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**A review of Business Incubator Model related Literature and Evolution**

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**Abstract:** Business incubators (BI), accelerators (BA) and science parks (SP) are widely recognized as ways of fostering innovation and help economy growth. This paper presents a review of business incubator model related literature and evolution as part of a research aiming at the development of a functional model describing BI operation, identifying the points of need/provision of information as necessary to support decision-making for the management and monitoring of the system efficiency and effectiveness. The various definitions have already been discussed in a previous paper in the context of the same research while the proposed model and the derived metrics will be discussed in separate future papers based on the results of the current experimentation.

**Keywords:** *Business Incubator/Accelerator, Science Park, Operation Model, Operation Process, System Monitoring & Management.*

### **Introduction**

Our empirical findings are based on in-depth case studies of over a dozen Incubator/Accelerator, 25 semi-structured interviews with managers of Incubator/Accelerator in Europe, Belarus, Kazakhstan and Egypt, plus EU incubator benchmarking surveys, guidelines for business incubator development, reports on business incubators best practices and interviews with the heads of technology transfer offices of two top technology universities in Kazakhstan and one in Belarus.

*Table 1 – Sources of information and data used in the study*

<b>Dates</b>	<b>Institution</b>
Oct 2017	Autonomous Cluster Fund " <b>Park of innovative technologies</b> " (Almaty Tech Garden), Almaty, Kazakhstan
Oct 2017	<b>Techno park Astana Business Campus</b> , Nazarbaev University, Astana, Kazakhstan
Oct 2017	<b>Science and Technology Park "Ertis"</b> , Pavlodar, Kazakhstan
Oct 2017	<b>MOST</b> Business incubator, Almaty, Kazakhstan
Nov 2017	Business incubator BSUIR, Minsk, Belarus
Nov 2017	<b>Hi-tech park</b> , Minsk, Belarus
Nov 2018	Business incubator <b>AUC Venture Lab</b> Cairo, Egypt
Nov 2018	<b>The Greek Campus: FALAK Startups accelerator</b> Cairo, Egypt
Nov 2018	Business incubator <b>Kamelizer Technology</b> Cairo, Egypt
Nov 2018	Business incubator <b>Flat6Labs</b> Cairo, Egypt

Besides these entities, the study benefits from three other sources of information, namely: 1) the involvement is the design and start-up of KGU and STAR-TAC business incubators, 2)

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the interaction with 3iCampus and FasterCapital, and 3) the supervision of Passerini (2016) research on the performance analysis of business incubators and accelerators in the London metropolitan area un-published thesis, available by permission of the author.

Additionally, the present research relies on the analysis of literature, best practices and case studies as well as interviews. The proposed model is informed of the “ten principles of Cabral” (Cabral, 1998a,b), the different business models reported in literature and most frequently adopted as per (Ryzhonkov, 2014) research, and the most common BI definition and functioning approach as reported per best practices and guidelines provided in UK (NESTA, 2014; BEIS, 2018; Clarysse et al, 2015; Dee et al, 2015; Miller & Stacey, 2014 ; Dee et al, 2011 ; Miller & Bound, 2010), EU (Anca, 2017; Avnimelech et al, 2007; Frenkel et al, 2008), USA (InBIA, 2016) and Russia (RVC, 2017).

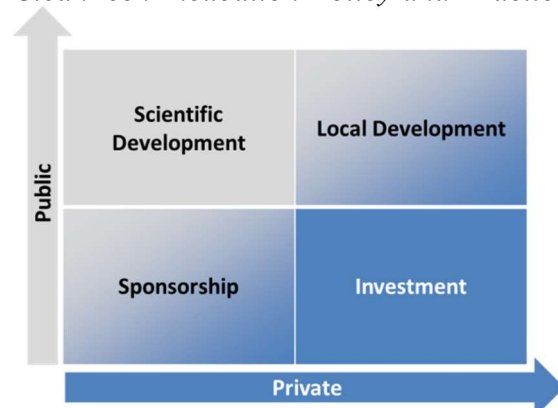
Most of the sources used agree that Business incubators are widely recognized as ways of fostering innovation and as such represent a very interesting research topic. However, despite over 50 years in operation, there is still some disagreement on what Business Incubators real impacts are. In time, several definitions have been formulated and many different models/approaches to business incubation (mostly focused on the economic aspects) have been developed depending on circumstances and location (Ryzhonkov, 2014). From the analysed sources, it is apparent that BI definitions differ in terms of approach (purpose, structure, process, etc.) as well as in terms of underpinning business model and implementation structure. The residence period varying from few weeks to 2-3 years and data available mostly refers only to the success cases without an adequate representation of the failures and difficulties encountered by the residents. In (Ryzhonkov, 2014) analysis, it is made clearly apparent the massive disparity between applicants and residents (around 1000 to 30-40 at most) as well as BI applicants’ acceptance rate. This in turn, points out the administrative complexity of the system and the extremely high rate of application refusal (and possibly lost opportunities), which could be possibly addressed by the introduction of Virtual Incubators, at least according to (Ryzhonkov, 2014), however, this does not eliminate the need for a thorough assessment of ideas - in terms of merit and impact - given the relatively scarce availability of funding and investment opportunities when compared with the demand.

The CleanTech Incubation Policy and Practice (2014), points out the four different basic model of business incubation available depending on the operation focus and source of the funding (Public versus Private) as well as the essential business model of incubation adopted (ibid, pg. 87-88).

CleanTech approach has been selected for its general validity and simplicity; it presents the various possible situation on the basis of the “organisation of the incubation process itself, and on the dominant stakeholders taking part in its organization” (ibid, pg. 88). The categories are mapped as per the diagram aside. This classification is particularly important when considering that – according to (Ryzhonkov, 2014) – 95% of business incubators are non-profit organizations.

The predominance of non-profit organization hints to a system that is more concerned with the development of the economic infrastructure (accepting the possibility of a certain

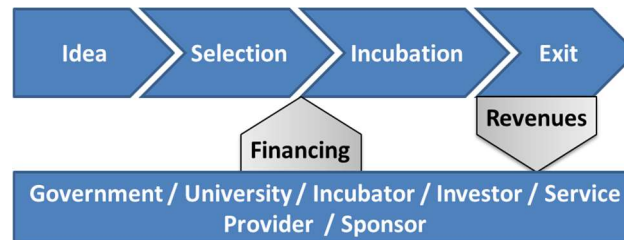
Figure 1: BI nature - adapted from CleanTech Incubation Policy and Practice



(Source: CleanTech Incubation Policy and Practice (2014))

number of failures) than a strict profit-oriented approach. In either cases, the overall process starts with the idea generation followed by a selection process that leads to incubation of the selected few and ends once the resident can create revenues, is ready to enter the market and can start providing some kind of economic/financial return to the financing entities (ibid, pg. 87).

Figure 2: BI process - adapted from *CleanTech Incubation Policy and Practice*



(Source: *CleanTech Incubation Policy and Practice* (2014))

Given the reported acceptance rates and the described process, it is clear that not all ideas will have the opportunity to be funded and thus the selection process (which differs according to BI nature and focus) is the one that differentiates the various models underpinning business incubation (as the different motivation and expectations of the entities backing the incubation will have a significant direct impact on the selection process itself).

### Literature review

Despite the fact that the first known business incubator dates back to 1959 (REF NEEDED), the model defined by (Campbell et al., 1985) is the first attempt to provide a theoretical understanding of the phenomenon, almost 30 years in the making. In this period, the phenomenon had been growing to the point that Quinn (1985) was talking of “Controlled Chaos” when referring to the management of innovation. The interest sparked in academia led to Campbell’s model which places the focus on process functions which are seen as the main business development tool that can transform ideas into real businesses. Non so long after, Smilor (1987) proposed a refining of Campbell’s model arguing that an incubator provides a transformation mechanism that assist entrepreneur in building a venture through four dimensions: 1) credible development, 2) shorter learning curve, 3) faster troubleshooting and 4) access to the network of entrepreneurs. Smilor’s approach is more focused on the relations among actors and their role in the process than in the process itself, however, both these models are interested in the business process, although from different perspectives, and not on the knowledge transfer and entrepreneurship skills development which in the end are what will empower the resident to thrive and survive. In other words, these models would not support the management of a BI to evolve based on the understanding coming from combining the lessons learned with the understanding of the process as described in the model.

In 1988, Nijkamp proposed a combination of Campbell’s and Smilor’s model to which then Smilor further contributed (Malecki & Nijkamp, 1988). In Nijkamp’s approach business incubation mediates between entrepreneurs and community requiring the existence of a perceived need and opportunity leading to a demand for incubation services. Once again, the model is more focused on the justification of the process than on its functioning (given the adopted black-box abstraction technique). According to (Ryzhonkov, 2014), Smilor’s, Campbell’s and Nijkamp’s models are, essentially, structure models of a business process and the authors focus was mostly on the components of the process rather than the process itself.

Interestingly, a further dozen of years separates the next significant model presented by (Carter & Jones-Evans, 2000), later revised with Zedtwitz to add five services crucial for the residents: 1) access to physical resources, 2) administrative support, 3) financial resources, 4) business/organizational support and 5) networking activities (Carayannis & Zedtwitz, 2005). However, even if this is first conceptualization of the business incubation flow, it does not give practitioners any relevant advice of how to set up or manage a business incubator.

The beginning of the 21st century has been characterised by several studies on BI, probably because of the aftermath of the Dot-com bubble and the need to support a fast recovery of economy. Based on the findings within the IT industry, (Nowak & Grantham, 2000) proposed the Virtual Incubation Model as “traditional business development entrepreneurs face a common challenge: the absence of capital, human resources, and management capabilities”. In their model the focus is on providing small business with a structure and mechanism to easily access information on “best practices”, industry and management experience, resources for international marketing, sales and distribution. This approach stresses the access to resources rather than the development process that may be needed to transform the would-be entrepreneur into a real and active entrepreneur.

In the same period (Booz, Allen & Hamilton, 2002) proposed a Corporate Incubator Model aimed at enhancing organization’s capability to innovate. This connects to the previous findings of Quinn (1985) in the sense that, while certain corporate had been successful in nurturing innovation, this was not always the case and a lesson was to be learned. They explicitly described the process, its pros, and cons, as well as key success factors that could help corporations to boost innovations. At the same time, Lazarowich and Wojciechowski (2002) proposed the idea of a “New Economy Incubator Model” stressing the need to examine “best practices” of setting up and operating business incubators to extract a blueprint for the establishment of a Business Incubator and the creation of a model suitable for local environment (in particular for Russia). Among the findings of their analysis of best practice emerges the suggestion that incubators should not be stand-alone operations but rather integrate into a network to promote innovation, competitiveness, technology transfer and other key public policy objectives.

In 2000 the UN published a very complete and detailed “Technology Business Incubator Manual” intended to guide planners, educators, sponsors and management teams in exploring and establishing a successful program (Lalkaka, 2000). The document has five parts, covering: 1) Incubation Concepts, 2) Planning, 3) Implementing, 4) Operating, and 5) what can be learnt from other previous experiences. The aim in this case was operational to guide whoever wanted to set up one such initiatives (although mostly aimed at governments and public institutions).

In 2002 the European Commission Center for Strategy & Evaluation Services published a benchmarking study including a general model of incubation which – according to (Ryzhonkov, 2014) – is based on previous work of Costa-David, Malan, and Lalkaka for NBIA. The model gives a clear perspective on what practices are used, however, according to (Ahmad, 2012), it has limitations as it does not provide an exact sequence of practices/step-by-step to be followed, is detached from national and regional environments, and does not account for the role of the residents.

In 2003 (Gibson & Wiggins, 2003) examined the situation of the US incubators and focused on the case of the Austin Technology Incubator providing a modelled view that is substantially aligned to the one previously defined by of (Smilor, 1987) although with some differences in terms of system I/O and with a strong emphasis on the external perspective, neglecting the internal one, entrepreneur’s process and incubation process (Ryzhonkov, 2014).

A further model substantially aligned to the one of (Smilor, 1987) is the one proposed by (Sahay, 2004), who clearly described the role of Technology Business Incubator, Angel Investor and Venture Capital funding in industrial development and used a simple model to show the main building blocks of business incubator.

In the same year, (Hackett & Dilts, 2004a) presented a model of business incubation stressing the fact that “an incubator is an enabling technology, rather than a critical or a strategic technology” as it is the implementation of a socio-economic strategy to promote the survival of new firms overcoming the difficulties that a new business may otherwise face in its early stage. In this respect (early stages), it is worth taking into account that the average incubation cycle times lie between two and three years and the rule of thumb is that a company may be in loss for the first year, should reach balance by the second and be profitable by the third. Hackett & Dilts point out that the “mere existence of an enabling technology such as a business incubator does not, in and of itself, necessarily translate into the development of critical and strategic technologies embedded in the products and/or services of innovative new firms; a lack of inputs such as capable entrepreneurs and/or critical or strategic technologies for commercialization might go a long way toward explaining why many incubators perform so poorly” (Hackett & Dilts, 2004a). Actually, according to (Relan, 2012), 90% of incubators and accelerators will fail.

These remarks resonate also in (Ryzhonkov, 2014) analysis that most Business Incubators “only select people and ideas, but they don’t grow them”. However, Hackett & Dilts also presented a theory that affirms and defends that the performance of business incubation depends on the incubator’s ability to create options through which the selection of weak-but-promising firms occurs (Hackett & Dilts, 2004b). In this respect they developed a specific formulation of Business Incubator Performance, where BIP stands for Business Incubation Performance, SP for Selection Performance, M&BAI for Monitoring & Business Assistance Intensity, and finally RM for Resource Munificence.

$$BIP = f(SP + M\&BAI + RM) \quad (Hackett \& Dilts, 2004b)$$

Hackett & Dilts (2004b) describe their model as follows: “the model indicates that incubatees are selected from a pool of incubation candidates, monitored and assisted, and infused with resources while they undergo early stage development. Outcomes refer to the survival or failure of the incubatee at the time it exits the incubator. Controls include regional differences in economic dynamism, level of incubator development and size of incubator.”

Based on the data and feedback collected during this research, Hackett & Dilts approach to modelling the system is extremely informative (actually, the functional model we have developed has brought to very similar results for what concerns the factors involved in determining the performance of a business incubator and the criticality of certain steps in its development process and subsequent cycles), yet (Hackett & Dilts, 2004b) model has a number of limitations according to (Ryzhonkov, 2014), which have been factored in the modelling effort described hereafter. More specifically it would be necessary to clearly identify the criteria to adopt for the selection of the candidates as well as the performance metrics to be used internally so as to measure also how start-up company performance would be outside in the real world. Another important point is how external issues, such as location and partnerships are taken into account as they can strongly influence the incubator operation and performance which would depend on the partnerships gained and maintained with higher education institutions, technology centres and other research institutions.

In (Bergek & Norrman, 2008) is proposed a modelling approach pitching a similar argument to the one of (Hackett & Dilts, 2004a), however, Bergek and Norrman reject the principle of a black box incubation model centred merely on results. They insist on the relevance of the



selection process as one of the most important aspects which needs to be aligned with the business incubator's characteristics and goals. In their view, the selection should be based either on the business idea or the entrepreneur's personality traits, personal skills, and capabilities. However, our research has pointed out that in the majority of the cases the selection entails both aspects rather than one or the other and this often restricts the possibilities of the applicants on the one hand, while tends to safeguard the image of the incubator and the expected ROI of the investors connected (especially in the private sector incubators). Overall, each stage of the process is attempting to reduce uncertainty and risk while creating a direct link between objectives of the incubator and its performance. Additionally, Bergek & Norrman didn't state explicitly how and which services should be applied, they argue that this choice has to be taken by the BI Management depending on its location and context. This makes their model general but at the same time less easy to implement as while the structure is logic and easy to follow, there is no practical guidance on what needs to be used unlike what provided in the UN manual published in 2000.

Although established in 1996, a World Bank Group program to promote entrepreneurship and innovation (InfoDev) has developed and published, in the period 2010-2016, several materials that could be valuable for those who are creating business incubators. The process they adopt stresses the linkage between business incubation phases and entrepreneurial life cycle attempting to map the two one on the other. The possibility to keep relationship with [alumni] mature companies can be a crucial strategy to assist with and subsidize their other programs (InfoDev, 2010). Our proposal for a specifically designed Information Management System for Business Incubators/Accelerator or Science Parks aligns with InfoDev suggestions but takes it forward to provide an additional source of income for the Incubator/accelerator as well as tighten and consolidate the connection with their alumni.

In 2010, Ewan Jones held a presentation at the SBI Conference in Liverpool titled "How to Create an Award Winning Incubator?" where he described the key characteristics of a Business Incubator based on the best-practice and examples available at Wales Digital (Friesi, 2011). In essence, according to Jones, there is an "incubation chain" characterised by entry policies, an incubation program (divided in early stage – about 2 years – classic incubation – about 2-3 years – to be followed by a graduate programme lasting ~ 1 year) as well as graduation policies and procedures (Friesi, 2011). The incubation program should be "tailored service focused on client need" and all these steps are interconnected. This is a first comprehensive approach to link incubation process to the processes in the innovation ecosystem and entrepreneur's life cycle (Ryzhonkov, 2014). Furthermore, it provides a clear idea of a valid incubation value chain, however, its extensive duration (~5-6 years) significantly limits the number of potential attendees and makes the potential negative consequences of a failure during the program even more daunting (not only for the applicant but also for the image of the BI).

A different approach has been adopted by (Chandra and Chao, 2009). This model focuses on the flow of the resources between the key stakeholders in the innovation ecosystem that is Government, Universities, business incubators and would-be-entrepreneurs. The role of private investment is not evident (this is probably due to the socio-economic context of the analysis, i.e. China), but clearly shows how each actors gains something in the process thanks to the resources flow between stakeholders (an aspect that has not been discussed previously).

Becker & Gassmann (2006) pointed out that "instead of comprehensively differentiating between non-profit and for-profit incubators, research has described a whole array of partly overlapping archetypes, thus missing out on important aspects". Their work on the one hand describes a business incubator analysis framework differentiating non-/for-profit incubators and, on the other, focuses on the mission, structure, process and resources needed, and how the Universities can learn from the Corporate's approach.

According to (Ryzhonkov, 2014), (Gadea, 2016), and (de Bem Machado, 2017), an interesting process and operation description of a Business Incubator has been provided in several presentations by Metibtikar in 2012. He describes the business incubation process stressing the importance of embedding a built-in Plan-Do-Check-Adjust (PDCA) cycle into every separate process/practice of an incubator. In his view, this is the best way to ensure that the process adapts to the life-cycle of the start-up development always providing value and benefit to the entrepreneur. Metibtikar's approach links the entrepreneur needs to the incubator processes, and the needs of the stakeholders while making a clear distinction between the process followed by the entrepreneur and the support services that are delivered to him. In our opinion this approach would be particularly beneficial and has been accounted for in the design of the process model we have built in our research. In particular, we have emphasised the fact that each company being incubated/accelerated is equivalent to a project and the PDCA is a well established approach to ensure quality in Project Management delivery (Sokovic et al., 2010).

One of the most recent approaches is proposed by Ryzhonkov (2014) who considers "Business incubation as a set of practices, tools and elements that form a system which helps entrepreneurs to increase their chances for success and nurture them in mature businesses". Based on this definition, Ryzhonkov (2014) formulates the concept of what he calls a "Generic Business Incubation Model" and that is substantially based on a synthesis of the models discussed beforehand trying to collect and combine the benefits of all of them. His analysis showed that there are still many challenges in the business incubator sector and that existing models must be improved to better fit the needs of the entrepreneurs. His analysis shows that the incubation cycle has a duration that can be estimated vary between 3 months and 3-5 years, depending on the sector, the type of the incubator, and capacity of the proposed activity, the profile of the businessman and his team and the evolution of the project activity itself. Furthermore, Ryzhonkov (2014) estimates that for every 1000 annual requests for access to the incubators, only 20 to 40 annual projects of some success are generated. His estimation is even more worrying when considering (Relan, 2012) findings that 90% of incubators and accelerators may/will fail as in many cases the BI itself are a start-up and therefore the potential for a high failure rate. Relan (2012) also pointed out that it is "more efficient to kill ideas rather than companies", and therefore it is far better not to "spin a company out without traction". Our research, as well as Ryzhonkov (2014) opinion that the future of Business Incubation is likely to be in "Virtual Business Incubators", leads back to the paramount relevance of carefully selected residents. At the same time, these observation cast doubts on the real effectiveness of Business Incubators and the need to focus on the process, its efficiency and effectiveness rather than on the amount of funding start-ups have managed to acquire which appears to be widely the practice, as if despite stringent selection process and criteria, the success of the incubation program is still a very limited percentage of the intake, then it is reasonable to investigate why incubators working (theoretically) with the best projects, selected based on economic efficiency, opportunity and sectoral character, still fail and, therefore, focus on the process in its entirety (from design to execution) and the way it is measured and managed.

This why the present research attempts to exploit tools and practices used for quality assurance and process optimization to derive a flexible, adaptive model of the incubation process operation that can be used to streamline resource management and optimize the process based on execution and output feedback while taking into account the operation context. This choice is grounded and supported by the findings of (de Bem Machado et al., 2017), that the models reported in literature describe the business incubator as a transformation mechanism without making explicitly better management practices for the continuous improvement of the incubated enterprises, this is also pointed out by (Ryzhonkov,

2014) when analysing (Hackett & Dilts, 2004) model and suggested by (Metibtikar, 2012) when stressing the need for a constant attention to service provision and management as well as to the Plan-Do-Check-Adjust (PDCA) cycle (which ultimately implies paying attention to process quality as per ISO9001, ISO21500, TQC, 6σ, etc.).

All in all, one aspect has clearly emerged from the analysis of both the business models and definitions emerged in time for business incubations: the focus is not on the development of the personal and professional characteristics of the (potential) entrepreneur but rather on the economic profitability of the idea/project and its potential return on investment (ROI). Almost all models stress the relevance of the selection process, yet no clear indication on which selection criteria to use or guideline for measure the effectiveness and efficiency of BI are given. As most incubators/accelerators demand a share of the resident equities the potential profitability of the projects is paramount, less so the influence on the “making” of the entrepreneurs proposing them, their ideas and their quality. This depends more on variables originating/controlled from the external environment, therefore, the impact of the incubator in producing a successful company, ultimately, depends on the characteristics of the candidates. And since the incubators too often do not focus on having an influence on entrepreneurs’ profiles most BI become a hostage of the innovation ecosystem in which they operate. If the ecosystem is sustainable and produces a lot of good projects and bright entrepreneurs, then incubators can become a benchmark for leading and successful companies. Furthermore, the cultural aspect is ignored in the modelling while it has a significant impact.

## **Methodology**

In the methodology please refer to the research strategy used, sample size and instruments used. When appropriate provide a table of constructs/dimensions/indicators and respective sources of where you took the scales from.

In order to ensure feasibility of our research on a domain that is extensive and has been researched for a number of years from very different perspectives, we have adopted an integrative review approach (Jones-Devitt, Austen, Parkin, 2017). The integrative review carried out intended to bring together and integrate the knowledge produced on business and management model for Business Incubator to identify the best possible way to support the decision making process thanks of the data managed and collected by information management systems. Our research is, therefore, located in the domain of Business and Management as it relates essentially to Business Incubation and to General Management, but it is not related to Accounting or International Management. There are 663 journal resources listed in Scopus that fall under the 3 subject areas related to Business and Management, that is:

- Business & International Management,
- Business, Management & Accounting (Miscellaneous),
- General Business, Management & Accounting.

If we consider only the Open Access, the count would reduce to 70. If we focus only on “Business & International Management”, then the overall number of sources available is 386 of which only 41 are Open Access. As inclusion criteria we considered articles/papers/reports/studies/sources that were fully accessible and fully matched the search criteria and were, therefore, included. As exclusion criteria we considered articles, papers, reports, studies, and sources that could not be fully accessed or were too dated or did not fully matching the search criteria and were, therefore, disregarded.

We initially identified the main keywords that were connected to the core concept of our research and mapped them using a mind-map approach. Once we had exhausted the keyword



identification, we designed the queries to be carried out for indexed publications in Scopus and Google Scholar. The search criteria included restriction of search fields to “Title”, “Abstract”, and “Keywords” only. Additionally, Google was used to locate officially published documents by INBIA, and NESTA plus regulations, international and national documents, guidelines, manuals and reports officially published by EU, UN, World Bank, and CSI official sources.

Table 2 - Systematic results of the literature and sources search

Search term(s)	Identified		Selected	Used
	GS <sup>2</sup>	S <sup>3</sup>		
“Business Incubator” AND definition	23 <sup>4</sup>	15	14	4
“Business Incubator model”	316	7	13	4
“Business Incubator business model”	13	1	13	5
“Business Incubator performance”	243	9	16	4
“Business Incubator” AND efficiency	5 <sup>5</sup>	38	14	4
“Business Incubator” AND effectiveness	36 <sup>6</sup>	64	16	4
“Business Incubator” AND metrics	2 <sup>7</sup>	5	11	4
“Business Incubator” AND “Key Performance Indicator”	127	2	16	5
“Information Management System” AND “Business Incubator”	54	0	11	4
“Information Management System” AND “Science Park”	174	2	17	1
“Business Incubation” AND “systematic review” OR “literature survey”	407	4	17	5
“Business Incubator” AND “systematic review” OR “literature survey”	408	7	13	4
“Business Incubator model” AND “systematic review” OR “literature survey”	52	0	10	4
“Business Incubation model” AND “systematic review” OR “literature survey”	48	1	4	1
			185	53

Given the variety of adopted models and naming conventions for the business incubation process it was perceived that an inductive approach in the context of an Interpretivist research philosophy would best serve. In conducting the research was also found that there is a strong resistance to provide information on certain aspects such as resident failures irrespective of the fact it being during and soon after completing the program. This suggests the desire to avoid a thorough scrutiny of performances and reinforced the authors’ belief that better ways to understand and manage the process are needed to support both prospected residents and investors. Better information management could lead to a clear assessment of the efficiency and effectiveness of business incubation. Therefore, the proposed model has been drafted using a descriptive approach based on several reports and case studies plus the direct involvement in a few Business Incubators (via direct observation), some interviews and a small survey. The results presented here are the basis for the next step that will include a survey and heuristic evaluation of the proposed approach, identified metrics, and KPIs.

<sup>2</sup> Google Scholar

<sup>3</sup> Scopus

<sup>4</sup> The search has been repeated using “Business Incubator definition” to reduce results from the 15400 originally identified

<sup>5</sup> The search has been repeated using “Business Incubator efficiency” to reduce results from the 13100 originally identified

<sup>6</sup> The search has been repeated using “Business Incubator effectiveness” to reduce results from the 15400 originally identified

<sup>7</sup> The search has been repeated using “Business Incubator metrics” to reduce results from the 2910 originally identified

## Conclusion

The analysis of Business Incubation as a process and of Business Incubators operation/functioning model is still open to further developments and could lead to the design of better approaches able not only to take into account the ten principles of Cabral, the best practices identified by the EU, UN, NESTA, INBA and others and reported in literature but also overcome the current limitations and the rapidly evolving phenomenon of the “Virtual Business Incubators/Accelerators” as suggested by Ryzhonkov (2014).

The growing adoption of business incubation/acceleration in the low/middle-income countries (such as Kazakhstan, Belarus, and Egypt) can certainly benefit from a better definition of the process and operational guidelines that could help maximising the benefits while minimising the issues encountered in the last 50 or so years of development of Business incubators (BI), accelerators (BA) and science parks (SP). Countries such as China have completed in 2017 an analysis of the outcomes from business incubators, while INBIA conducts a yearly assessment of the performances of the incubation/acceleration practices to inform their members and help them adapt their strategies to the constantly changing operation environment. NESTA has conducted a number of studies on this phenomenon and overall, there is a continuous production of new data.

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