to his study, the only factor that has a significant and direct influence on the effectiveness of incubators is the professional network.

The results lead to the conclusion that the most important resource for client firms is the "network of professional services" associated with or available within the incubator. The other resources are not related to the performance of the incubator or at least not in a direct way.

The analysis of the study leads us to quickly understand that the variables studied by the model do not concern the incubator's own resources, but rather the services and resources made available to the incubated companies. The proposed model is in line with the current trend that explains the performance of incubators by the services provided to the incubatees and does not include other dimensions that affect the organization or the process of the incubator, apart from the selection process.

#### **4 THE HACKET & DILTS MODEL (2008)**

Starting from the observation of the absence of empirical studies on the incubation process, these two authors, whose publications are the most cited in the field of incubation, are the first to want to analyze the "black box" of the incubator and understand the functioning of its process.

To do so, they developed a model to explain the performance of these organizations. The model reveals three determinants likely to influence the performance of incubators.

Thus, in order to guarantee a successful incubation process, the selection of candidates must be based on (1) the characteristics of market of the business project, (2) his financial characteristics, (3) the degree of innovation of the product, and (4) the characteristics of the entrepreneur. According to the model, these three factors interact with each other and lead to one of five incubation outcomes:

1. The incubatee survives and grows profitably
2. The incubatee survives and moves towards profitability;
3. Incubatee survives, but does not grow and is not profitable or is only marginally profitable upon exiting the incubator,
4. The incubatee did not complete its incubation process, but losses were minimized,
5. The incubatee did not complete its incubation process and losses were significant.

Based on real options theory, these five outcomes provide information about the success or failure of incubation. Only the first three are considered to be a success of the process.

Based on the literature, a survey questionnaire was developed and validated in a survey with a sample of 53 incubator 's managers. The results suggest the existence of unforeseen factors as well as the inability of some items to reliably measure certain anticipated dimensions. The initial and adjusted models are illustrated in the following two figures:

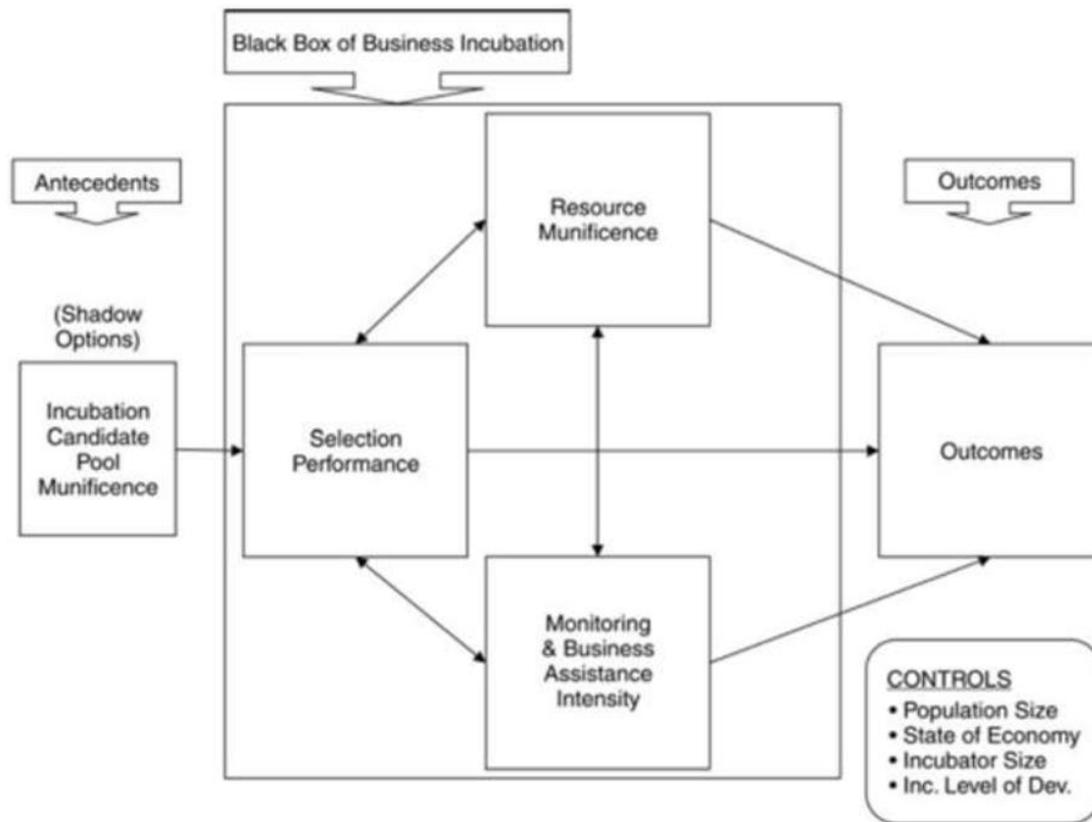


Fig. 2. Performance Model of Hacket & Dllts (2008)

These authors explain that one of the reasons why the incubation process remains poorly understood is due to the lack of a measurement tool that allows researchers to understand and analyze the internal workings of the incubator. Thus, this study presents an important advance in incubator research and reveals structures underlying incubation performance. Its main contribution is the development of a reliable measurement tool that can be used by researchers.

They point out that the literature on incubation, although abundant, is still based on literary reflections and proposals and still lacks results from empirical studies.

*« The fact that only 51.8% of the items were retained despite having drawn them from the literature, grounding them in theory and subjecting them to extensive, expert-driven pretesting suggests that caution must be used when reading the extant literature. »*

Their suggestions also address the sample size to be used so that the results are generalizable. To do this, the authors recommend investing in the development of measurement scales to be filled out by entrepreneurs, who are able to accurately indicate the value of the assistance they receive.

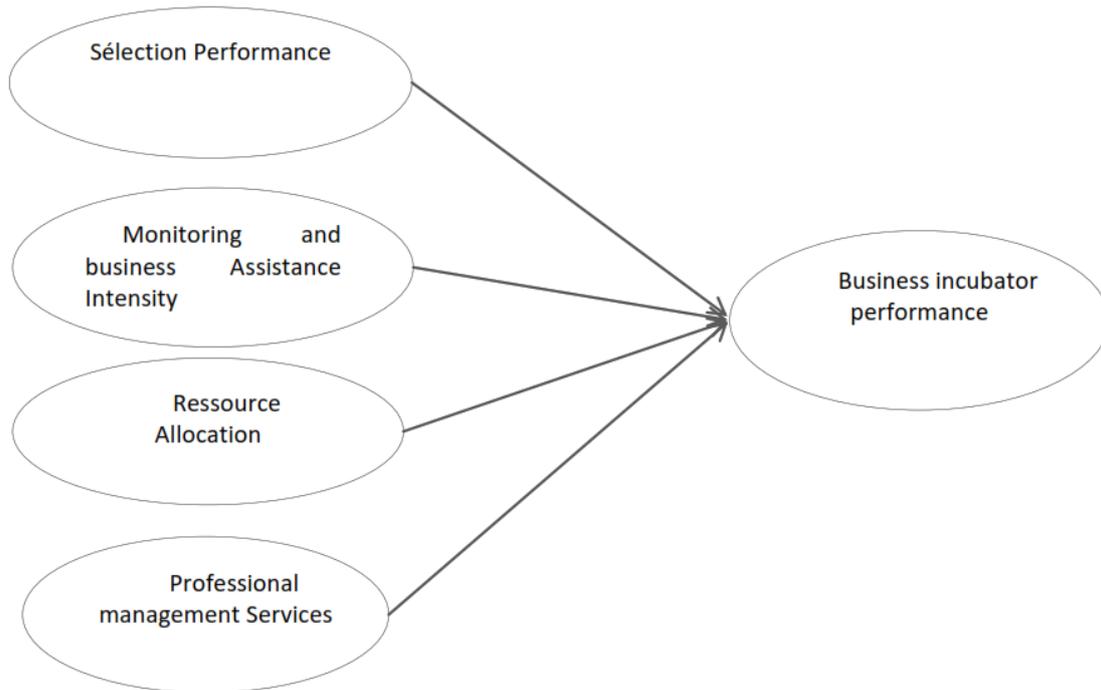
*“Assuming that some bias has crept into the scales despite these efforts, future scale development efforts may seek to balance the scales, as it were, by sampling the entrepreneurs who are the recipients of value-added business assistance services as long as participating entrepreneurs are self-reflective enough to accurately assess the value of the assistance they receive.”*

## 5 PERFORMANCE MODEL (ABDUL KHALID’S 2012)

Based on the study tool developed by [23]. [24] proposes to analyze the underlying components of the technology incubation process in Malaysia and their impacts on the performance of the structure. Including other factors related to the provision of services related to assistance in management and marketing, the author proposes a model with four determinant variables:

The analysis of the impact of selection touches on the four types of criteria outlined by [23]. Market characteristics, product characteristics, financial characteristics, and entrepreneurial characteristics. Monitoring and assistance to firms includes the intensity of coaching, understanding, and quality of services. Resource allocation touches on the dimensions of completeness, quality, and use of services. The author in addition to the three dimensions studied by [23] analyzes the effect of business management support services. This hypothesis is motivated by the particular context of technology incubation where the majority of incubatees do not have managerial knowledge. This variable includes assistance services in marketing, financial management, strategic management and team management.

The model tested and presented enhances understanding and provides a valid basis for future research. The results of the study revealed that all four constructs in the business incubation process were statistically significant in predicting incubator performance outcomes.



**Fig. 3. Performance Model of Abdul Khalid (2012)**

They suggest that the adoption of selection criteria is critical to incubation success. Indeed, they show that "Selection Performance" stands out as a critical factor in the business incubation process. In particular, the importance of "product - based selection" in a technology incubation context should be noted. The results also suggest that the adoption of detailed selection criteria regarding each of the three attributes that are selection by product, selection by financial characteristics, and selection by target market characteristics is essential to improve the chances of incubation success. Selections based on entrepreneurial characteristics had the least significant impact among the four variable constructs.

For the second variable, "intensity and follow-up of business assistance," the study highlights that the amount of interaction between incubatees and incubator managers is a weak predictor of incubator outcomes, according to the author, it is the quality of the interaction, not the quantity, that influences incubation outcome. In addition, the author finds that incubators that provide a wide range of assistance to firms and continually seek to assess the perceived quality of their services tend to perform better than those that do not.

This suggests that incubators need to improve their ability to build and maintain adequate coaching practices that meet the evolving needs and expectations of entrepreneurs. The author also stresses the importance of maintaining a functional website in order to improve the visibility of the structures and the services they offer to incubate.

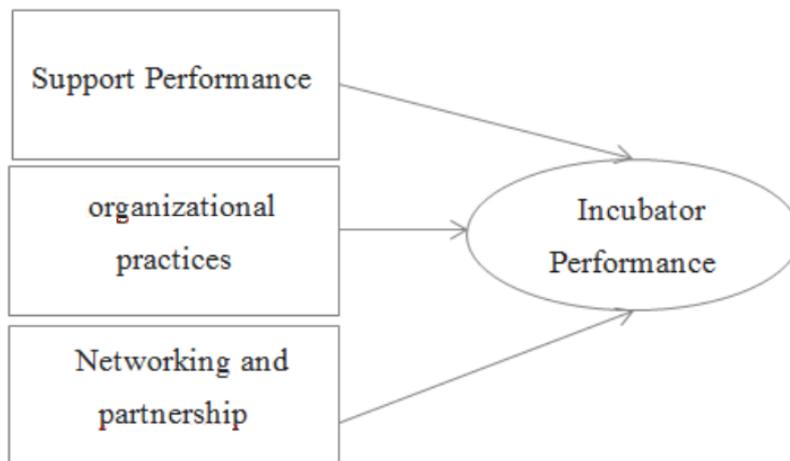
**6 MULTIDIMENSIONAL MODEL (FAKHRI & BAHOUSSA, 2019)**

This model can be used as a tool to guide managers decisions and help them better manage the performance of their incubator. In addition to its simplicity, the originality of this model lies in the integration of new variables that have been little

or not studied as a whole. In addition to the RBV widely deployed in incubator performance research, the authors incorporate other theories such as dynamic capabilities and...

This model integrates three categories of antecedents to incubator success: the support offered, organizational practices, and insertion into the environment and intensity of interaction with the entrepreneurial ecosystem.

Each of the categories groups together variables directly related to the final performance of the incubator.



**Fig. 4. Performance Model of FAKHRI & BAHOUSSA (2019)**

This model was empirically tested on a sample of 25 entrepreneurs to verify the psychometric qualities of the questions and measurement scales deployed by the authors. The final sample of the model test included 131 entrepreneurs who have completed or are in an incubation program.

The approach taken allowed us to overlay the empirical results on the theoretical propositions, and to understand the relationship between the different variables to be used in the study. In addition, the authors opted for an analysis methodology that allowed them to measure the impact of the identified variables on the performance of the accompanying

structures, and then to manipulate and test the different relationships that may exist between the previously identified variables. It was also an opportunity to identify and raise new relationships between variables and new hypotheses appropriate to the Moroccan field.

In addition to the integration of the new variable, the measurement of performance as conceived in this model also contributes to its originality. Indeed, the model proposes to evaluate performance according to two main axes: the first one widely used is the performance of the accompaniment. But in addition to the measures relating to the level of success of the project, the authors also integrate criteria relating to the development of the entrepreneurial skills of the entrepreneur, and his or her satisfaction with the support provided. The second axis is that of organizational performance, which focuses on the efficiency of the use of resources and means and the degree of achievement of organizational objectives.

Two main conclusions emerge from the model: "close" support has a negative influence on the success of the incubatee. Thus, the more intense the accompaniment and the more it is adapted to the apparent needs of the incubatee, the less effective it is, and may even have negative effects on the success of the incubated project and the development of the incubator's skills.

With respect to organizational practices, other interesting results emerged. The authors show that agility, whether internal or external, has a significant influence on overall performance, but also on the other two variables, namely support and development of effective partner networks. Thus, the more the incubator is attentive to the evolutions and changes of its environment, but also to the needs and demands of its incubatees, the more its practices and support services are more relevant and effective. According to the authors, this agility has its origins in motivated, committed and well-trained management teams and coaches. The quality of the human resources hired by the incubator therefore seems to be the central element to which the authors suggest paying more attention. These results provide a practical contribution to incubator managers and policy makers, and show that it is in their best interest to choose qualified personnel to associate with their organizations.

## 7 CONCLUSION

The models we have just presented are perhaps not exhaustive of the diversity of approaches to the performance of incubators.

The importance given to entrepreneurship and its accompaniment has given rise to a craze among researchers in order to analyze its impact on the accompanied companies and the business environment in general, to understand the mechanisms of its functioning, and to propose approaches and methods for its evaluation.

Currently, several studies emphasize that business incubation is a powerful instrument that should be encouraged and supported as an important component of the entrepreneurial ecosystem. Therefore, the more the performance capacities of Incubators/Incubates are strengthened, the more they will be able to contribute to the promotion of entrepreneurship.

In this perspective, we have devoted this contribution to the presentation of models of antecedents and factors influencing performance. Our objective is guided by the desire to present a synthesis of the literature review that has attempted to test and empirically validate different variables leading to the performance of coaching processes and incubation structures.

From this review of the literature, it appears that to date, although some researchers have attempted to identify the antecedents of performance; the results are limited and deserve more attention. Indeed, few studies have attempted to model them and to test the mutual relationships that these variables have with each other and with the final performance. Furthermore, it is clear that the majority of these studies and models are based on resource theories, or the model developed by Hackett and Dilts in 2008, itself based on real options theory.

The evaluation of performance in these models also remains limited to the evaluation of "coaching" performance and only one model attempts to integrate other dimensions of organizational performance.

Thus, we can conclude that current knowledge still lacks empirical studies on the determinants of performance. In summary, it is felt that an important direction for research lies in identifying other factors that contribute to business incubation performance and examining their interaction.

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