



## Incubation - An evolutionary process

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### ABSTRACT

This study presents a two-step approach, combining bibliometric analysis with a literature study investigating incubation as an evolutionary process. Incubation is a vast and multi-phased subject. In order to identify and classify articles we used a theoretical framework consisting of life cycle, underlying evolutionary process and resource-based theory, and dimensions of incubation. Through the bibliometric analysis we collected 429 articles in step one. Generating an attempt to bring a fragmented topic in to a systematic logic by using a literature study, we closely examined the subject matter in step two, summarizing and categorizing our findings into sub-themes and component themes. In so doing, we offer a reliable, ontologically constructed, and practical insight into the incubation evolutionary process is. We discuss the phenomena as an ecosystem that generates an interim debate on which new theory on incubation may be built and research may be conducted. We conclude that conceptualizing incubation as an evolutionary process has potential for future research and theory development.

### 1. Introduction

Incubators are vague as a concept, especially regarding the concept's relationship to start-ups and small firms. The term incubator has recently been introduced in business and technological literature, derived from natural sciences. Originally defined and described by Lindholm (1994), the concept implies that firms, universities, and public organisations can act as incubators. Incubation takes place within an established structure of an organization's technological capabilities and competence, creating an enabling environment for new firms.

According to Bhatli (2016), there are more than 10 000 incubator organisations worldwide, which provide resources (tangible) and capabilities (intangible). The incubator's main purpose is to create a supportive environment that is conducive to the "hatching" and development of start-ups (Chan and Lau, 2005; Bergek and Norman, 2008). This definition incorporates contextual and organizational diversity, including parent organisation, pre-incubators, (business) incubators, science parks, accelerator, as well as regional conditions (Barbero et al., 2012; da Silva and Forte, 2016; Lecluyse et al., 2019). Today the concept of an incubator refers to a specific organisational feature aiming to support a start-up, where the organisation's value as an incubator is related to survival, growth, and innovation (Oakey, 2007; Clarysse et al., 2014; Autio et al., 2014). The current mixed use of the word incubator is not how it was originally meant; incubators refer to parent organisations

of newly established firms (Lindholm-Dahlstrand, 1999). It seems that the contemporary definition, as merely an external support organisation, has blurred what incubation is (Aernoudt, 2004; Mian et al., 2016; Soetanto and Jack, 2016; Narayanan and Shin, 2019) and essentially fails to acknowledge that incubation is an evolutionary process that takes place in time, place, and context.

Incubation is a process that can be identified, from an emerging and new venture perspective in evolutionary life cycle phases, in phases of origin, survival, and growth (Hackett and Dilts, 2004; Lindelöf and Löfsten, 2005; McAdam and McAdam, 2008). Nevertheless, much of the earlier debate has been taken over by the field of behavioural entrepreneurship, where distinct features of individuals or a firm's configuration can predict success or failure (Unger et al., 2011). Incubator research tends to focus on formal processes, but interactions within actual incubator ecosystems also rely on informal pathways and networks as part of community instigated exchanges (Lindelöf, 2002; Aaboen et al., 2016), a system that is largely actor driven.

Start-ups that need support in their development or "hatching" are normally in need of different forms of support during their development. This, in turn, requires access to different types of resources and skills at the incubator (Barbero et al., 2012). Given this, there are of course different underlying interests for whoever finances the incubator and the purpose for its operations, which can lead the development of the current incubate in different directions (Van der Spuy, 2019; Vaz et al.,

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2022). During the incubation process, new ideas and start-ups not only need support, but also be protected from disruptive elements and from losing their idea/concept to others (Albahari et al., 2022; Jutterström and Samuelsson, 2022). The incubation process itself can then be considered an evolutionary process that is influenced by the role of the incubator and the surrounding ecosystem (Hackett and Dilts, 2004; McAdam et al., 2016; Lecluyse et al., 2019). The literature has to a small extent considered the evolutionary aspect of the incubation process and the need for different kind of support and developing environments during various phases of the development. Studies have also captured other aspects of incubation as a phenomenon (e.g., Hackett and Dilts, 2004; Barbero et al., 2012; da Silva and Forte, 2016; Lecluyse et al., 2019; Narayanan and Shin, 2019; Jutterström and Samuelsson, 2022), but there is still a need to study what the literature says about incubation as an evolutionary process.

We argue that the concept and definition of an incubator has been distorted over time, which means that there is a need to clarify what an incubator as a system in relation to emergent and new venture evolutionary life cycle phases is. The lack of theoretical understanding and foundation that addresses change in incubation over time can be found in the ecosystem literature (e.g., Wurth et al., 2021; Cantner et al., 2021; Cho et al., 2022). The current understanding of ecosystems does not consider the inherent actor driven dynamics of entrepreneurial ecosystems from a venture perspective. Furthermore, the current literature on incubation as well as ecosystem literature lacks a coherent integration of evolutionary dynamics of the venture process (Albort-Morant and Ribeiro-Soriano, 2016; Arantes et al., 2019). Many papers do not address incubation as an evolutionary process, making this an interesting topic for study. In short, there is a lack of a theoretical base to consider incubation as an evolutionary process and the importance of the surrounding environment as a supportive ecosystem. By understanding incubation as an evolutionary process within a context, we will increase knowledge of the ecosystems, thereby contributing to establishing a taxonomy and theory that bridges the individual's contextual connection (Lecluyse et al., 2019).

This paper aims to create a conceptual framework of incubation, based on the resource-based view (RBV) and life cycle perspective of emerging and new firms, adding to our understanding of incubation as a process, as well as the emerging concept of ecosystem. Taking a process view, the concept of incubator as an ecosystem is discussed from an evolutionary lifecycle perspective. The paper classifies the literature along three stages of evolution and derives insights from it. The framework can serve as basis to understand incubation as an evolutionary process and the need of different kind of support during different phases of the "hatching process". The benefit of this should come into use when incubation environments are created to help the development of new ideas and entrepreneurship.

The research questions explored in this article are as follows.

1. Is there support in the literature for considering incubation as an evolutionary process?
2. How can the evolutionary incubation process be understood from a life cycle perspective?
3. How can the evolutionary incubator process be understood from a resource-based view (RBV) were the need for different forms of resources changes through the various phases of the incubation process?
4. How is the evolutionary process defined in incubation as an ecosystem?

In this section, the need to consider incubation as an evolutionary process was noted, and thus the need to review the literature. The remainder of the article is organized in the following manner. First, a discussion about incubation is developed and literature from a life cycle perspective to an entrepreneurial ecosystem is reviewed, followed by a section on incubation from a resource and capability evolutionary

perspective. Second, the method used to identify and select articles for review and the encoding process used is described. Third, we outline our analysis of the incubator and incubation literature emerges in three stages of incubation, followed by a discussion section on what the literature analysis led to and what influences incubation in the ecosystem process. We conclude with a proposal for a new definition of the concept of incubation.

## 2. Theoretical framework used in the literature review

### 2.1. Life cycle perspective and incubation as an entrepreneurial ecosystem

It is relevant in all forms of development (hatching phases) to consider the process from a life cycle perspective. It has long been known that products undergo a life cycle with significant phases. Early publications include Cox (1963) and Levitt (1965). Levitt (1965) argued that the life story of most successful products shows a history of their passing through certain stages. Stage one, Market Development, is when a new product is first brought to market, before a proven demand for it, and often before fully proven technically sound in all respects. Sales are low and improve slowly. Stage two is Market Growth; demand begins to accelerate, and the size of the total market expands rapidly. In stage three, Market Maturity, demand levels off and grows, for the most part, only at the replacement. During stage four, Market Decline; the product begins to lose consumer appeal and sales slow. Product life cycles demonstrate a development curve that consists of an introductory phase, a growth phase, a maturation phase, and a phasing-out phase. As the venture undertakes its process trough out the life cycle, the incubation as a process is aligned with the same.

Industries also undergo life cycles and how a start-up firm should act depends on the industry's degree of maturity. Covin and Slevin (1990) summarize the new firm's strategic postures and organization structures varied across the industry life. Entrepreneurial strategic postures and organic structures were characteristic by new firms in emerging industries. Greater conservatism and less organicity were characteristic of the new firms in more advanced industry life cycle stages. Entrepreneurial strategic postures and organic structures were most positively related to performance among new firms in emerging industries. The relationship between performance and these two variables was less positive among firms in growing industries and negative among firms in mature industries. Accordingly, behaving in entrepreneurial manners and having organic structures may not be viable goals for new firms in all industry life cycle stages. Covin and Slevin (1990) argued that these results have important implications for the management of new firms. Regarding the strategic posture results, a risk-taking, innovative, and proactive entrepreneurial entry strategy may be instrumental to achieving high performance in many emerging industries, implying that the incubator process has to be aligned with the same process to be relevant for emerging/new venture.

Literature on organizational development and connection to life cycle perspective deals predominantly with small, new or rapidly growing firms, particularly in the high-technology sector, which is close to incubation (Kazanjan and Drazin 1990; Phelps et al., 2007). Literature on process development and implementation from a lifecycle perspective focuses mostly on activity sequences in the innovation process (Lager, 2011; Kurkkio et al., 2011; Milewski et al., 2015). Other research has focused on the development of new ideas and start-ups and the needs of these firms in their various phases of development. Entrepreneurial firms evolve over time through various stages from start-up, development, and growth through to decline and closure. The firm changes during these stages in ways that often requires different skills, structures, and resources to manage them. Jirásek and Bílek's (2018) literature review found 24 different organizational life cycle studies. In common, organizational life cycle is described in five stages: (i) founding, (ii) growth, (iii) maturity, (iv) decline, and (v) revival. Birth or founding stage of the organizational life cycle is characteristic by the

organizational struggle for survival, which is mediated by product development and acquisition of necessary resources. Typically, the organization generates negative cash during these times. At this stage, the organization has little power over its external environment and therefore needs to adapt to it. When the organization succeeds in creating competitive advantage, growth in sales and market share follow. The focus switches to managing relatively rapid expansion, with production and resources issues at the forefront.

The development of a strong relationship between a new venture and each of its stakeholders is important for performance and the actions that need to be taken to develop this relationship, and how this comes about may differ for each stakeholder group (Shepherd and Zacharakis, 2003). An effective incubator must understand in which configurational phase a venture is in and what type of resources and capabilities are needed in each consecutive phase (Dee et al., 2012). Perceptions of venture legitimacy change as a venture develops. As a venture transitions from being dependent on resource providers with a certain set of expectations to others with an alternative expectation of what constitutes a legitimate entrepreneurial identity, it confronts the challenge of operating under conditions of salient institutional pluralism, where it must comply with institutional conventions of multiple social systems (Fisher et al., 2016).

Patzelt et al. (2021) take the incubation process one-step further by combining the entrepreneur or the entrepreneurial team life cycle with the venture life cycle. Transitions between venture and team life cycle phases are not automatic and it is the team that pushes itself and its venture proactively from one phase to another. The explanation of how incubation as an entrepreneurial ecosystem evolves over time and across space requires a longitudinal perspective (Cho et al., 2022).

The existing literature on entrepreneurial ecosystems attempts to account for inherent mechanisms by investigating their governance configurations, their resilience, and their evolutionary dynamics (Wurth et al., 2021; Cantner et al., 2021; Cho et al., 2022). Cantner et al. (2021) present a dynamic model of ecosystems based on the lifecycle model as introduced by Vernon (1966). They propose that an ecosystem transitions from an entrepreneurial ecosystem, with a focus on start-up creation, towards a business ecosystem with a core focus on the internal commercialization of knowledge, i.e., intrapreneurial activities, and vice versa. Their lifecycle model considers the inherent dynamics of entrepreneurial ecosystems that lead to their birth, establishment and growth, maturity, decline, and re-emergence. Cho et al. (2022) and Cantner et al. (2021) assume that an incubation as an entrepreneurial ecosystem for new firms evolves over time. Starting with the introduction or the beginning of an entrepreneurial ecosystem, birth (phase I), establishment (II), the growth phase (III). Stage III reflects the intersection with the regional business ecosystem, the transition and change from the entrepreneurial to the business ecosystem, were the new venture are not aligned with the incubation process anymore. Cantner et al. (2021) conclude that the combination of individual entrepreneurial decision-making and resultant actions over the lifecycle phases contribute to the dynamism within incubations as an entrepreneurial ecosystems.

## 2.2. Incubation from a resource and capability evolutionary perspective

The argument in this paper is that incubation can be viewed from an evolutionary system approach, generally associated with the current research field of economic ecosystems. Economic ecosystems are perceived to be dynamic and evolutionary, where the life cycle perspective visualises the antecedent, origin, and change (Spigel and Harrison, 2018). Were the antecedent, origin and change can be found and identified in the context as incubation agents as part of a system as well for the contextual integrated entrepreneurial venture, over time.

The evolutionary view draws its logic from Schumpeter (1911, 1934), where the entrepreneur is perceived as the facilitator as well as the enabler for the re-creation of a given economic system. The system

change is mediated by altering the technological regime (creative destruction) as an inventor and introducing the new idea into the market for innovation (Basberg, 1987). In this assumption of society, the idea of economic and societal development that Schumpeter suggests, birth, growth and ultimate death within the market with price mechanism as a regulator, is tangent to the idea of social Darwinism (Marciano, 2007). The entrepreneurial venture that can cease the new opportunity and adapt to ever changing fluctuation on the market will survive and prosper. In contrast to Schumpeter, Friedrich List (1789–1846) argued that emerging industries need protection and support; he argued for limited market exposure and suggested that “fair” exchanges between two parties can only be achieved in the context of being on the same economic and societal strength. This idea can be discerned in the argument of the “liability of newness” for new firms that comes from organisational shortcomings as well as inequalities on the market.

The liability of newness occurs from what Williamson (1975) and Teece (1986) argue, namely that emerging and new firms are hindered in their development due to asymmetric market conditions. Asymmetric market conditions arise due to lack of information and capabilities/resources, as well as opportunism and uncertainty. Asymmetric conditions lead to transaction costs (Coase, 1937) on why organisational hierarchies arise versus markets. Transaction is proportionally larger for nascent and emerging new firms compared to established firms. Incubators as an organisational entity can be seen as a hierarchy where economies of scale and coordination benefits are assumed to exist, and uncertainty and risk are assumed to be reduced. The transaction cost for each unit produced is reduced through economies of scale and coordination, which means that these obstacles to the new or nascent economic development and activity are reduced or eliminated when it assumed to be the most harmful, the early stages in the venture life cycle (Lindelöf, 2002; Shepherd and Zacharakis, 2003; McAdam and McAdam, 2008).

There are several life cycles models, however, we believe that the differences between the models are more semantic than substantial in nature. We rely on Kazanjian's (1988) conceptualization of the life cycle stages for our argument, where the initial stage of the model relates to emergent/nascent entrepreneurship, establishment/survival, growth, and prosperity. In the first stage, the emergent/nascent stage, the new venture is not conceptualized as an independent venture but as nurtured by the incubator. This can be seen as an active strategy, for example at universities as ecosystems for commercialization of intellectual property rights (Siegel and Wright, 2015), or as a planned spin-off scheme, where a firm's R&D portfolio is refined as a disinvestment or sale of lesser core inventions. The process might involve an active strategy from the nurturing incubator organisation, providing resources; however, the process might also include different levels of illegal/none-ethical appropriation of resource and capabilities, thus rendering the nurturing incubator organisation an unwilling supplier (Lindelöf, 2011).

In order to overcome the liability of newness, the emerging/new venture needs resources, and adapt and develop capabilities (Stinchcombe and March 1965). Furthermore, as Hannan and Freeman (1984) suggest, different resources and capabilities are required and the ability to appropriate the resources and capabilities is different in different stages of the new venture development. As Porter (2008) argues, for each life cycle stage the emerging new venture organisation configuration effects the venture's ability to reach business objectives, adapt to changes in internal and external conditions, and to successfully launch and compete. The ability also differs between new venture configurations, where background and context are where the new venture emerges from (Lindelöf and Löfsten, 2005). McAdam and McAdam (2008) suggest that throughout a lifecycle analysis, firms with effective resources and capabilities are more likely to succeed though out the stages of birth, establishment, and growth.

The RBV has widely contributed to the underlying explanation of firms' strategic behaviour and has been increasing in importance in understanding why some firms perform better than others (Conner,

1991; Barney, 1991). The RBV dates back to the works of Chamberlin (1933) and Penrose (1959), arguing that a heterogeneity of resources and capabilities gave firms a competitive advantage. This straightforward assumption has been evoked to explain the importance of managers generating and developing resources. The sustained competitive advantage evolves from the conditions on the factor market when resources are rare, difficult to imitate, and subject of immobility, imitability, and non-substitutional (Grant, 1991). In general, the resource-based view (RBV) can be summarized as an emergent/new venture, which as an organisation is a collection of unique resources and capabilities. The RBV refers to financial, physical, human, commercial, technological, and organisational resources. Furthermore, the RBV in relation to the venture are used to investigate and analyse how the deployment of key resources and capabilities in the incubator ecosystem are deployed for creating, supporting, and protecting a new venture from a lifecycle perspective. Lockett and Wright (2005) and Lindelöf and Löfsten (2006) found that the RBV can be used to conceptualise both the contextual and the dynamic routines associated with incubators. The RBV and lifecycle perspectives provide a basis for conceptualizing the emergence and development, of entrepreneurial firms, and for differentiating between stages (Fisher et al., 2016).

Alvedalen and Boschma (2017) criticise the current boundary setting of an economic ecosystem, either for being too narrow, exemplifying with new venture support systems, or for being too large, too global. We argue that by combining the RBV and lifecycle perspective, a meaningful definition of an incubator as an economic system can be developed. The new definition needs to go beyond the current resource and service approach, limited to a physical space to integrate a dynamic process understanding of the new venture development as dynamic; where it comes from, how it develops, and how actors within the organisational context interact with the new venture development. However, extending beyond the defined boundary, as for including region as a contextual incubator supporting new venture developing, then becomes ambiguous. Amezcua et al. (2020) distort the meaning of the concept of incubator. Incubation then substitutes the concept of regional agglomeration and regional cluster effects. Defining corporation within region as a contextual incubator, in an open and free market economy, cannot account for the full liabilities of transactions costs, where in the open context the new venture is still exposed to market forces and relative unequal transactions costs. The region can be supportive at best, but is not protective enough; business protection is essential as well to define the incubator context. By adding the element of protection, the semi-open incubating as organisational context offers limited access for participants, protection from the full market force and absorption of the relative effect of the transaction cost. Examples of protection effects within the incubator context include the assumption of risk sharing, as limited economic exposure for the emerging/new venture (Dettwiler et al., 2006) and community induced networks by proximity for learning and joint knowledge creation (Aabo, 2009; Lindelöf and Löfsten, 2005; Clarysse et al., 2014). Defining the incubator as a supportive and protective context from a system view in relation to the venture life cycle stages offers a meaningful boundary setting to define and understand evolutionary incubator processes that are akin to ecosystems.

### 3. Method

Focusing on the process of incubation rather than on the incubator facility and its configuration will draw attention to the underlying causes of new venture development in an incubation environment. The path to such theory development will entail multiple research methods, generating a two-stage approach (Hackett and Dilts, 2004; Snyder, 2019). The first stage included the original obtained data set of articles, which perceived to be large, and the scope of the study is broad, not at first suited for a literature review. In order to gain deeper insight and to provide insights and an overview to the topic, identifying the core data set, we conducted a bibliometric analysis. When identifying the core

data set, we conducted a literature review on the remaining articles (Donthu et al., 2021). The purpose was to identify incubators as a function and the concept of incubation as an evolutionary process incorporated in an ecosystem and with that open up directions for new research.

An initial bibliometric systematic data base search (Denyer and Neely, 2004; Pittaway et al., 2004; Snyder, 2019) was carried out to identify incubation processes. Following the method of coding (Berg and Lune, 2012), key words, where component themes of the incubator process were identified, covering life cycle dimensions (Jones et al., 2011). After coding, strategically selected publications were chosen to initiate the second stage, namely the systematic literature review, in an attempt to limit selection bias and generating an overview of this specific area of knowledge.

#### 3.1. Data collection

The first step in the bibliometric analyse were to select what databases to be used. According to Forliano et al. (2021), no single database is complete. Different databases can also variate in the quality of the data obtained rendering problem with the validity. In order to assure validity for the study, six databases were utilized: ABI/INFORM of ProQuest, Business Source Premier/Econ Lit, JSTOR, Science Direct, Scopus, and Web of Science. We began by determining the search protocol based on incubator processes and its stages that were identified from a life cycle perspective. Key words are grounded in the Resource Based View (RBV) literature to identify incubation processes from an evolutionary perspective. Key resources target dimensions as resource and capability, contextual utility, and strategic core. To target incubation as a process the following generic terms were used: incubator, incubation, technology incubator, business incubator, Science Park, Technology Park, Research Park, techno pole, business development centre, technology transfer, and accelerator (bibliometric analysis). To identify specific processes from an evolutionary perspective, relating to life cycle theory, a combination of the following keywords was used for life cycle stage 1) incubation – spin-off, spin-out, de-investment, enabler, new venture creation, resources, and capabilities. For life cycle stage 2) incubation – new venture operations, survival, growth, enabler, support, resources, and capabilities, and for life cycle stage 3) incubation – catalyst, accelerator, growth, profit, resources, and capabilities. These key words terms were also searched and the findings were related to the theoretical framework as a part of the literature review, for in titles, abstracts, and key words for each paper in the remaining dataset of articles.

#### 3.2. Data extraction and analysis

The field of incubation is immensely diverse, yet we wanted to go beyond understanding to also identify key elements of the process. In order to meet this goal, we applied a variation of a systematic review that involves both synthesis from open coding (Berg and Lune, 2012) to subjective interpretation and evaluation. By doing so we identify sub-themes as well as apply informal evolving ontological classifications (Jones et al., 2011) as themes for institutional arrangements, organisational design, resources, and processes. In all, we identified 42 sub-themes, here referred to as first order ontological themes related to incubation evolving. This led to the identification of a second order classification with four component themes, which are identified as present over all three life cycle stages (see Table 4). The data analysis process allowed us to identify many themes and compare how they are related to the existing literature and to one another (Strauss and Corbin, 1998). Fig. 1 illustrates the process we followed from key findings to first-order themes to second-order component themes and finally the aggregate dimension (Gioia et al., 2013; Barrett and Tsekouras, 2022; Germain et al., 2022.)

We ended our search and evaluation on January 28, 2022. The

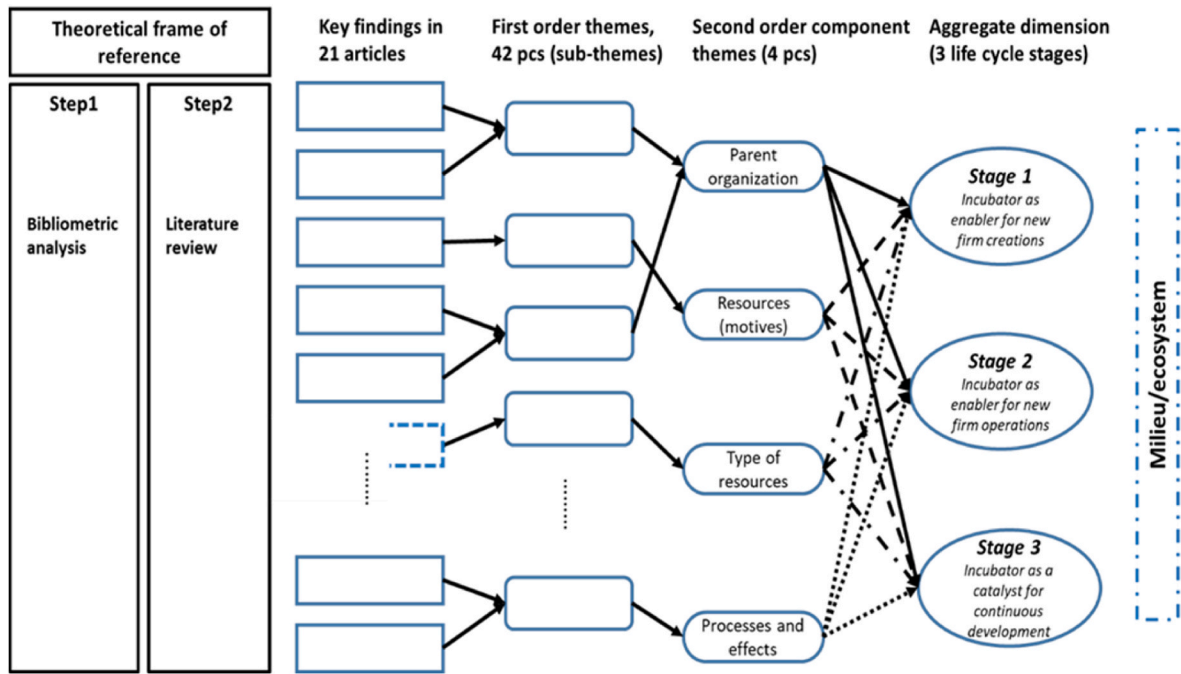


Fig. 1. Data extraction and analysis overview (Influenced by Barrett and Tsekouras, 2022; Germain et al., 2022.).

search was limited to articles, editorials, and reviews. There were no limitations to citations or age. In total, the search yielded 429 publications. Of those, 202 articles show substantial overlap. The remaining literature represents the core perspectives published on the incubation process, yielding 227 articles. Conducting a literature review on the remaining 227 article, 98 articles were selected with a focus on system dynamics and in-depth analysis (subjective). Many of the key concepts were already included, building on previous references. By excluding conceptual overlap and repetitions, we yielded 21 articles with explicit relevance to the suggested conceptual understanding of incubation.

The selection process of articles and analyses is illustrated in Fig. 2. The finding of articles and the defining and identifying concepts are presented in Tables 1–3. The strategically selected 21 articles over three life cycle stages generated clarity, focus, and allowing for a synthesis, which in turn enabled an understanding of incubation as an evolutionary process incorporated in an ecosystem. Furthermore, to identify valuable research gap for future studies.

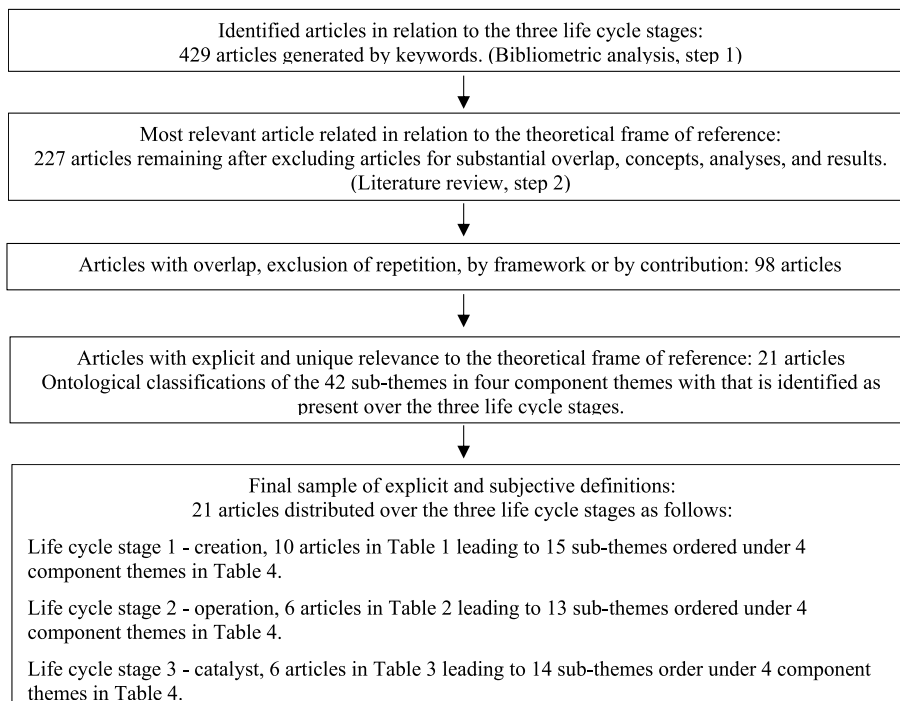


Fig. 2. Article selection process.

**Table 1**  
Stage one - Incubation as an enabler for new firm creations.

Study	Sampling context	Used method	Summary of key Findings – relevance for the identification of first and second order themes
Rydehell et al. (2019)	401 new technology-based firms (NTBFs) in Sweden.	Hypothesis test by phone survey.	Incubators that provide important means for NTBF development and growth acceleration are negatively related to early performance.
Mathisen and Rasmussen (2019)	University spin-offs (USO).	A systematic review of 105 research papers.	USOs emerge in the institutional conditions of universities and must make a transition into the business world to obtain resource orchestration and capability development.
Yagüe-Perles and March-Chordá (2012)	32 biotechnology spin-off firm in Spain.	Hypothesis test by fieldwork.	Compared to non-spin-off firms, research spin-off firms face more and more serious challenges and disadvantages.
Clarysse et al. (2011)	48 corporate and 73 university spin-offs in Flanders.	Hand-collected dataset.	Corporate spin-offs grow most if they start with specific narrow-focused technology that is sufficiently distinct from the technical knowledge base of the parent company and which is tacit.
Bigliardi et al. (2013)	Academic spin-offs companies in Italy.	Review 21 articles and a Delphi study.	University spin-offs benefit from a broad technology, which is transferred to the spin-off.
Becker and Gassmann (2006)	25 large Technology-driven corporations in Europe and US.	Benchmarking survey of 77 incubators and 52 interviews.	Identified four classifications for factors affecting the performance of an academic spin-off: University, Founder, Environment, and Technological.
Mustar et al. (2006)	Research based spin-offs (RBSOs).	Review 50 articles.	Of the incubation process's four phases (selection, structuring, involvement, and exit), involvement is the most important value-adding process, similar to venture capitalists' interaction with their new ventures.

**Table 1 (continued)**

Study	Sampling context	Used method	Summary of key Findings – relevance for the identification of first and second order themes
Lockett et al. (2005)	Units of analysis from PRI, spin-off firm, venture team, and incubators.	Review papers from different countries.	creation and (2) spin-off development. The dimensions that differentiate between firms are the type of resources, the business model, and the institutional link. The findings underscore the importance of the acquisition, development, and integration of knowledge in the development of spin-offs at PRIs. Notes different stages in the spinning-out process (e.g., opportunity recognition through to raising risk capital and building a sustainable new venture).
Löfsten and Lindelöf (2005)	134 NTBFs on Science Parks in Sweden.	Hypothesis test by a survey.	The capability to innovate relates to technology and market development, where the limited resources of small firms make it difficult to overcome internal and external restrictions in developing innovation.
Sapienza et al. (2004)	54 technology-related spin-off firm in Finland.	Hypothesis test and personally interviews.	Provides evidence to demonstrate the relationship between ex ante knowledge relatedness and the growth of spin-off firms is curvilinear and distinguishes between different types of knowledge relatedness in a dyadic learning relationship.

**4. Conceptual view of incubation stages – based on the articles included in the analysis**

Incubation becomes a way to describe different characteristics of incubator firms, which aim to create conditions for new firms to develop their market, technological, and operational capabilities together with entrepreneurial activities before launching into a new venture (Lindholm, 1994; Hackett and Dilts, 2004; Lindelöf and Löfsten, 2005; McAdam and McAdam, 2008). With this definition of incubation

**Table 2**  
Stage two - Incubator as an enabler for new firm operations.

Study	Sampling context	Used method	Summary of key Findings – relevance for the identification of first and second order themes
Hausberg and Korreck (2020)	International journals.	A systematic literature review of 347 articles.	Innovation and social capital theory increasingly complement the resource-based view as frameworks to understand business incubation.
Yusubova et al. (2019)	iMinds research institute, Ghent, Belgium, management and 8 technology ventures.	Semi-structured interviews.	Even though the specific type of support required differs for each development stage, the ability of the incubator to deliver this support to its tenant ventures depends on three underlying capabilities: (1) its networking capabilities, (2) its internal knowledge base, and (3) its selectivity.
Sá and Lee (2012)	MaRS Innovation Centre, Toronto, Canada, tenants' network.	29 semi-structured interviews, document analyses, and observation of events.	Networks promoted by technology-based incubators ups can only to some extent support start-ups. To be able to adapt incubator support, the start-ups involved must be involved in formulating the networking activities needed. Whilst BIs of all generations offer similar support services, tenants in older generation BIs make less use of the BI's service portfolio.
Bruneel et al. (2012)	7 business incubators in Europe.	Multiple case study.	A HTBF's propensity to make effective use of the USI's resources and support increases as the lifecycle stage of the company increases and the small firm searches for independence and autonomy.
McAdam and McAdam (2008)	18 HTBFs within two separate USIs, Ireland resp. UK.	Longitudinal interviews and focus groups over a 36-month period.	Self-financing is the dominant characteristic of funding in the small firms sector. The attitudes and motivation of the firm founders and managers is a key factor in the ability to raise funds and achieve high growth and profitability.
Löfsten and Lindelöf (2003)	283 NTBF on and off Science Parks in Sweden.	Questionnaire survey.	

**Table 3**  
Stage three - Incubator as a catalyst for firm development.

Study	Sampling context	Used method	Key Findings – relevance for the identification of first and second order themes
Brantnell and Baraldi (2020)	Academic inventors IPR/IP in 4 medical innovation processes from Stanford and Uppsala university.	Multiple case study with 4 cases. Assess requirements of individual roles as role intensity	IPR ownership does not influence role intensities in a remarkable way. The findings support a distinguishing between patentable and non-patentable inventions as these two types of IP nature are associated with different roles and role intensities.
Del Sarto et al. (2020)	38 accelerated start-ups from five Italian accelerators and a control group of 38 non-accelerated Italian start-ups.	Fuzzy-set qualitative comparative analysis (fsQCA).	The findings support the business accelerator literature that regards accelerators as a new and distinct generation of business incubators. Factors affecting survival of accelerated firms are different from factors affecting the survival of incubated firms.
Neumeier et al. (2019)	Women entrepreneurs in 2 municipal eco-systems in Florida, US.	Hypothesis test by a 120 interview.	Effects of venture typology, race, ethnicity, and past venture experience on the social capital distribution.
Heaton et al. (2019)	University ecosystems at top universities in US.	Iterative article and case study. 3 concept case studies.	Preserving and strengthening the university's positive societal impact on innovation ecosystems, rather than subtracting from it.
Lindelöf and Löfsten (2006)	134 small firms on science parks in Sweden.	Analysis of firm behaviour conducted by multivariate approach.	The study confirms that the external environment faced by the NTBFs has an impact on firm behaviour. The firm's need of management increases when technology and environments change.
Löfsten and Lindelöf (2003)	283 NTBF on and off Science Parks in Sweden.	Questionnaire survey.	Self-financing is the dominant characteristic of funding in the small firms sector. The attitudes and motivation of the firm founders and managers is a key factor in the ability to raise funds and achieve high growth and profitability.

**Table 4**  
A conceptual framework for an incubation evolutionary life cycle, three-stage model.

Stage 1 Incubator as enabler for new firm creations	Stage 2 Incubator as enabler for new firm operations	Stage 3 Incubator as a catalyst for continuous development
<b>Parent organization</b>	<b>Parent organization</b>	<b>Parent organization</b>
<ul style="list-style-type: none"> <li>– Firms</li> <li>– University</li> <li>– Public sector</li> </ul>	<ul style="list-style-type: none"> <li>– Incubators</li> <li>– Pre-incubators</li> </ul>	<ul style="list-style-type: none"> <li>– Incubators</li> <li>– Accelerator</li> </ul>
<b>Resources (motives)</b>	<b>Resources (motives)</b>	<b>Resources (motives)</b>
Transfer of resources -spin-offs and buy-outs	Resources for support to new firms	Resources for continuous development of firms
<b>Type of resources</b>	<b>Type of resources</b>	<b>Type of resources</b>
Institutionalized	Institutionalized	Institutionalized Specialized experience for:
<ul style="list-style-type: none"> <li>– Experience (internal)</li> <li>– Networks</li> <li>– Assets; tangible and intangible assets</li> <li>– Technology</li> <li>– Lack of resources and capabilities</li> </ul>	<ul style="list-style-type: none"> <li>– Experience (external)</li> <li>– Capital</li> <li>– Infrastructure</li> <li>– Formal support networks (provisional)</li> </ul>	<ul style="list-style-type: none"> <li>– Markets/export</li> <li>– Technology value extraction</li> <li>– Management</li> <li>– Capital</li> <li>– Informal support networks embedded in firm cohorts</li> </ul>
<b>Processes and effects</b>	<b>Processes and effects</b>	<b>Processes and effects</b>
<ul style="list-style-type: none"> <li>– Innovation milieu</li> <li>– Framing the innovation opportunity</li> <li>– Voluntary/non-voluntary transferring of resources and capabilities</li> <li>– Value creator as an enabler</li> <li>– New firms</li> <li>– Risk sharing and reduction of uncertainty by using a pool of resources and capabilities</li> </ul>	<ul style="list-style-type: none"> <li>– Nursing milieu</li> <li>– Staging and explore the opportunity, configuration</li> <li>– Learning and knowledge transfer</li> <li>– Value extraction and preservation as an enabler, motivator, and risk sharing</li> <li>– Survival and growth</li> <li>– Risk sharing and reduction of uncertainty by community participation</li> </ul>	<ul style="list-style-type: none"> <li>– Entrepreneurial eco-system</li> <li>– Sustaining and exploiting the opportunity, transformation</li> <li>– Learning and joint knowledge creation</li> <li>– Value extraction as an enabler, motivator, and risk sharing</li> <li>– Growth and profit</li> <li>– Risk sharing and reduction of uncertainty by community participation</li> </ul>

resources and capabilities (consciously or unconsciously) are transferred from one economic/organizational system to another, where new firms are created in the form of "spin-offs" or disinvestments from parts of the incubator's technical and competence structure. This, in turn, requires access to different types of resources and skills at the incubator (Barbero et al., 2012).

The conclusion, in Section 2, regarding incubation as early phases in an organization's life cycle (e.g. Cho et al., 2022; Cantner et al. 2021), together with our combined bibliometric analysis and literature review of the incubation literature, evidenced three distinguish stages of incubation, namely the incubator as an enabler for new venture creations, incubation as an enabler for new venture operations, and incubation as an accelerator (catalyser). Next, we describe each stage.

**4.1. Incubation as an enabler for new firm creations**

For a new idea to be realized, a certain form of support is needed. In our literature analysis, it is clear that several studies show the unique need for support that the incubator should offer in support of the idea at an early stage. Table 1, life cycle stage one, presents summaries of 10 strategic selected articles with key findings that are relevant for identification of the first order focus on incubation as an enabler for new venture creations and the role of the incubator in the initial stage. To be more concrete, Table 1 presents the identified 15 sub-themes ordered under the 4 s order component themes. The findings of the first and

second order themes are presented in Table 4. As can be seen from Table 1, in this early stage there is an emphasis on creating conditions for new ideas through transformation from the parent organisation to a context that can support further development of the idea. The transfer of resources from spin-offs and buy-outs creates an innovative environment and shapes innovation opportunities. Value creation as an enabler and capabilities in the form of both tangible and intangible assets is important in this stage. Interestingly, the initial stage is generic from a cross-border and industry perspective. The life cycle stage one and the identified themes relates to what incubation is from resource and capability evolutionary perspective with the regards to support and protection.

In relation to Cooper (1985) and Hausberg and Korreck (2020), a narrow definition of what an incubator is, the findings in this study identify that incubation as enabler for new venture creation as broader then previous accounted for, were different types of organisations can act and perform the role of an incubator. The findings have implications for the understanding how to view the wider incubator eco-system in relation to boundaries and actors.

Incubators as enablers of new business creations relates to specific dimensions of liability of newness regarding transfer resources and capabilities to the emerging firm. The initial incubation with associated configuration is not assumed to solve all dimensions of liability of newness. Instead, the start-up needs to be supported with other kind of knowledge and capabilities both to be able to realize the idea and at the same time protect their ideas from others. This is the role of the incubator as an enabler for new venture operations.

**4.2. Incubation as an enabler for new firm operations**

The second phase relates to incubation as a process that supports the development of existing start-ups, and merely as sustained of firm operation (Pauwels et al., 2016). However, even in this organisational context, the definition of what an incubator is, is not clear-cut (Nicholls-Nixon et al., 2020). Most incubators focus their activities on products rather than technology, as evidenced decades ago by Ambrosio (1991). Previous research distinguishes between three different forms of incubation/incubator in relation to type of business and the ideas on which they are based (Mian et al., 2016) as follows.

- "Mixed-use incubator" supports all types of firms. There are no requirements for firms in a specific industry, technology level, or niche.
- "Empowerment/micro firms' incubator" supports development of firms in areas with structural societal problems.
- "Technology incubator" focuses on firms in emerging technologies.

In general, the incubation process in the second stage can be characterized as offering participation and support from an existing incubator. The incubator offers resources and capabilities that aim to make it easier for the firm to develop (Mian, 1996, 1997). As a primary or secondary function, incubator units provide support for management and capital supply. It also provides, or assists, in the access to capital and operational support (Steffen, 1992). The expected outcome of these provisions is the creation of favourable conditions for the development of business operations. The life cycle stage two and the identified themes relate to what incubation is from resource and capability evolutionary perspective with the regards to support and protection. Table 2, life cycle stage two, presents summaries of six strategic selected articles with key findings relevant for identification of the first order. The first order consists of identified 13 sub-themes ordered under the 4 s order component themes. The findings of the first and second order themes are presented in Table 4.

As can be seen in Table 2, the incubator as an enabler for new firm operations relates to the specific dimensions of liability of newness that relates to survival of the established firm. Where the resources and capabilities in stage two are complement to the stage one configuration



that relates to the operational support aspects of the start-up. The incubator in this stage is defined by functionality and fulfilment of the new firms need in relation to its operations, rather than a predefined organisation expression of what incubation is. The findings stands in contrast to [Bergek and Norrman \(2008\)](#) and [Roig-Tierno et al. \(2015\)](#), who's definition of an incubation manifest itself from a presumption of organisational operation that may or may not exist in an organisation labelled as an incubator. As the firm passes through stage two specific dimensions of liabilities of newness, it shifts the resources and capabilities from survival to performance, growth, and profit. The incubator role then is transformed into catalyst.

#### 4.3. Incubator as a catalyst

Pre-empting the definition of accelerator, [Lindelöf \(2002\)](#), [Löfsten and Lindelöf \(2003\)](#), and [Lindelöf and Löfsten \(2006\)](#) identified the incubator as a tool for growth, distinct from sustaining a firm. However, accelerators are considered a more recent phenomenon than incubators and can be traced back to the mid-2000s ([Miller and Bound, 2011](#)).

The defining difference between incubators and accelerators is that accelerators provide participation through a highly selective program within a limited period ([Cohen and Hochberg 2014](#); [Hallen et al., 2014](#)). Assistance through an accelerator includes development of the business plan, investor networks, prototypes and market testing, education, mentorship, and network development. The accelerator process is focused on growth with the aim of creating a type of firm that will, typically, scale up rapidly or fail fast, therefore minimising resources used ([Pauwels et al., 2016](#)). As can be seen in [Table 3](#), the life cycle stage 3 and the identified themes relates to what incubation is from resource and capability evolutionary perspective with the regards to support and protection. There is a dynamic shift over time from a formal expression of incubator functionality to functionality based on informal structures and social dependencies for resources and capabilities. The findings identify acknowledge the informal structures that incubators contains that has previously not been fully accounted for. The findings deviates from e.g. [Hausberg and Korreck \(2020\)](#) discussion of the dynamics of the incubator process. The findings also open ups to view the incubator as less rigours confined to a single organisational entity, containing actors from the outside as well as the inside. Generating a blurry organisational system definition how an incubator is formed and operates. The life cycle stage three, presents summaries of six strategic selected articles with key findings relevant for identification of the first order. The identified 14 sub-themes ordered under the second order of the four component themes. The findings of the first order and second order themes are presented in [Table 4](#).

With the dimensions of liability of newness is minimised or more preferably eliminated in the final third stage, incubator as a catalyst. The incubation process is over, with regards of the protective and support aspects the firms is exposed the general aspects of "doing business", were the firm needs to deal with the general shifts in the market and exposure to competition. The incubation process creates a fine line between what is acceptable protection and support for emerging and new firms or the crossing over to unacceptable subsidizing of firm operations, which distorts the market process.

#### 4.4. Evolutionary incubation life cycle model

The finding of the study is summarized in [Table 4](#). The table presents findings with the regards to life cycle perspective of incubators. The table also presents and integrates the life cycle perspective of incubation from a resource and capability evolutionary perspective. Where configuration of organisational entities with the regards to resources and capabilities, shifts over different life cycle stages, which also results in different incubation stages.

In this study, the term incubator is synonymous with incubation process, and it is used as a concept to describe how conditions are

created for new firms based on three connected but distinct process stages. These stages manifest as differences in motives and purposes, outcomes and efficiency, resources and capabilities, and stakeholder interest.

From a first glance of the incubator literature, three distinct stages can be identified, which has implications for new venture configuration and operations. Based on our findings we propose a new conceptual framework, namely "a dynamic incubation stage model", which includes underlying functions of incubation such as resources (motives), the driven participant in the incubation process, required resources, as well as the outcomes of incubation process. [Table 4](#) shows the interaction within and between different stages, where Step 1 deals with the creation of new firms and Steps 2 and 3 deal with the support of new venture and entrepreneurship.

## 5. Discussion

The incubation process is associated with enabling new business creation, supporting new firm development, and enhancing business performance through entrepreneurship. The first stage in an incubation process is the creation of new firms through "spin-offs" and disinvestments. The second incubation stage comprises support (often external), where new firms receive help in developing their business operations. The third stage focus on supporting, enhancing, and design enduring business performance.

Our combined bibliometric analysis and the literature review of the incubation literature has support in the literature for considering incubation as an evolutionary process. This is also supported by [Lager \(2011\)](#), [Kurkkio et al. \(2011\)](#), [Milewski et al. \(2015\)](#) and it is possible to draw parallels to the life cycle of organisations as supported by [Hackett and Dilts \(2004\)](#), [Lindelöf and Löfsten \(2005\)](#), [McAdam and McAdam \(2008\)](#) and [Patzelt et al. \(2021\)](#). Incubation organisations must provide different resources (tangible) and capabilities (intangible) in the different phases (compare with the experiences from e.g. [Lindelöf, 2002](#); [Aaboen et al., 2016](#)). The literature and as displayed in our tables (1–3) shows, there is a differentiated need for support in different the three stages (compared to e.g., [Barbero et al., 2012](#)). Furthermore, the literature shows that for a successful incubation process, the surrounding environment with other start-ups and supporting functions must form a network with the aim of contributing to the success of the incubating firm, which is consistent with [Lecluyse et al. \(2019\)](#), which we refer as ecosystem.

[Table 4](#) shows three main processes and indicates how an incubator is defined and operates, where the definitions and functions are correct based on their assumptions. The difference between definitions of stages one, two, and three can be compared with the discussion of what is entrepreneurship, where entrepreneurship is understood as a process for starting and running a business. The prerequisites for efficiency depend partly on the firm's and the contractor's initial resources and capacity but also on the capability and resource ability of the incubator. If incubation as a function exists, then this forms the basis for whether incubation as a process exists, which means.

- That an understanding of incubation depends on time, space, and function (process).
- That incubation is considered a process, and it is assumed that the incubation process supports the ability of resources and capabilities for entrepreneurial development (ability and function).
- That when incubation exists, the process leads to the emergence of new firms, survival, growth, and profit (purpose).

#### 5.1. Incubation as eco-system and opportunities for future research

The findings presented here relate to a steady stream of studies acknowledging the importance of the incubator's influence on

entrepreneurship. Furthermore, the contextualisation of entrepreneurship has become increasingly important to understand when, how, and why entrepreneurship happens (Welter, 2011; Fayolle and Liñán, 2014), but why is the context for entrepreneurship so important to study?

First, economic behaviour can be better understood within context. As Welter (2011) argues, there is a tendency to overestimate individual factors and underestimate contextual factors that enable or inhibit individual behaviour. Secondly, Baumol (1990) states that pre-requisites for entrepreneurship change over time and place, therefore rendering a strong need to analyse differences and tendencies that emerge from the aspect of context. Establishing links between individual behaviour and context needs to be handled with care since the relationship between the two is not obvious.

In conclusion, deeper knowledge on the incubator, its dynamic incubation process, and the incubation process as an ecosystem is needed to improve the possibility to realize opportunities related to new ideas and spin-offs. This will strengthen knowledge on incubators as communities and understanding of entrepreneurship as a process and function.

The ecosystem approach converges notions of biology and ecology in understanding economic systems (Tece, 2007). As such, the ecosystem approach offers methods of analysis based on an established taxonomy and theory that bridges the individual – contextual nexus. Welter (2011) describes a multi-layered eco-system approach where the nature of individuals is combined theoretically with the components of the economic system to analyse the relationship between context and entrepreneurship (Stam and Spiegel, 2017; Malecki, 2018). Relations and network theory are common in other areas of research to explain the interdependencies between economic actors (e.g., Håkansson and Snehota, 1989).

Firms must interact with different communities within the ecosystem to maximize resource and knowledge transfer and to understand the logic of exchange dynamics operating between actors (Lindelöf and Löfsten, 2003). This exchange is dynamic and evolutionary over time, rendering the ecosystem to be dynamic and evolutionary to fulfil its supportive and protective purpose. This community (network) interaction presupposes a delicate balance between existing opportunities and threats in the marketplace to coordinate knowledge acquisition in a meaningful way (Löfsten and Lindelöf, 2001, 2003; Pitelis and Tece, 2010). The concept of the “ambidextrous organization,” which defines how organizational adaptation and change take place, envisions a venture that can exploit available knowledge and, at the same time, manage threats to the firm that might leave it exposed (Chang and Hughes, 2012; Ritala and Hurmelinna-Laukkanen, 2013). The venture, with its established networks interacting with the different communities, will then ‘seesaw’ between absorption and diffusion to maintain a certain balance and to comply with community standards (Yusubova et al., 2019; Sedita et al., 2019). The question then becomes for incubators: What are the different dynamic organizational capabilities that create conditions that facilitate the required change, while simultaneously ensuring a sense of stability and protection?

Processual understanding becomes a tool for determining how, where and when value for incubated firms is created and captured when interacting with various actor driven communities within the incubation ecosystem to explore.

- i. How changes in evolutionary process stages affect resource value, appropriation, and the nature (open/closed) of co-creation and learning within the ecosystem communities.
- ii. How co-creation and learning, and the combination of network configurations (human, technological and organizational), are affected by the process within the ecosystem communities.
- iii. How co-creation and learning changes in process stages affect strategy, knowledge development, and the community (network) within the ecosystem.

- iv. How boundaries and levels of interaction of an evolutionary/ ecosystem as community are defined and understood.
- v. How the governance of evolutionary ecosystems as community is defined and understood.
- vi. How bridging an evolutionary lifecycle transition phase within an evolutionary ecosystem as community can be defined and understood.

To better describe how business origin, survival, and growth is generated, we need to acknowledge what influences incubation in the ecosystem process. A diminished need for the approaches discussed above often stems from a lack of acceptance or a lack of recognition of a new reality created by a problem and the concomitant need to formulate viable solutions. Less emphasis on policy relevant theories – how innovators might co-create knowledge for organizational change – only feeds a self-reinforcing cycle and worsens efforts to address existing reality. We find that these questions have been more researched than other initiatives aimed at designing better policies that influence the/ ecosystem, incubator processes, and incubator community development.

## 6. Conclusion

### 6.1. Definition of incubation and agenda

As described in the introduction, we argue that the concept and definition of an incubator has been distorted over time, which means there is a need to clarify incubator as a concept as well as its various incubation phases. The essential features of the incubator are support and protection (Albahari et al., 2022; Jutterström and Samuelsson, 2022), however the current state of the research field does not incorporate the evolutionary aspects of incubation. Based on our incubation research review and summarizing the research questions we propose the following definition of incubation:

“The incubation process is an essential evolutionary incubation process and a part of an eco-system, where agents, organisations, providers, interact by the transferring of resources and capabilities from one organisational entity to another, done in consecutive dynamic stages, creating an ecosystem with apparently different purposes and agents, but with the same intentional outcome. The advancement of entrepreneurial firms, the incubator as the ecosystem for genesis, survival, growth, and success. The organisational boundaries to that of the ecosystem is inherently connected and defined by the utility of agents, organisations and providers. In the aspect of utility there is also a need to relate the incubator process to the new venture process.”

By adding this definition to our understanding, we do not only generate clarity of what incubation is, but we also add to the conceptual understanding what ecosystems are.

Incubation is vast research field, but we believe that this study managed to summarize the current research field’s main finding in relation to the research questions and point out future research. From the biometrical analysis and the literature study, the study establishes that incubation cannot be seen as static process and designated to single organisational entities, but as an evolutionary process. The evolutionary process involves different organisational development stages and shifts in stage of processes. This research summarizes what these stages mean in relation to the incubation process and its specific dimensions. The findings show the evolutionary incubation process as a part of an ecosystem, where agents, organisations, providers, and organisational boundaries are less obvious. These findings have implications regarding how to look at incubation, incubation processes, and enablers of processes. This facilitating of incubation process creates a further need to understand context and incubation as an ecosystem. This new insight, incubation as evolutionary process incorporated in an ecosystem, opens

several interesting new research angles of understanding and analysing system dependencies, system and organisational design for processes and effects.

We have attempted to map the literature on incubators through the development of tables aimed at identifying three generic processes within the typologies of incubators from an organisational configuration, process, resource, and capability functional perspective. The analysis enabled us to identify and integrate these into a framework, using the set of variables or combination of variables that were found by the various authors in the literature, to differentiate between incubators and incubator processes. This was dependent on time, space and function, resource and capability endowment and purpose. This provides a first step towards mapping understanding on the various conceptualisations and taxonomies associated with incubators as well as the process itself.

Additionally, the analysis enabled a distinction to be drawn between research that focused on incubation as a process of new venture creation and research that focused on incubation as a dynamic process of new venture development. It also uncovered a gradual move from the former to, the second and finally the third, with implications for the type of issues that need to be addressed by incubator scholars. By mapping the existing literature (see tables), we were able to identify gaps in understanding related to existing process taxonomies and potential opportunities for future research – incubators as dynamic community-based ecosystems.

The literature on incubators offers diverse conceptualisations and models for understanding and analyse of incubation. Such models largely focus on identifying diverse stakeholders and analysing incubators from a single perspective. This study provides multiple contributions to the literature of incubators and incubation. First, we discussed the historical development of the concept of incubation. Second, we reformulated a definition of what incubation is from a life cycle and ecosystem perspective. Lastly, we developed a new conceptual framework, a dynamic incubation stage model for analysing the three stages of incubation and ecosystems.

## 6.2. Limitations

This study is not free from limitations and as any bibliometric analysis, it is based on the selection of key word as search terms and as such, selected databases may not be fully complete. As such, the literature review provided in this paper is limited in scope by the set of papers obtained. The study has been extensive in its use of six databases, ABI/INFORM of ProQuest, Business Source Premier/Econ Lit, JSTOR, Science Direct, Scopus and Web of Science to ensure validity. The databases are well known and frequently used we deem them adequate for the exploration of the research questions. Yet it cannot be excluded that even with and through investigation, relevant articles may have been left out. However, we believe that the critical mass of knowledge/understanding obtained through this analyse enables the development of a broad conceptual framework that contributes to understanding of the incubation evolutionary process as well as the ecosystem as a concept. We conducted a thorough investigation, although we recognize this may be influenced by bias. However, we believe that the synthesis presented here provides a solid and sound base for future research.

## Data availability

No data was used for the research described in the article.

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