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Research paper

The role of business incubator on cultivating innovation on start-ups: The case study of Bandung techno park (BTP) Indonesia

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Abstract

The importance of business incubators to support the growth of start-ups cannot be overemphasized especially in developing country such as Indonesia. This study aims to determine the most appropriate model that competent to provide an accurate depiction of the role of a business incubator on cultivating innovation of startups during the incubation process. It is conducted by using a case of Bandung Techno Park (BTP) as one of the first business incubators in Indonesia that positioned itself as an incubator for technology-based start-ups. The data were collected by ensuring the credibility, transferability, dependability, and conformability by adopting triangulation as the primary method. Informants were recruited from different stakeholder groups and provided with the opportunity to verify the result of the interviews. The findings show that there are none of the existing models that are able to provide a complete yet accurate depiction of BTP functioning. Almost all of the models suffer from lack of means to accommodate the learning process that must be undergone by start-ups during the incubation process. In order to respond to this gap, this study offered minimum requirements that must be satisfied by any incubator models.

Keywords: *Business Incubators; Incubator Model; Open Innovation; Incubator Canvas for Innovation; IC4I*

1. Introduction

1.1. Research Background

Small and Medium Enterprises (SMEs) is a business division that contributes enormously to the economy of a nation, particularly in Indonesia. SMEs assume a vital part in keeping up the suitability and development of developing nations (1). The quantity of SMEs in Indonesia has achieved 56.5 million and persistently expanding. SMEs in Indonesia are likewise ready to retain 90 million specialists or around 97% of the aggregate workforce (2). Currently, the development of SMEs received greater attention from various parties including the government and society. The empowerment of SMEs should be directed at encouraging new entrepreneurs in such sectors that show high productivity. Sectors that based its growth on knowledge, technology and local resources (3).

Technological developments that are characterized by improved access information and communications bring positive impacts to the business world and affect the nature of business model used. The SMEs are increasingly benefited from the emergence of various technology-based systems that are able to boost the amount of income and facilitate business activities. Various easiness is continually evoked through the increasingly dynamic innovation in knowledge and technology that leads to increased society's economy. One recent development of the attempt to accelerate the development of new business creation is the availability of business incubation for technology-based start-ups that mostly undertaken within a Techno Park.

Techno Park is an area that accommodates research, development and incubation facilities that transform inventions into commercial products (4). According to Rahardjo (5), the purpose of establishing Techno Park is to create a permanent link between academia, industry (business), and government with the aim to combine ideas, innovation, know-how, and access to finance. Community involvement also becomes an essential factor in encouraging the development of Techno Park in Indonesia. Thus Techno Park's fundamental function does not only serve as a liaison between academia, business and government. Techno Park also plays a role on fostering relationships between startups and communities in order to trigger new technological developments and their commercialization. Techno park serves as a catalyst in the growth of knowledge-based economy and technology.

Innovation is the determinant of company sustainability and hence affecting the pattern of company production (6). The innovation process is conducted by various approaches such as open innovation (7), co-creation (8), strategic alliances, customer relationship, and business model adoption (9). Business model is one of the most important factor of business growth. Since the dawn of the internet era, business model has become a prominent concept among other management concepts. The business model is at the heart of every company's effort in order to outgrow the competition. The business model is the manner by which an association makes, conveys, and catches the monetary esteem (10).

The progression of mechanical headway has turned into the best need in created nations. Indonesia as a developing nation has begun applying the techno stop idea to trigger the National Innovation System (NIS) (11). Principally, NIS, bolstered by techno stop, is the way to empowering and advancing financial and upper hands related with national improvement (12, 13).

As indicated by the above paragraph, Techno park is believed to be able to assume the role of a business incubator in order to ac-

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celerate the growth of startups through innovative efforts. Hence, the main aim of this study is to analyze how business incubator able to cultivate the innovation process undergone by start-ups by using single case study (14, 15). As its intermediate aims, this study also tries to identify the gap that originated from the incompatibility of existing models in depicting the learning ecosystem in incubation process.

1.2. Introduction of Bandung Techno Park (BTP)

Bandung Techno Park (BTP) was established in 2010 as the result of cooperation between Telkom Institute of Technology (STT Telkom) and Indonesian Ministry of Industry. BTP was designed as a business incubator that able to leverage the synergy produced by quadruple helix (i.e. academy, business, government, and community). The objectives of BTP are to produce technologically sustainable innovation products, to create and grow technological-based start-up, and to commercialize inventions as products of research. The primary goal of BTP is to contribute to the Indonesian economy growth (16).

Until recently, start-ups that have joined BTP has reached the number of 54 startups with 17 active startups. BTP is manned by 20 coaches and mentors. BTP already produced 20 products and formed 9 partnerships (17). The incubation process in BTP consists of three stages: the pre-incubation stage for 3 months is the product validation process; Incubation stage for 6 months is problem-solution fit and product-market fit; and lastly, the post-incubation stage is the business evaluation process. Some of the facilities offered by BTP for startups include co-working space, access to funding, and mentoring. Currently, BTP is also a profit institution by offering services such as office rent, training and consulting, and 3D printing service (16).

2. Literature Review

2.1. Antecedents of SME Innovativeness

Innovativeness can be characterized as "the thought of receptiveness to new thoughts as a part of a company's way of life" (18). As per Drucker (19) innovativeness, from the point of view of an administrator is to raise an adjustment with a specific end goal to make new open doors and utilize the one existing. Innovation results could be considered regarding whether advancements concentrate on items, administrations, procedures, or business model (20).

Various examinations have recommended an assortment of key determinants on SME's innovativeness, and further explore how those influence SME's business and innovation execution (21). Expository after effects of help globalization has constrained SME's Business Model to advance demonstrating a particular example of evolving innovativeness. Numerous SMEs are attempting to escape a local market, and subsequently adhere to a worldwide infant Business Model with no worldwide intensity. In the contrary, some SMEs react effectively to the globalization and grow new Business Models (22).

2.2. Open Innovation (Innovation 2.0)

Innovation is not only a procedure of formation of new innovations or, just, creation. The requirement for another imaginative arrangement originates from the trouble that associations (23) need to develop through their own (inner) endeavors (24). The Open Innovation paradigm describes the extent to which a firm interacts with other private or public organizations in order to complement its internal R&D efforts and enhance its innovation performance (25). Although Open Innovation has been initially presented as the opposite of a closed innovation strategy, recent literature considers Open Innovation more on a continuum than on an open versus closed innovation dichotomy (26). Firms can find fertile grounds for Open Innovation in their customers, suppliers and competitors, universities, private or public R&D laboratories, etc. In such a broad sense the main understanding of ‘open innovation’ implies that innovations result from the sharing of competences between different players along and beyond the value chain, with deep implications for a company's external relationships (7). To date, empirical evidence exists that open innovation strategy enhances the innovativeness of firms. Laursen and Salter (27) assess open innovation strategy on firms' innovative performance by introducing the concepts of “search breadth” i.e. the number of external sources incorporated in the innovation process, and “search depth” i.e. the intensity of the collaboration with each partner. T \he advancement of open innovation is a vital procedure of ceaseless rehash of the business and of production of new business ideas. The hypothesis is investigating the veracity of the announcement that Open Innovation is really Closed Innovation (Innovation 1.0) enlarged by methods for advertising procedure (28).

2.3. Community and Its Role on Embedded Innovation (Innovation 3.0)

As per Innovation 3.0 goes past Open Innovation (Innovation 2.0) (29), theoretically grasps particular able to use both hands hierarchical capacities (30) of utilizing committed institutional courses of action to achieve the inserting procedure. Additionally, (31) characterize Innovation 3.0 as the key capacity of a firm to synchronize hierarchical structures, procedures and culture with open collective learning forms in encompassing groups, systems and partner bunches in order to guarantee the joining of various outside and inward information, i.e. abilities or innovative capacities, and to abuse this learning to business closes.

The innovation scene is portrayed as being greatly "open and dynamic". Ideation, outline, advancement, and usage of developments are implanted in over fit system of particularly SMEs ("multi-specialist frameworks") that are in nonstop exchange with their encompassing groups (29). The basic achievement factor in these 'multi-specialist frameworks' is to create adequate "gravitational implanting power" to connect them to 'Groups of Knowledge (31):

a) Communities of Affinity (CoA): nonstop discourse with prosumers and end-purchasers (B2C) to make up for lost time with new (outline) thoughts, requests, states of mind, styles and business openings;

b) Communities of Practice (CoP): coordinated effort with each other (B2B), and with smaller scale firms or consultants to adaptably improve information streams, principally for plan and co-advancement;

c) Communities of Interest (CoI): encounter trade with developing firms from the same and different divisions to profit by hybrid thoughts and integral information,

d) Communities of Science (CoS): exchange with the researchers to ingest new advances

2.4. Incubators and Incubation

The incubator is normally observed as an impetus empowering the procedure of information exchange and advancement commercialization (32). Business incubator is famous devices that have been set up worldwide to encourage and quicken the way toward making effective firms and business visionaries. There are seven parts of brooding (put, time, sources, assets, control/administration, exercises/administrations and results) describe the single hatchery, which frames the essential setting of incubation (33). The point of hatcheries is to deliver fruitful organizations, which is the reason hatcheries help organizations to survive and develop amid their underlying stages (34). Hatcheries support youthful firms, helping them to survive and develop amid the start-up period when they are most powerless (European Commission Enterprise Directorate-General, 2002). For a business incubator, inner systems administration among brooding firms is as critical as outer systems administration for developing start-up organizations (35). Accomplices of business hatcheries are basic in the brooding pro-

cedure as they give assets to assemble administrations to occupants i.e., new companies and SMEs. Thusly, BIs set up systems administration game plans or associations with colleges, government, NGOs, or potential industry associations so as to access required assets in connection to BI administrations (36). Vanderstraeten and Matthyssens (37) contend that by using outer and interior arrangements a hatchery can accomplish benefit separation that can upgrade the estimation of the broods, while (35) recommend that inner systems administration among the incubatees inside an incubator is similarly essential as outside systems administration and underscore the cooperative energy between incubates..

2.5. Incubator Model

Incubation models have undergone evolution over the years and can be classified into different generations based on the period of change (38). The innovation of business model requires an organization to focus its attention on the exploration and potential exploitation of arising opportunities within the environment (39). There are a lot of researches have been conducted recently on product and process innovation, but only several dedicated on business systems innovation (40).

3. Methodology/Materials

3.1 Research Framework

This study aimed to test the suitability of existing model and offer a new model to describe incubator role on the innovation process of start-ups. Those purposes are achieved by using Bandung Techno Park (BTP) as a case to test the suitability of existing models. It is conducted by implement each model to the case of BTP and then identifying the strengths and weaknesses of each model. The next phase is to identify minimum requirements for incubator model. These minimum requirements are drawn from the strengths or compatibility and weaknesses or incompatibility of each model. The final step of this study is to propose an adjustment to existing model or introducing new model if it deemed as necessary. All of the necessary steps involved in this study is shown on Figure 1.

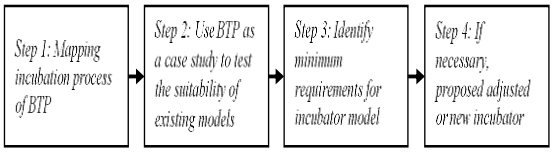


Fig 1: Research Framework

3.2. Case Selection

Case study is selected as the methodology of this research due to the requirement of in-depth understanding of unit of analysis (41). As the opposite to quantitative research, a case is selected can be based on level of its extremity, level of its similarity to population (i.e. typical case), its level of its variation or difference to other cases, the extent to which a case assumes specific features or attributes (i.e. level of intensity) such as possession over certain processes or experience, and the ease to access the data (i.e. level of convenience) (42). In this study, the case of BTP is selected based on its level of intensity due to its possession of several important characteristics and also due to its convenience. Firstly, it already operated for 10 (ten) years since 2007 and hence it has gained substantial experience and well-documented. Secondly, one of the stated purposes of BTP is to produce sustainable innovation that are based on technology. Thirdly, it already implemented lean startups model that based its operation on validated learning (43).

3.3. Data Collection

To ensure trustworthiness of the data collected in this study, several measures are taken into account. According to Guba, there are four criterions (Guba's construct) that can be followed to ensure the trustworthiness of a study, namely: credibility, transferability, dependability, and confirmability(44). Moreover, triangulation also serves as the primary methods to ensure credibility, dependability, and confirmability. There are four type of triangulation: method triangulation, source triangulation, theories triangulation, and investigator triangulation(45).

First, to ensure the congruity of findings to reality (i.e. credibility or validity), this study incorporates several different methods including interviews, observations, and report review (i.e. method triangulation). this study tries to take as many perspectives as possible by interviewing key person from different stakeholders including the manager of incubation units in BTP, one coach of BTP, one startups founder, one representative of corporate client, and one researcher of Telkom University that actively involved in providing training to start-ups of BTP (i.e. sources triangulation). Informants also provided with the opportunity to refuse to participate in the study to improve the chance to provide honest answers. This study also used two interviewers to conduct the interviews (i.e. investigator triangulation) and using five different theories to portrait the complete picture of Bandung Techno Park (i.e. theories triangulation).

Second, ensuring the extent to which the findings can be applied to the wider population (i.e. transferability) can be perceived as impossible since the sample used in the qualitative study is simply too small (46). However, to satisfy the need to ensuring transferability, this study serve the contextual data regarding the time length of the study, place of the study and number of sessions of the interview that are conducted. First of all, the data collection activities are conducted within 4 (four) months period during February to May 2017. The interviews also conducted on informants' premises to make the informants more comfortable. Moreover, each informant provided with the opportunity to check for the result of the interview to ensure its validity. The set of questions posed to the manager of incubation are the longest and most thorough. Meanwhile, for other informants, the questions are lesser and highly correlated with part of the incubation process that those informants most familiar with.

Third, to ensure that the study will produce similar results if the study is repeated identically (i.e. dependability), the design of this study is reported in detail to facilitate future replication. This study also employs several different methods as previously explained since good credibility leads to good dependability (46). Fourth, to ensure confirmability of the data collected, this study employs triangulation as previously mentioned.

4. Results and Findings

4.1. The Evaluation of Existing Incubator Model

The important role of business incubators in cultivating innovation of SMEs is unquestionable. In order to do that, a proper model of business incubator must be identified in advance. This model will be helpful in order to provide an accurate depiction of business incubators functioning. Even though past studies do not provide off-the-selves models that is ready to be used, several kinds of literature provide valuable insights regarding incubator model. Few models are developed specifically as the attempt to describe the functioning of business incubators. Each model built with its own strengths and weaknesses as discussed in the following sections. Those models are Bergek-Norrman Model, Incubator-as-service-provider Model, Business Model Canvas (BMC), and Platform Canvas.

4.1.1. Bergek - Norrman Model

Bergek - Norrman Model is a framework that is specifically designed for business incubators. It provides groupings of activities

and resources that commonly organized by incubators during the incubation process. Referring to Bergek and Norrman (47), the model consists of several components, namely:

a) Selection is associated with a set of attributes that must be possessed by potential start-ups. These set of attributes serves as criterions used by incubators in deciding which type of start-ups that will be enrolled.
b) Infrastructure is shared benefits that serve as prerequisites for startups to operate in effective and efficient manner. Infrastructure consists of localities (i.e. geographical position), facilities (e.g. conference room, workshop, machinery, and parking lots), and administrative services.
c) Business support is treatments (e.g. training and coaching) provided by incubators that intended to improve tenant's capability in solving business problems.
d) Mediation is the means used by incubators to connect start-ups with external actors (e.g. government, universities, and consumers).
e) Graduation is associated with exit policies or the circumstances that must be fulfilled by start-ups in order to leave the incubator.

As recognized by Table 1 below, BTP provides the incubation service exclusively to technology-based start-ups that consist of companies that offered such products as smart parking system, GPS and embedded system, portal market place, social media advertiser, and smart home system (43). BTP provides several facilities to its start-ups including coworking space (consist of two sets of personal computer, desks, and drawer), conference room, meeting room, machinery (e.g. 3D printing), administrative services, parking lots, and library.
The process consists of three phases: pre incubation, incubation, and post incubation. In the pre incubation, startups are guided to develop the prototype and business model. Team formation also takes place in this phase. In the incubation phases, the primary services that are offered to start-ups are mainly consisted of training, coaching, and training. The larger part of mediation activities (e.g. business matching) happened at the end of incubation process even though BTP provide other means to connect start-ups to other actors during the incubation phase. BTP also provide means for startups to share knowledge among themselves. Start-ups are considered passed the incubation phase in BTP after completing the pre incubation and incubation process that take around three and nine months consecutively. In the post-incubation phase, graduated start-ups (or also called as alumni) still received opportunities to received funding (e.g. government grants) and training.

Table: The Use of Bergek - Norrman Model on Bandung Techno Park (BTP)

Selection	**Infrastructure**	**Business Support**	**Mediation**	**Exit Policy**
○ Technology / ICT-based start-ups ○ Student, professor, or public-initiated business	○ Co-working space ○ Conference room ○ Meeting room ○ Machinery ○ Administrative services ○ Library ○ Parking lots ○ Within the university area	○ Training ○ Coaching ○ Mentoring	○ Business matching ○ Anchor tenant (planned)	Participating on pre-incubation, incubation, and post-incubation process that approximately take one year to be completed

(Source: Author's Interpretation)

By using BTP to validate the model, it is confirmed that Bergek-Norrman Model is able to cover all of the key activities and resources that are found in BTP. As to the learning process, this model acknowledges the role of BTP in facilitating the engagement of startups to its other actors. However, this model also possessed several major weaknesses. Despite its ability on describing values created by BTP in great detail, this model cannot be used to describe how BTP is supposed to capture part of the values created by start-ups. Moreover, it is unable to describe the involvement of start-ups in the value creation process of BTP. In short, this model does not acknowledge the role of start-ups as value creators. The incubator model of BTP also shows that the involvement of external actors and their contribution to the incubation process remained to be uncovered. The same is also true regarding the collaboration between startups. Left alone the means adopted by incubators to capture a portion of the value received by startups and other actors. These weaknesses indicate that this model, although specifically designed for business incubators, is simply inadequate.

4.1.2. Incubator-as-service-provider Model

In Incubator-as-service-provider model, professional service firm is used as the analogy to depict the basic functioning of business incubators. Unfortunately, this model provides an only partial explanation of business incubators. First of all, this model brought some dilemmas that originated from the complexities of relationships established by business incubator with its surrounding environments. As part of its value proposition, business incubators accumulate and transfer resources from external actors (e.g. governments, mature businesses, and universities) to start-ups in terms of customized professional services (48). Hence, the value of business incubators largely depends on the quantity and quality of relationship built by business incubators with external actors (48). As found in the case of BTP, the complexities of relationships formed by business incubators with external actors become a source of dissimilarities with professional service firms. By using a value flow map (48), the relationships between BTP and the external actors that are involved in the incubation process are as described in Figure 2.

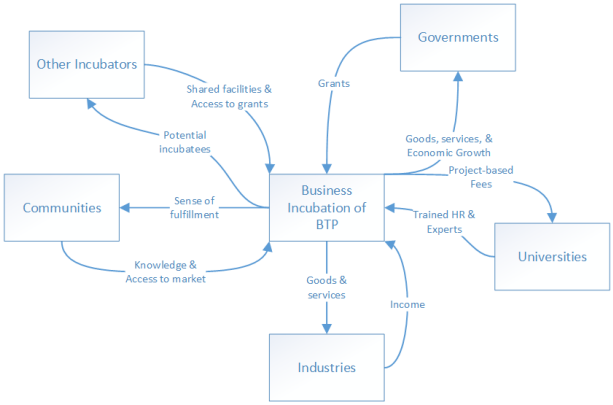


Fig 2: The Values Exchanged Between Business Incubation Unit and External Actors of BTP
(Source: Author's Interpretation)

Secondly, the focus of business incubators' value-creating activities is start-ups. Hence, it is logical to assign the role of consumer to start-ups. However, the dependence of business incubators on government's funding as the source of income also raise a question whether to make government as the consumer of business incubators (48). Moreover, business incubators can also draw some resources from start-ups that have graduated in term of financial resources (e.g. dividend) and time and energy (e.g. mentoring activities). Hence, in the case of BTP, it is very difficult to recognize the entity who can solely assume the role of consumer. Thirdly, if startups can be analogized by consumers, this model is simply lack of means to describe the learning process that might

be undertaken by consumers as it is commonly undergone in incubation process. Therefore, the use of service provider as incubator model can be considered as incompatible.

4.1.3. Business Model Canvas

Business model can be defined as sets of mechanism that are used by business entities in a consistent manner to create and deliver value to the customers and capture part of the value created in terms of profits. One concept of a business model that gained wide acceptance in management literature is Business Model Canvas (BMC). At its core, BMC serves to answer four critical questions in interrelated and comprehensive manner: what values are created by the business, how the business organized itself to create the values, how the business delivers values to the customers, and how the business captures a portion of the values created (9). The use of BMC on BTP is shown in Figure 3. Unfortunately, the use of BMC to depict the functioning of business incubators also rose some unresolved problems.

<table>
<tr>
<td rowspan="2">Key Partners
• Other incubators
• Affiliation company
• Communities
• Business Practitioners
• Government (Ministry of Research & Technology)</td>
<td>Key Activities
• Recruitment
• Coaching
• Training
• Funding
• Business matching
• Business launching</td>
<td rowspan="2">Value Proposition
• Improved survivability (risk reduction)
• Access to knowledge and funding</td>
<td>Customer Relationship
Dedicated personal assistance by internal employees as coach</td>
<td rowspan="2">Customer Segment
• New ICT-based businesses as start-ups
• University inventors (researchers) as start-ups</td>
</tr>
<tr>
<td>Key Resources
• Internal employees
• Shared facilities
• Network</td>
<td>Channel
• Digital advertising
• Study tour</td>
</tr>
<tr>
<td colspan="3">Cost Structure
• Training cost (fixed cost)
• Utility cost (fixed cost)
• Maintenance cost (fixed cost)</td>
<td colspan="2">Revenue Stream
• Subsidy from other businesses
• Revenue sharing from industrial project
• Portion (25%) of grants received by start up
• Dividend from stocks of startup (planned)</td>
</tr>
</table>

Fig 3: The Use of Business Model Canvas (BMC) on Bandung Techno Park (BTP)
(Source: Author's Interpretation)

As mentioned earlier, business incubators must establish complex relationships with its surrounding environments (i.e. internal and external actors) to cater the need of startups for various resources (see Figure 3). In its very nature, incubators can be analogized as "glue" (48) or "bridge" (47) that simultaneously protect start-ups from and connect startups to their business ecosystem. This diversity of values transferred by each external actors and the complexity of relationships between start-ups, incubators, and other actors are likely to transcend the scope of traditional BMC. In the study of BTP, the support of internal actors, i.e. other units that provide direct and indirect support to business incubation process, are very critical to the existence of incubation process. This is displayed in Figure 4.

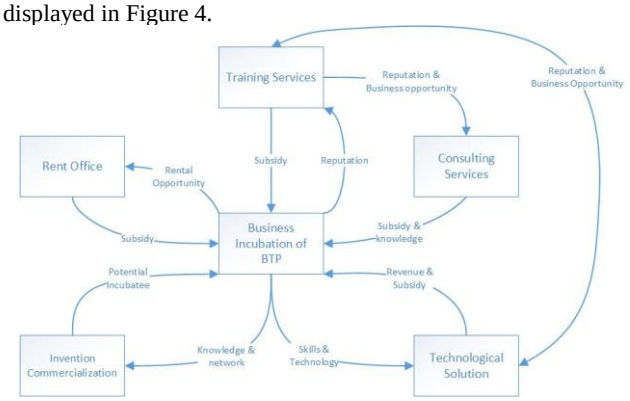


Fig 4: The Values Exchanged Between Business Incubation Unit and Internal Actors of BTP
(Source: Author's Interpretation)

Despite its wide acceptance, BMC does not acknowledge some essential roles as assumed by BTP or other typical business incubators. Firstly, BMC does not accommodate the mediation roles played by BTP in order to connect start-ups to internal actors (i.e. other units under the management of BTP). Even though the existence of business incubation process, especially in BTP, is supported by numerous act of value exchanges with several internal actors (e.g. technological solution service and consulting service).
Secondly, BMC unable to provide an accurate picture regarding learning activities undertaken by start-ups by collaborating with external communities. In the case of BTP, some external communities able to provide knowledge through training (e.g. Open-Embedded Software Foundation that provide ICT-related skills training). External communities also provide start-ups with access to international market by means of providing exhibition opportunities (e.g. Indo Globit). Moreover, business model must also be perceived as a means to capture or monetize values created by innovative endeavors (49). However, the learning process as essential part of innovative endeavors is clearly beyond the scope of BMC.
In the case of BTP, start-ups are also involved in the value creation process of other internal units of BTP. One frequent example of it is start-ups of BTP are involved in developing a technological solution that will be offered to industries and government in the form of goods or services. As a matter of fact, this type of involvement serves as an income-generation opportunity provided by BTP to its start-ups. As for BTP, the value propositions of start-ups are used to enriched the value proposition offered by BTP to external parties (e.g. industrial client). This practice leads to the third weakness of BMC. By using BMC, start-ups cannot assume multiple roles or appear on different business models simultaneously. Fortunately, this weakness can be easily compensated by a variant of BMC that able to depict several business models simultaneously, namely multi-layered BMC.

4.1.4. Multi-layered Business Model Canvas

In its inception, multi-layered Business Model Canvas (multi-layered BMC) is used to depict coherent yet different perspectives of a business model (50). It enables businesses to simultaneously integrate economic, social, and environmental perspectives in a single business model. One interesting idea of multi-layered BMC that might solve the problem found on traditional BMC is it adds "depth" (vertical dimension) over "width" (horizontal dimension). This is the idea that can be adopted to enrich the depiction of the incubation process on BTP. The elements that are associated with value delivery and revenue-generation process (i.e. downstream tasks) of multiple business models that exist on BTP is shown in Table 2.

Table 2: Downstream Tasks of Multiple Business Models on Bandung Techno Park (BTP)

Internal Entities / Services	Value Proposition	Customer Segment	Customer Relationship	Channel	Revenue Stream
Business Incubation	Enhanced survivability (risk reduction) and access to knowledge and funding	Technology-based start-ups	Dedicated personal assistance	○ Digital advertising ○ Study tour	○ Subsidy ○ Revenue sharing ○ Portion of grants ○ Dividend (planned)
Rent Office	Real / virtual domain and working space (accessibility and status)	ICT-based business (small scale)	Personal assistance	○ Digital advertising ○ Poster	Rent Fee
Training Service	Access to knowledge and skills (accessibility)	○ In house training (B2B) ○ Public training (B2C)	Personal assistance	○ Company-owned Account Managers ○ Digital and conventional advertising	Training Fee
Consulting Service	Formal planning activities (getting the job done)	Municipal Government	Dedicated personal assistance	○ Company-owned ○ Account Managers	Consulting Fee
Technological Solution	Customized technological solution (getting the job done)	Industries Governments	Dedicated personal assistance	○ Telkom-owned ○ Account Managers	R&D Fee
Invention Commercialization	○ Access to markets (existing industries) ○ New business development	Existing industries	Dedicated personal assistance	Formal agreement / partnership initiated by the management of BTP	○ Patent license sold to industries ○ Sale of Common Stock of start-ups

(Source: Author's Interpretation)

Table 3: Upstream Tasks of Multiple Business Models on Bandung Techno Park (BTP)

Internal Entities / Services	Value Proposition	Key Activities	Key Resources	Key Partners	Cost Structure
Business Incubation	Enhanced survivability (risk reduction) and access to knowledge and funding	○ Recruitment ○ Coaching ○ Training ○ Funding ○ Business matching ○ Business launching	○ Internal employees ○ Shared facilities ○ Network	○ Other incubators ○ Affiliation company ○ Communities ○ Business Practitioners ○ Government	○ Training cost (fixed cost) ○ Utility cost (fixed cost) ○ Maintenance cost (fixed cost)
Rent Office	Real / virtual domain and working space (accessibility and status)	○ Marketing ○ Infrastructure maintenance	Working space and facilities	None	Maintenance expense
Training Service	Access to knowledge and skills (accessibility)	Training delivery	Trained human resources and experts	○ University professor ○ IT practitioners	○ Trainer fees ○ Rental cost ○ Consumption cost ○ Transportation cost
Consulting Service	Formal planning activities (getting the job done)	○ Review (planning activities) ○ Survey (minor)	Trained human resources and experts	External consultant	○ Bonus for internal employees ○ Fee for external consultant
Technological Solution	Customized technological solution (getting the job done)	○ Product development ○ Research	Business developers	○ Technology-based start-ups ○ External developers ○ Researchers ○ University students	Research and development cost
Invention Commercialization	○ Access to markets (existing industries) ○ New business development	○ Marketing (licensing) ○ New business development (non-licensing)	○ Financial resources ○ HR ○ Network	○ Government as the source of grants ○ Universities as the source of invention	○ Marketing expenses ○ HR expenses ○ Legal expenses ○ HR expenses

(Source: Author's Interpretation)

Meanwhile, the components that are associated with value creation and its impact on cost structure (i.e. upstream tasks) of multiple business models that exist in BTP is shown in Table 3.

As found in this study, multi-layered BMC is able to acknowledge the role of start-ups as value creators or producers in the ecosystem. In the case of BTP, start-ups are involved in the value creation process of technological solution service as shown by the shaded area. However, this is the only advantage of multi-layered BMC found especially in the case of BTP. There are several

weaknesses emerged from the use of multi-layered BMC on BTP case.

Firstly, even though the use of multi-layered BMC can describe the business model of BTP in its entirety, the network of value exchange established by BTP cannot be clearly described due to the absence of focal point. Hence it made them merely a collection of business models without any additional contribution toward the understanding regarding the values that flow between business models. Secondly, the means used by BTP to facilitate the learning process of startups is still very difficult to be detected. Not to mention on explaining how BTP is supposed to capture part of the value created by the learning process undertaken by its start-ups. Again, BMC seems to be less than adequate to provide complete picture over business incubator role on innovation cultivation.

4.1.5. Platform Canvas

One feature of business incubation that is also worth to address is most start-ups can assume more than one roles, i.e. as consumers and producers. Also, in most cases, business incubators play a role of interface or platform that protect start-ups from and connect startups to the outside world. Those features can be accommodated by Platform Canvas. The use of platform canvas on the case of BTP is shown on Figure 5.

Platform basically is an underlying structure upon which consumers and producers can exchange values. The goal of the platform is to enable interactions that convey values between producers and consumers so it can happen repeatedly. The basic components or stacks of a platform are network-marketplace, infrastructure, and data. Some platforms are focused heavily on network-marketplace. Others are focused on infrastructure. Still, others focused on data (51).

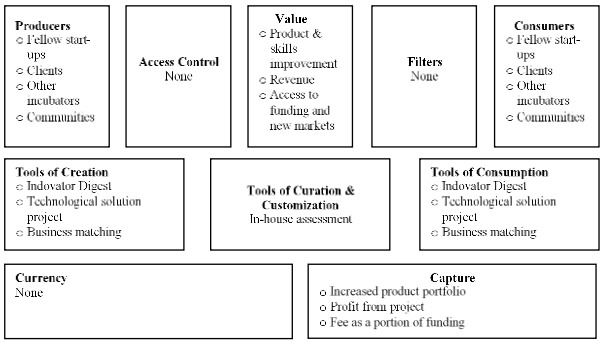


Fig 5: The Use of Platform Canvas on Bandung Techno Park (BTP) (Source: Author's Interpretation)

The use of Platform Canvas on BTP indicate some redundancies embedded in the model as can be seen from the vacant building blocks. These redundancies provide strong signal of incompatibilities in the model. One major reason is because Platform Canvas is built to depict the functioning of platform-based businesses that emerge and operated in the world of web 2.0. On the contrary, since BTP operated in the real world, it does not require various technology-based tools to facilitate the interaction. Moreover, Platform Canvas is built for businesses that deal with a large number of consumers and producers. Hence the technological support to facilitate aggregation of supply and demands are of paramount importance.

On the bright side, this model acknowledges the need to develop two mechanisms to capture the value created. The first is the means provided by the platform for producers to obtain some sort of rewards (i.e. currency). The second is the means used by the platform to realize gains from the value created on the platform (i.e. capture). Nonetheless, the model requires some adjustment in order to remove the redundancies and enhancing the accuracy of its terminology. The model also need to put more weight on describing the learning process undergone by start-ups including providing means to capture the value from start-ups learning.

4.2. The Minimum Requirement of Incubator Model

As has been mentioned, this study used BTP as a case to test the suitability of existing models in representing the functioning of business incubators especially in cultivating innovation of SMEs. Based on discussions on the strengths and weaknesses of each existing models, incubator model at the very least must be able to satisfy 5 (five) essential criterions in order to be deemed as adequate. Hence, these criterions serve as the minimum requirements that must be satisfied by any model to depict the role of business incubators in cultivating SMEs' innovation. These 5 (five) criterion are:

a) The proposed incubator model must take business incubators' perspective as the party that held accountable for the whole incubation process. Almost all of the models discussed in this paper are able to make business incubator as the focal point. Although this criterion is difficult to be satisfied by using Multi-layered BMC.

b) The proposed incubator model must be able to address the nature of business incubators as interface or mediators that simultaneously protect start-ups from and connect start-ups to the surrounding environment (i.e. internal and external actors). Only two models that have such feature, namely Bergek-Norrman Model and Platform Canvas.

c) The proposed incubator model must be able to reflect multiple roles that might be assumed by startups especially as value creators or producers. This criterion is very logical since each startup is basically an entity with its own unique business model. This feature can only be found on Platform Canvas and Multi-layered BMC.

d) The proposed incubator model must be able to describe the mechanism used by business incubators in facilitating the learning process undertaken by start-ups. As previously mentioned, start-ups learning must be managed effectively in order to produce innovation. To complete the process, the proposed model must also be able to provide depiction regarding the means used by start-ups to convert the value of learning into business performance. Unfortunately, none of the models presented above able to completely describe this mechanism.

e) One of the most important things, the proposed incubator model must also be able to address the means used by business incubators to capture part of the value created by startups from the learning activities undertaken by start-ups. Without this component, the learning environment will not be healthy and cannot be sustained over the long term. In respect to this matter, Platform Canvas manages to offer two mechanisms to capture the value as previously discussed.

By using these five criterions, the suitability of each model on depicting the role played by business incubators on cultivating start-ups' innovation can be evaluated. The summary of the existing model evaluation is displayed in Table 5.

Table 5: The Suitability of Existing Models to be Used On the Case of Bandung Techno Park (BTP)

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	
Existing Models	**Ability to adopt business incubators' perspective**	**Ability to address mediation roles of business incubators**	**Ability to address the role of start-ups as value creators**	**Ability to address learning process undergone by start-ups**	**Ability to address the means to capture a portion of learning value**	**The Ability of Models to satisfy the criterions**
Bergekk-Norman Model	√	√	X	X	X	0,4
Incubator-as-service	√	X	X	X	X	0,2

provider Model						
Business Model Canvas	√	X	X	X	X	0,2
Multi-layered BMC	X	X	√	X	X	0,2
Platform Canvas	√	√	√	X	X	0,6
Suitability Score	0,8	0,4	0,4	0,0	0,0	

(Source: Author's Interpretation)

The result shows by Table 5 indicate that – based on the use of each model on Bandung Techno Park (BTP) – none of the models discussed previously able to completely depict the role of business incubators in cultivating innovation of start-ups. Even the most suitable model, i.e. Platform Canvas, only able to satisfy 3 (three) out of 5 (five) criterions. These findings provide a strong reason for the development of new incubator model that specifically designed to manage innovation process of start-ups.

4.3. Developing the New Incubator Model

As can be easily recognized from Table 5, there are 2 (two) criterion that had not yet satisfied by the existing models namely: the ability to address the learning process of start-ups and ability to address the means to capture a portion of learning value. Both of the criterions must be integrated on the proposed incubator model. To further explore the nature of the model that able to accommodate the learning process of start-ups on incubation, the insights from Innovation 3.0 are also taken into account. Innovation 3.0 lean on the beliefs that in order to successfully innovate, an organization must integrate the communities that act as the source of knowledge to its business model. In order to integrate communities of knowledge in the learning process of an organization, a business model must be transformed. The transformation is led by several guiding principles (31) as can be seen in Figure 6.

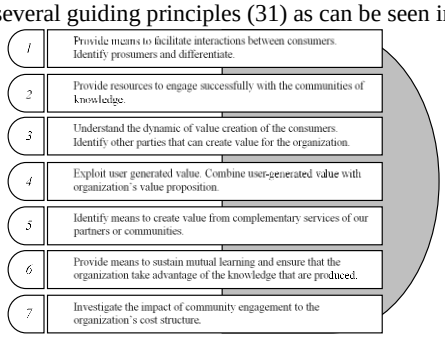


Fig 6: The Guiding Principles of Implementing Innovation 3.0 on Business Model
(Adapted from: Hafkesbrink and Schroll, 2010)

In its essence, the principles suggest that any incubator model that aim to integrate the communities of knowledge must able to describe three essential components. First, the incubator model must be able to provide means to facilitate mutual learning between start-ups and the learning counterparts (i.e. communities of knowledge) (principle no. 1 and 2). Second, the incubator model must be able to capture the portion of the value created by start-ups and learning counterparts (principle no. 3, 4, 5, and 6). Fourth, the incubator model must be able to reflect the impact of providing learning ecosystem for startups on its cost structure (principle no. 7). Based on these tenets, coupled with other minimum requirements identified earlier, the new incubator model is proposed. The proposed incubator model is named as Incubator Canvas for Innovation (IC4I) and illustrated on Figure 7.

IC4I consist of nine interrelated building blocks and explained as follow:

a) Start-ups, as the focus of any business incubators' activities, must become the first building block that must be attended to. The shared characteristics of start-ups and their purpose dictate the expected benefits of the learning process and the means to convert them to business performance. Hence the key questions that correspond to start-ups including what are common characteristics shared by start-ups? What are their mission and goals? How does it affect the dynamic of the learning process?

b) Values represent the benefits that can be gained by start-ups and their counterparts from the learning process. The greater the benefits, the greater the commitment of start-ups and counterparts to engage in mutual learning. The type and magnitude of expected benefits drive the type of learning tools that must be made available and the means to convert the benefits into business performance. Values building block also dictate the selection of counterparts. The key questions that correspond to expected values from learning process are: what are the benefits expected to be obtained by start-ups and counterparts from the learning process? How do these values contribute to the achievement of mission and goals of start-ups and counterparts?

c) Counterparts consist of internal actors (i.e. other units under the management of business incubator) and external actors (e.g. government, communities, and clients) that possessed potential knowledge that might be valuable for start-ups. Hence the selection of counterparts must be based on the value of unique characteristics or position occupied by counterparts. Thus the key questions that correspond to counterparts are: who must be involved in the learning process of start-ups? What are their mission and goals? What unique attributes possessed or position occupied by counterparts that can be valuable to the learning process?

d) Learning tools refer to programs dedicated to facilitating the mutual learning of start-ups and counterparts. This is including set of policies and procedures involved to support the success of the program. The key questions that correspond to learning tools are: what programs provided by business incubator to facilitate learning process? What are the policies and procedures involved to ensure the success of the program?

e) Conversion consist of the means used by start-ups to convert benefits obtained from learning process (i.e. values) into business performance. Key questions that correspond to conversion are: how do start-ups convert learning benefits into business performance? How does business incubator able to facilitate or ease this process for start-ups?

f) Incentives refers to reward or compensation transferred by business incubators to counterparts in order to sustain the integration of counterparts in the learning process. Key questions are: what benefits transferred by incubators to compensate for counterparts' efforts? How does it help to sustain the learning process?

g) Resources refer to tangible resources (e.g. money and facilities) and intangible resources (e.g. man power) committed to facilitating the learning process. Key questions that correspond to resources are: What resources that must be provided by business incubators to facilitate learning process?

h) Capture, refer to effort undertaken by business incubators to capture a portion of the value created by the learning process. The success of this effort partially determined by the successful attempt of start-ups to convert learning benefits into business performance. Key questions that correspond to capture are: How business incubator capture the value generated from the learning process? How does it relate to business incubator's mission and goals? Does it worth the cost?

i) Cost, concern with the impact of the learning process on the existing cost structure of business incubator. Hence,

the cost is affected by the level of resources committed to the learning process. The key question that corresponds to cost is how much does it cost business incubators to facilitate the learning process? How big is the impact on existing cost structure?

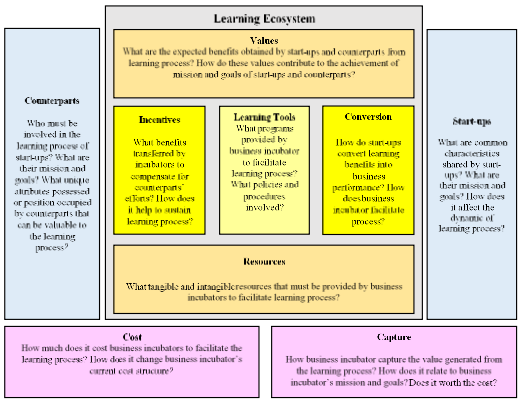


Fig 7: Incubator Canvas for Innovation (IC4I)

4.4. The Use of New Incubator Model on The Case of BTP

As a newly born model, the compatibility of IC4I to describe the role of a business incubator on cultivating start-ups innovativeness is still subjected to doubts. Nonetheless, IC4I can serve as a prototype that must be further developed by applying this model to various type of business incubators. Ideally, IC4I can be used as a model to map, measure, evaluate, and improve the performance of business incubators on cultivating innovation on start-ups. As the first attempt, IC4I is used in the case of BTP as shown in Figure 8.

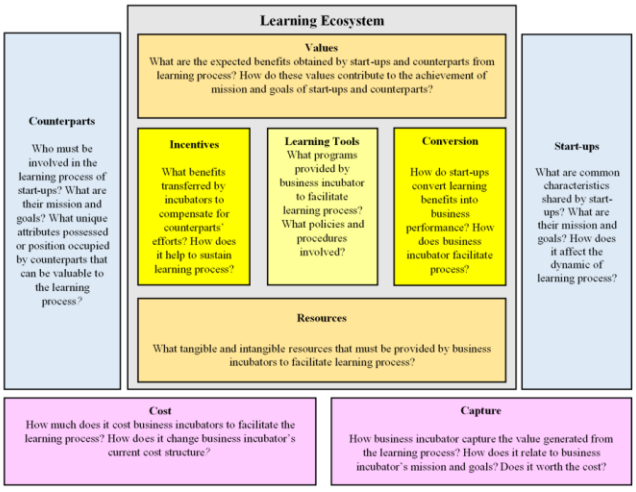


Fig 8: The Use of Incubator Canvas for Innovation (IC4I) on Bandung Techno Park (BTP)
(Source: Author's Interpretation)

IC4I managed to reveal that the mechanism used by BTP to capture a portion of learning value of start-ups is mutually beneficial for both start-ups and BTP. It indicated BTP already suceeded in creating a healthy learning ecosystem. BTP already provide several learning tools even though the performance of some of the tools, Indovator Digest and Business Matching, are assessed as poor by the informants. Those learning tools improve the learning value received by start-ups. The larger the learning value, the greater chance available for startups to convert that value into business performance. BTP capture this value by assigning projects to more skillful start-ups. The means used by BTP to capture a portion of that value able to strengthen the learning ecosystem.
There are also several weaknesses that can be identified regarding the performance of BTP on facilitating innovation of start-ups. First of all, BTP efforts to integrate counterparts into the learning process of start-ups is still at a modest level. It can be seen from the variety of learning tools provided by BTP and the resources required to support the operation of learning tools. Hence, BTP is suggested to aim for improved learning value and develop new learning tools. Secondly, the means to convert the value of learning is limited to increase in sales of startups' products and services. Thus, BTP must find other creative means to help start-ups to convert the learning value into business performance.

5. Conclusion

Despite the importance of business incubators to support learning process of start-ups, appropriate model as the tools to understand and assess incubator performance are nowhere to be found. Several models, including Bergek-Norrman Model and Business Model Canvas (BMC), that are applied to depict the learning process undergo by start-ups in incubation process produce unsatisfactory results. In response to that gap, a new model had to be built. That model is Incubator Canvas for Innovation (IC4I).
This model designed to compensate the weaknesses of the existing models by incorporating 5 criterions that serve as a minimum requirement for any incubator model. Among these 5 criterions, all of the existing models generally fall short on 2 criterions: the ability to facilitate start-ups' learning process and the means to capture a portion of value produced by that learning process. By incorporating these 5 criterions with the principles of Innovation 3.0, the new model able to successfully show some of BTP's weaknesses in cultivating innovation among start-ups.
Despite of its success in explaining the learning ecosystem of BTP, this model is still in the inception phase. Several advancements in respect to future research must be undertaken to ensure model robustness. As the first step, a Delphi study will be conducted to quantitatively measure the agreement of all stakeholder groups. This measurement – improvement cycle will be conducted repeatedly until the model passed a certain threshold. Then, another case study will be conducted by taking a sample of the different type of business incubators especially with respect to the learning process. These steps are very crucial to reveal every expressed and hidden assumptions that formed the basis of IC4I. Hopefully, this model able to optimize its positive contribution to the growth of start-ups and global economic prosperity.

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