



## Performance Factors for Successful Business Incubators in Indonesian Public Universities

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**Abstract.** Measuring the performance of business processes is already a main concern for both faculty and enterprise players, since organizations are motivated to reach the productivity stage. Employing a performance achievement framework for the relationship between business incubator success factors will guarantee connection with commercial schemes, which support a high level of performance indicators in successful business incubator models. This research employs a quantitative approach, with the data analyzed using the IBM SPSS version 23 and Smart PLS version 3 statistical software packages. Employing a sample of 95 incubator managers from 19 universities which geographically located in Indonesia, it is shown that the image of business incubator factors has a positive effect on incubator performance. The study investigates the relationship between incubator performance and business incubator success factors in Indonesia. It was found that IT, as part of the business incubators' facets/abilities, partially supports their performance; that the entry criteria directly support the performance of the incubators; that mentoring networks also support the performance, with good infrastructure systems as a moderating factor; that funding supports the performance of business incubators, also with good infrastructure systems as a moderating factor; and that university regulations and government support and protection enhance the performance of business incubators, with credits and rewards as a moderating factor. In addition,

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doi: [10.14716/ijtech.v11i1.2464](https://doi.org/10.14716/ijtech.v11i1.2464)

a variety of indicators from the local context affiliate positively to promote a community that highlighted the incubators' strategies.

*Keyword:* Incubator performance factors; Indonesian public universities; Successful business incubator

## 1. Introduction

Commercialization passage such as “If you cannot measure it, you cannot manage it” or “What is measured, improves” (Drucker, 2006) are occasionally challenged as they are not measurable to a significant extent (Ryan, 2014). Nevertheless, that passage help incubator managers to measuring their company's performance and successful factor (such as gapping from quantitative to qualitative and from financial to non-financial), that can support the study of the business activity performance dimension (Van Looy and Shafagatova, 2016). However, a performance framework to support the business process strategy and performance factors needs to be selected and employed (Shah et al., 2012).

Sometimes, the optimized performance measurement framework used is the balanced scorecard (BSC) developed by Kaplan and Norton (2001), which provides four measurement methods of business performance: (1) the financial perspective; (2) customer perspective; (3) internal business process perspective; and (4) learning and growth perspective.

The role of performance factors in successful business incubators has received increased attention across several disciplines in recent years. During the last decade, the performance of business incubators has been at the center of much attention. Many are currently trying to achieve the best performance in the intense competition to be successful. The purpose of this research is to assess the extent to which these performance factors are important for success in business incubators in Indonesian public universities. The research will greatly help incubators to achieve their best performance so that they can help their tenants to perform.

## 2. Literature Review

Service innovation has been widely accepted as part of the strategy to generate more advantages for business players, particularly SMEs. Therefore, it is safe to conclude that business players which employ and apply the latest innovations and activities as part of their routine actions will have greater chances of significantly upgrading their performance at company level. This will consistently equip them with the basic economic and financial resources needed to maintain the growth of their service innovation. By generating new assistance, which may have not recently existed in the business, SMEs can obtain the urge conditions to employ extreme innovations. In this way, they can beat their main business rivals, as well as significantly improving their business performance.

Research by Aerts et al. (2007) on the relationship between the filtering process of incubators and performance found coherence between filtering based on activities set with higher tenant survival rate. While this is an important indication for incubator managers to understand the filtering process, it does not demonstrate the application of incubator support, as the filtering process introduces heavy selection factors compared to incubators which are not filtered.

Peters et al. (2004) emphasize the effect of incubator services, including infrastructure, mentoring and networks, and on the percentage level of graduation of incubates. They found that simple comparison of types of services offered was not enough to highlight the differences in graduation rates among incubators. Instead, they conclude from investigation

that screening activities as well as literate resources are needed through networks, and that the relationship between co-tenants are the important factors in establishing incubator performances in terms of graduation rates.

Mian (1997) advises that performance evaluations also support program development and sustainability, tenant's firm survival and growth, implication to the University's mission sponsor and the environmental impacts should be noticed into account in order to measure incubator performance. The findings on technology business incubator performance can be observed by studying the incubation process, including the knowledge-sharing process, diffusion of innovation and individual creativity, which is vital for the developmental process of new ventures (Binsawad et al., 2019).

The lack of perception from incubatees of the future challenge led Chan and Lau (2005) to propose an adjusted model to understand the implication of technology firms through their business operation. Using previous research, they found a set of indicators to compare performance from the incubatees' perception. The nine elements consisted of pooling criteria, sharing facilities, coaching and mentoring services, public impress, networking, clustering, geographic proximity, finance, and funding support. They identified that the tenants' level of improvement affected the influences of each incubator characteristic on the tenants.

It has also been identified that the capability to connect start-ups to specific financial sources improves the factors important for incubators for increase their investments (Van Rijnsoever et al., 2017). It has also been found that participating in network events, engaging in referral services and the sheer fact of being linked to a reputable incubator puts the start-ups in a beneficial position, while supporting actions directly targeted at gaining more funding (such as pitch training) have less influence. In spite of that, it does not mean that the supporting actions correlated to hit-making, such as coaching, mentoring or workshops, are all in vain. The performance indicators related to raising funding are primarily applicable to new business players (Eveleens et al., 2017).

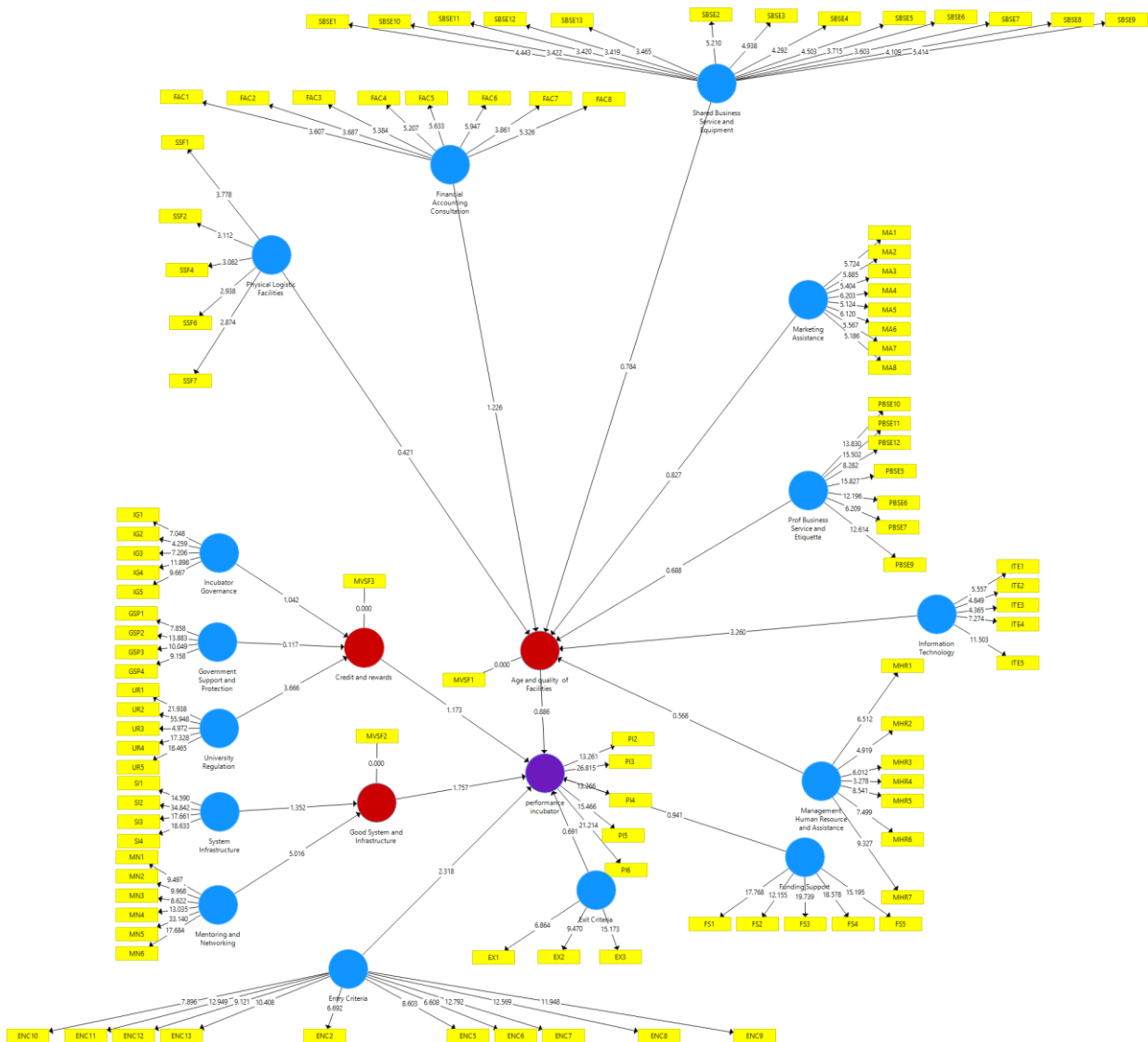
The important factor in incubation is the capability of the incubators to link the networks to the incubatees (Sherman and Chappell, 1998; Colombo and Delmastro, 2002; Haapasalo and Ekholm, 2004; Pena, 2004; Bøllingtoft and Ulhøi, 2005; Chan and Lau, 2005; Hughes et al., 2007). One of the important performance factors in incubation is the process of governing the incubatees' affiliations. Public business incubators, which consist of regional offices and universities, represent most of the business facilitators activated within the observed context. Universities and the local government play a key role in the development of public policies and contribute to research funding, agreements between universities, incubators and the regional entrepreneurial systems to aid and promote entrepreneurship, economic development and innovation (Corsi and Di Bernardino, 2014). Finally, the research also finds the 'learning' factor to be the foundation of performance (Messeghem et al., 2018).

This research has arisen because previous papers, for example Vanderstraeten and Matthyssens (2012), O'Neal (2005), Voisey et al. (2006), Löfsten and Lindelöf (2002), Mian (1997) and Bigliardi et al. (2006), have not used any processed data. Only Lalkaka (2003) indicates five factors, namely public policy, which stimulates entrepreneurial businesses and provides a business infrastructure; private sector partnerships for mentoring and marketing; the knowledge base of learning and research; professional networking, nationally and globally; and community involvement to promote entrepreneurship and cultural change. Stefanović and Stanković (2014) found that usually the model developed to measure business incubator performance was only one that measured financial

statements. This research seeks to develop a model that measures the performance factors of business incubator in public universities in Indonesia.

### 3. Structural Model, Performance Indicators, and Hypotheses

The factors studied in this research include the abilities of business incubators (Smilor, 1987; Costa-David et al., 2002; Verma, 2004), incubator governance (Campbell, 1989; Hannon, 1995; Verma, 2004), entry criteria (Campbell, 1985; Smilor and Gill, 1986; Campbell, 1989; Costa-David et al., 2002; Verma, 2004; Hackett and Dilts, 2004; Hutabarat, 2014), exit criteria (Costa-David et al., 2002; Verma, 2004), mentoring and networking (Campbell, 1985; Costa-David et al., 2002; Verma, 2004; Hackett and Dilts, 2004; Aerts et al., 2007), funding and support (Campbell, 1985; Costa-David et al., 2002; Verma, 2004), government support and protection (Smilor, 1987; Mian, 1997; Lee et al., 1999; Chandra and Chao, 2011; Wilson, 2012; Wolf 2017), university regulations (Smilor, 1987; Gibson, 1988; Mian, 1997; Carayannis et al., 2006; Chandra and Chao, 2011; Wonglimpiyarat, 2016), and system infrastructure (Hackett and Dilts, 2004; O’Neal, 2005; Carayannis et al., 2006). A structural model of all the factors to be assessed from the performance of successful business incubators in public universities in Indonesia is shown in Figure 1.



**Figure 1** Structural model of the performance of business incubators in Indonesian public universities

The incubator performance framework section explained that the incubator performance framework should typically determine different performance approaches from which performance measurement could be further defined. However, we should observe that performance measurement and (key) performance measurements as phrasing (Dumas et al., 2013).

H1: The greater the focus on the performance of business incubators moderated by the quality of facilities, the more likely the business incubator is to be performed due to good quality of facilities.

H2: The better the incubator's governance, as moderated by credit and reward, the more likely it is to be performed.

H3: The stronger the enforcement of tenant entry criteria, the higher the probability of the business incubator performing well.

H4: The stronger the enforcement of tenant exit criteria, the higher the probability of the business incubator performing well.

H5: The better the mentoring and networking of the business incubator, moderated by a good infrastructure system, the more likely the business incubator is to be performed.

H6: The better the funding and support of the business incubator for its tenants is moderated by good system of infrastructure, the more likely the business incubator is to be performed.

H7: The better the support and protection from the government, moderated by credit and reward, the more likely the business incubator is to be performed

H8: The better the university regulations are moderated by credit and rewards, the better the initiative programs and projects for business incubator performance.

H9: The better the system and infrastructure are moderated by a good infrastructure system, the more likely the of the business incubator performance

#### 4. Methodology

Using a mixed method approach, the research involves sequential timing in the use of several different methods. One approach is first employed, and the conclusion used to select the sample to establish the instrument, and to write the analysis for the subsequent approaches. Other applications were used to establish the designs of the differing approaches of equal weight and sequence. The second method involved data collection and procedure; first, a qualitative study, followed by a quantitative study. The weight between the qualitative and quantitative studies should be equal, although in practice one approach is used more than the other.

The decision on choosing an appropriate approach for a study hinges upon the goals of the research, and should be determined by the study questions (Marshall, 1996). The mixed-method approach incorporates mixed-methods design, employing both quantitative and qualitative studies. This approach has been utilized in many fields of study, including social, behavioral and health sciences (Yin, 2003). Tashakkori and Creswell (2007) define mixed-methods as research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry. Johnson and Onwuegbuzie (2004) advocate the use of mixed-methods research as the third research paradigm in educational research, and recognize the importance and usefulness of both types of study.

Consequently, the use of qualitative and quantitative methods was considered suitable for this research. The study first seeks to examine the indicators and success factors for business incubators in Indonesian public universities, second investigates these factors, and finally examines the research framework performance through statistical analysis. Based on various literature reviews, the survey questionnaire was constructed and developed into a consolidated survey questionnaire consisting of different measurement scales and questions. Each related success factor was measured using a 1 to 5 Likert scale, which was incorporated into the questionnaire, and respondents were requested to indicate the importance of factors relative to others.

The objective of the study is to distinguish those factors which have a relatively higher score. It then continues with the quantitative method using reliability and validity tests, in which all the success factors are valid and reliable (Gozali, 2018), research hypothesis tests, and a structural model test. Case studies are used as part of the qualitative method to study the differences between public university business incubators in Indonesia.

The qualitative study was adapted from the literature reviews, in which business incubator success factors were identified. The survey questionnaire was constructed and developed from face-to-face interviews with Indonesian public university business incubator experts. The survey questionnaire was then validated by ten professors from six countries (i.e. the USA, Scotland, Finland, Australia, Malaysia and Indonesia) (Gozali, 2018). After validation of the questionnaire and completion of the correction process, the final survey questionnaire was circulated to respondents via e-mail or conducted face-to-face. The Cronbach's alpha value obtained from the 95 respondents gave a value of 0.98, which shows that the reliability of the results is quite high.

The quantitative study was supported by data from in-depth, one-to-one interviews. The reliability of the quantitative factors in the study was assumed to be higher than the qualitative ones, since the interviews with the experts were originated on empirical data which had been previously collected (Graff, 2016). The main approach is to utilize questionnaires on a large sample in the form of quantitative data collection, hence the creation of the survey for the purpose of this research (Denscombe, 2007). This research examined the results to identify the performance of business incubators using the survey questionnaire developed for the study and the business incubator success framework (Gozali, 2016).

## 5. Research Locations and Research Sample

### 5.1. Research Location

The 95 respondents consisted of business incubator managers from Indonesian public universities, chosen from the following institutions: Institut Teknologi Bandung, Institute Teknologi Sepuluh November, Andalas University, Institut Pertanian Bogor, Diponegoro University, University of Indonesia, Samratulangi University, Brawijaya University, Airlangga University, Riau University, Udayana University, Gorontalo University, Sebelas Maret University, Jambi University, North Sumatera University, Bandung Technopark, Padjajaran University and Yogyakarta State University.

### 5.2. Research Sample

The sample used for the study consisted of business incubator managers in Indonesian public universities involved in the day-to-day operations of the incubators and the graduated tenant companies. In their role as sample or respondents, the business incubator managers would have the necessary insights and experience of managing incubators, with a relationship between the incubators and tenant firms. The sample for this research

consisted of 95 respondents, all of whom were business incubator managers from Indonesian public universities.

## 6. Results and Discussion

The research employs the mixed method approach, and the data are analyzed using the IBM SPSS version 23 and Smart PLS version 3 statistical software packages. After data collection and analysis, the results are shown in Table 1.

**Table 1** Structural model measurement for the performance of business incubators

Hypothesis	Construct relationship	t stat	p value
H1	Information Technology → Quality of Facility	4.374	0.000
H2	Incubator Governance → Credit and Rewards	0.461	0.645
H3	Entry Criteria → Business Incubator Performance	2.125	0.034
H4	Exit Criteria → Business Incubator Performance	0.997	0.319
H5	Mentoring and Networking → Good System Infrastructure	2.686	0.007
H6	Funding and Support → Business Incubator Performance	3.535	0.000
H7	Government Support and Protection → Credit and Rewards	2.309	0.021
H8	University Regulation → Credit and Rewards	3.515	0.000
H9	System Infrastructure → Good System Infrastructure	1.486	0.138

Lalkaka (2003) proposed five factors, government support, mentoring networking, infrastructure, community support and sharing knowledge, which will increase business incubator performance. Stefanović and Stanković (2014) developed a model by only measuring financial statements.utama et al. (2018) state that business incubator performance depends on office space, tenant rooms, discussion room 1 and a tenant production display room, with a minimum time requirement for the incubation process. Grapeggia et al. (2011) state that incubator governance, marketing assistance and infrastructure are important for increasing business incubator performance in Brazil. Binsawad et al. (2019) state that the performance of technology business incubators is influenced by sharing knowledge and incubator governance, while Zibarzani and Rozan (2017) state that mentoring networking and sharing knowledge greatly influences business incubator performance in supporting start-ups. Xie et al. (2011) explain that incubation funding can improve incubator performance but not directly influence the tenants' income.

Van Looy and Shafagatova (2016) show that the performance indicators from quantitative to qualitative methods and from financial to non-financial factors, almost similar to Kaplan and Norton (2001), who take a four-dimensional approach to organizational performance, from the: (1) financial perspective; (2) customer perspective; (3) internal business process perspective; and (4) learning and growth perspective. Learning is a key indicator for performance, as stated by Messeghem et al. (2018), Mian (1997) and Binsawad et al. (2019).

Aerts et al. (2007) developed screening criteria, or entry criteria. Corsi and Di Berardino (2014) emphasizes the roles of university regulations and collaborations in investment and public policies. Van Rijnsoever et al. (2017) and Eveleens et al. (2017) recommend funding and support. Van Rijnsoever et al. (2017), Bøllingtoft and Ulhøi (2005), Chan and Lau (2005), Colombo and Delmastro (2002), Haapasalo and Ekholm (2004), Hughes et al. (2007), Pena (2004) and Sherman and Chappell (1998) acknowledge the relationship between mentoring and networking. All the above theories and models support the factors within the findings of this analysis.

**Table 2** Results of performance hypothesis testing

Hypothesis	Description	Result
H1	The greater the focus is on the performance of business incubator moderated by the quality of the facilities, the more likely the business incubator to perform due to good quality of facilities.	Partially Supported (Information Technology and E-com Assistance)
H2	The better the incubator's governance is moderated by credit and reward, the more likely the business incubator to perform	Not Supported
H3	The stronger the enforcement of tenant entry criteria, the higher the probability of business incubator to perform	Directly Supported
H4	The stronger the enforcement of tenant exit criteria, the higher the probability of business incubator to perform	Not Supported
H5	The better the mentoring and networking of the business incubator moderated by good system of infrastructure, the more likely the business incubator to perform	Supported
H6	The better the funding and support of the business incubator for its tenants is moderated by good system of infrastructure, the more likely the business incubator to perform	Supported
H7	The better the support and protection from the government moderated by credit and reward, the more likely the business incubator to perform	Supported
H8	The better the university regulation is moderated by credit and rewards, the better the initiative programs and projects for business incubator on the performance (university regulation).	Supported
H9	The better the system and infrastructure are moderated by a good system of infrastructure, the more likely the performance of the business incubator to increase	Not Supported

The results of the hypothesis analysis shown in Table 2 demonstrate that information technology (Grapeggia, 2011; Lalkaka, 2003), as part of the abilities of a business incubator, partially supports their performance and that entry criteria (Campbell, 1985; Smilor and Gill, 1986; Campbell, 1989; Costa-David et al., 2002) directly support performance. Mentoring networking (Lalkaka, 2003; Zibarzani and Rozan, 2017) supports the performance of business incubator, with good infrastructure systems as a moderating factor and funding (Xie et al., 2011; Van Looy and Shafagatova, 2016; Van Rijnsoever et al., 2017; Eveleens et al., 2017) also supports performance, with good infrastructure systems also as a moderating factor. Finally, university regulation (Corsi and Di Bernardino, 2014) supports the performance of business incubators, with credits and rewards as a moderating factor.

## 7. Conclusions

This research has been conducted to measure the factors that are critical to incubator performance. The research design employed the mixed methods approach. To conclude, it can be said that comprehensive skimming of references has provided us with numerous factors which account for the success of incubation performance. An important finding from the paper is that information technology, entry criteria, government support and protection, funding and support, mentoring networking and university regulation support the performance of business incubators.

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## Appendix A

### The content of the Questionnaire

1. The following criteria relate to the ability of the business incubator to provide PHYSICAL OR LOGISTICAL FACILITIES: Office Space, Workshop Space, Laboratory, Computers, Conference Room, Meeting Room, Furniture and Equipment Rental, Telephone Equipment, Canteen, Shipping and Receiving, Logistic.
2. The following criteria relate to the ability of the business incubator to provide SHARED BUSINESS SERVICES AND EQUIPMENT: Audio Visual Equipment, Mail Service, Photocopy, Electricity, Water, Filling, Clerical Service, Receptionist, Office Hours Answering, Air Conditioner, Cleaning, Maintenance, Custodial Services.
3. The following criteria relate to the ability of the business incubator to provide FINANCIAL AND ACCOUNTING CONSULTATIONS: Business Taxes, Risk and Management Units, Government Grants and Loans, Government Procurement Process, Government Contract Preparation, Equity and Debt Financial Agreement, Export Development Assistance, Writing Financial Report.
4. The following criteria relate to the ability of the business incubator to provide MARKETING ASSISTANCE. Market Research, Advertising and Media Promotion, Customer Service Training, Pricing Strategy, Product and Image Development, Selling and Distribution Strategy, Business Events, Conferences and Exhibitions, Network to other business support, agencies, and potential clients.
5. The following criteria relate to the ability of the business incubator to provide PROFESSIONAL BUSINESS SERVICES AND BUSINESS ETIQUETTE: Pre-Incubation Services, Legal Counseling, Legal Representation, Patent Assistance, Accounting, Computing and Information Services, Book Keeping, Introduction to Seed and Venture Capitalist, Business Angel Network.
6. The following criteria relate to the ability of the business incubator to provide MANAGEMENT AND HUMAN RESOURCE ASSISTANCE: Business Planning Skill, Budgeting Skill, Employee or Human Relations Skill, Controlling Skill, Renumeration Packages, Career Path Planning, Public Speaking and Presentation Skill, Training Package for Human Development.
7. The following criteria relate to the ability of the business incubator to provide INFORMATION TECHNOLOGY AND E-COMMERCE ASSISTANCE: E Business or E commerce, E business or E Commerce, Computer & Software Skill, Network Provider, Web Admin, Accessibility.
8. The following criteria relate to the INCUBATOR GOVERNANCE: An Experienced Incubator Manager, A Key Board of Directors, A Noted Advisory Council, Concise Program Milestones with Clear Policies and Procedures, Dynamic and Efficient Business Operation, Good System Operation Procedure of Business Incubator, Vision, Mission, Value and Culture of Business Incubator.
9. The following criteria relate to the ability of the business incubator to screen tenants for admission to the incubator (ENTRY CRITERIA). Ability to Create Jobs, Ability to Present a Written Business Plan, Have a Unique Opportunity, Ability to The Firm to be Owned Locally, Advanced Technology Related Firm, Ability of Firm to Present Its Space Needs, Complementary to Existing Firms, New Start Up Firm, Age of Firm, Affiliated with University, Be Able to Pay Operating Expenses, Business Must Have an Innovative Project, Business Must Demonstrate The High Growth Potential, Social Impact.
10. The following criteria relate to the ability of the business incubator to decide when tenants should leave the incubator (EXIT CRITERIA): Time Limit of Tenancy, Space Requirements, Achieved Business Target and Objectives, Fail to Achieved Business target and Objectives, Need More Support that Incubator Cannot Offer.
11. The following criteria relate to the ability of the business incubator to provide MENTORING AND NETWORKING: Entrepreneurial Network, Entrepreneurial Education, Tie to a University, Community Support, Affiliation with Key Institutions, Finding the Strategy and Expertise Partner.
12. The following criteria relate to the ability of the business incubator to obtain GOVERNMENT SUPPORT AND PROTECTION: Grant or Funding, Good Regulation, Tax Holiday or Protection, Special Stock Market for Startup Company.
13. The following criteria relate to the ability of the business incubator to obtain FUNDING AND SUPPORT: Financing Arrangement, Organizational Arrangement, Good Supporting Data, Intellectual Property Protection, Help with Regulatory Compliance
14. The following criteria relate to the ability of the business incubator to obtain UNIVERSITY REGULATION: Good University Regulation for Entrepreneurship, Good Entrepreneurship Programs, appointed a Good Business Incubator Manager, Give Credit and Rewards for Business Incubator, Manager, Mentor and Counselor, Evaluation System for Business Incubator Services and social impacts
15. The following criteria relate to the ability of the incubator to provide SYSTEM INFRASTRUCTURE. Integrate Clients in the Largest, Technology Development System, Good Service Provider, High Speed Broadband Internet, Technology Support
16. The management use the following criteria to monitor the PERFORMANCE OF THE BUSINESS INCUBATOR itself. Incubator Occupancy Rates, Number of Companies Graduating from Incubator, Job Created by Tenant/Graduate Companies, Turnover of Tenant/Graduate Companies, Financial Performance of Incubator Itself, Business Incubator Contribution to Society or Local Development