INCUBATOR MANAGEMENT MODEL IN INDONESIA

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Abstract: Incubator is required to increase the creation of newly technology based firms (NTBFs) that will be dealing with the change of response of market demand as well as technological developments. Incubator management needs sufficient capacity supported by a variety of factors that can determine as the influential factor of an incubator management. The purpose of this study was to compare self –assessment performance based on the factor of incubator management and to describe the diversity of these factors and reduce thus gaining a dominant factor by using principal component analysis, this study was conducted in LIPI, Bandung Techno Park and Solo Techno Park. Purposive sampling was used for the sampling technique with a total population of respondent 18 of 49. Based on the results of research conducted in three incubator institution. LIPI has strength in service criteria compared with two other incubator but weak in objective & management and strategy criteria. Bandung Techno Park has strength in objective & management, strategy, resources criteria. The research has managed to reduce 58 to 13 are considered to be contributing factors in incubator management. This research also generated cumulative proportion diversity of Resources=75.635%; Services=59.177%; Selection System=69.277%; Strategy=81.584%; Objectives and Management=84.582%. This indicates that each of these factors in the perception of respondents in this study can affect the influential factor in the management of incubators

Keywords: Incubator, dominant factor, principal component analysis, self-assessment.

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The role of MSMEs (Micro, Small and Medium Enterprises) in domestic economy is increasing, especially after financial crisis in1998 (Tambunan, 2010). SMEs are an integral part of national business world which have very important position, potential and strategic role in realizing more balanced national economic structure based on economic democracy. In crisis time, SMEs demonstrate their ability to cope with crises, when many large companies cannot survive from a prolonged critical. However, seen from the role and contribution of SMEs, although the number and the role of contribution to employment reach more than 90%, its contribution to national economic value added is only about 58% (Hubeis, 2011).

However, the development of the business environment demands a shift in the ability of MSMEs to be part of SMEs which respond to change in market demand and technological developments. One way to enhance the competitiveness of MSMEs is to develop Business and Technology Incubator

(IBT) (Bergek and Norman, 2008). Incubator is expected to be an institution that can provide solutions in the creation of SMEs that can compete in an increasingly competitive market, so that the management requires sufficient capability supported by various factors that can determine the success of an incubator. Incubator is an organization that provides infrastructure and services that increase the added value of a business. Business incubator will bring the idea and concept of "*technopreneurs*" in the first stage into business plans and implementation (BI, 2006). Incubator plays a role in accelerating value creation by reducing the level of risk of financing and failure with the support of a conducive environment (Khalid et al, 2012).

Associated with the incubator, Lalkaka (1997) state that the performance of an incubator should always be measured as it will show the development and survival of the tenant companies in it. In various literature related to the determination of key of success of incubators, each expert discusses different thing, but there is no contradiction between one and the other. In this case, Wagner (1997) identifies that proximity to the center of science development is one of the keys of success of incubator establishment. Wagner also reveals another need for a feasibility study as one of the keys of success of a project in an incubator. Arlotto et.al (2011) stated that the performance of incubator is largely determined by the performance of incubator manager so that it requires a manager who has a good entrepreneurial spirit who can motivate his team.

Cooper (1985) stated that the success of a small business depends on the quality of an entrepreneur. However, Hickman and Raia (2002) indicate that innovation will grow and develop in a conducive environment as will happen in an incubator. Chiu (2007) reveals several variables that can influence the success of incubator management namely: Resources, Services, Selection, Strategy and Purpose.

Incubator has an indicator of successful incubator management as a form of performance, expressed by the amount of employment created, tenant profits, the amount of commercialized research, export earnings, policy impact, and income increase (Mubaraki, 2011). In order to meet the achievement of the indicator, incubator requires activity parameters that have important contribution in achieving performance

In this study, identifying activities that give important contributions in achieving performance begins with self-assessment of the institution in order to know the strengths and weaknesses of the institution.

According Rangkuti (2009), SWOT analysis is the identification of various factors systematically to formulate the strategy of company. This analysis is based on the logic that can maximize strength and opportunities, but can simultaneously minimize weakness and threats. After the strength profile of the institution is mapped, an analysis was conducted to determine a number of dominant factors in the management of incubator.

The purpose of this study is to illustrate the comparison of incubator management in three institutions through self-assessment of incubators and identification of dominant factors in incubator management.

RESEARCH METHOD

Data Collection

Types of data used in this study are secondary data and primary data, namely questionnaires given to 18 incubator managers from a total of 49 populations in three incubators, namely LIPI, Solo Techno Park and Bandung Techno Park. The selection of respondents was based on the level of involvement in incubator management, so that only the personnel directly involved became the respondents in this study, as well as the position in the incubator. This research was conducted in July-August 2016.

Techniques used are:

1. Secondary data analysis method to identify influential factor based on literature study, which further is referred to as variable in this research.
2. Descriptive analysis method used was questionnaires filling by using nominal scale for ability of institution with Yes = 1 indicates that the incubator has performance on variable and No = 0 indicates that the incubator does not have

performance on variable. This method was used in conducting self-assessment analysis of the ability owned by each incubator institution.

3. Main component analysis (AKU) method was used to reduce the variables so as to produce dominant factors which contribute to the management of the incubator, by using questionnaire filling by using *Likert* scale between 1-6 based on the importance level, in which scale 1 indicates unimportant and scale 6 indicates very important. This method was used to reduce existing factors into dominant, supporting and additional factors.

This study is based on the conceptual framework contained in Figure 1, with restrictions on self-assessment analysis and analysis of dominant factors in the incubator management in three incubator institutions.

In this research, sampling was done by purposive sampling technique. The basis for the selection of incubator institution is based on the diversity of institution's identity. Center for Innovation LIPI is an incubator institution which is supported by government funding and is a public research institution with more than 500 intellectual property. Solo Techno Park is a local government-owned incubator agency that has implemented BLU financial management. Bandung Techno Park is a privately-run incubator institution affiliated with Telkom University and PT Telkom Indonesia as the holding agency.

Data Processing

Data analysis method used was comparative analysis for data of self-assessment and main component analysis to identify dominant factors in incubator management.

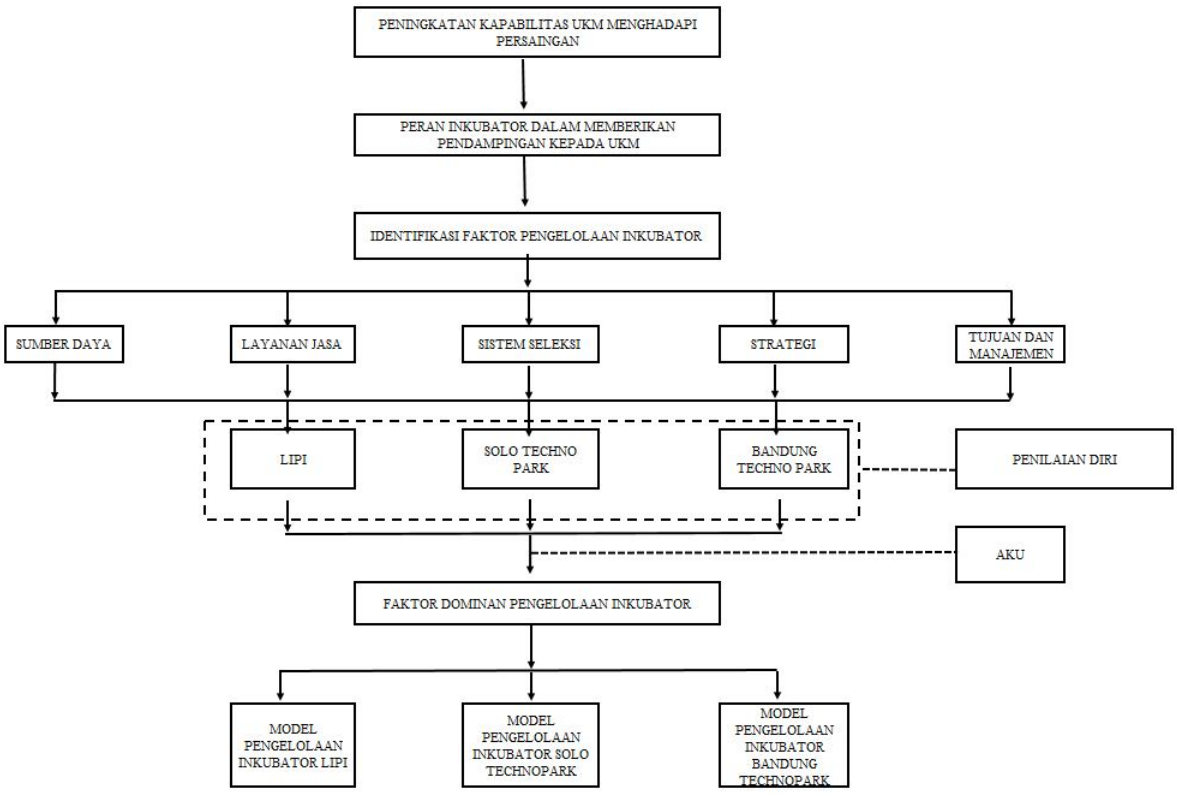

Figure 1 Conceptual Framework and Analysis

Main component analysis technique is to simplify the data, by transforming the data linearly in order to form a new coordinate system with maximum variety.

Factor analysis process seeks to find the interrelationship between a several mutually independent variables, so that may be one or more sets of variables less than the number of initial variable (Hair, 2010). Main component analysis can be used to reduce the dimensions of a data without significantly reducing the data characteristics. According to Suliyanto (2005), the steps in the factor analysis are as follows:

(1) Formulating the problems.
(2) Making correlation matrix between variables, to know the adequacy of sample, *barletts test sphericity* and Kiser-Mayer-Olkin (KMO) is used, in which the value of KMO must be greater than 0.5
(3) Determination of the number of factors is based on the *eigenvalue*, in which the *eigenvalue* value must be greater or equal to. *Eigenvalue* is defined as indicating the amount of contribution of a factor to the variety of all original variables.
(4) Rotation factor used *varimax* procedure;
(5) Performing factor interpretation based on loading factor, in which the value of loading factor must be greater than 0.7. Loading factor is a number indicating the magnitude of the correlation between a variable with the first, second, or third factor formed. The process of determining variable that will enter the factor is done by looking at the ratio of the correlation of each row in each factor in matrix table.
(6) Surrogate variable selection by representative selection of each variable in a new factor based on the highest factor loading value.

The variables in this research are presented in Table 1.

FINDINGS AND DISCUSSIONS

Descriptive Analysis

Figure 2 Self-Assessment Profile of 3 Incubator Agencies

Table 1 Research Variables

Peubah	Keterangan	Peubah	Keterangan	Peubah	Keterangan	Peubah	Keterangan	Peubah	Keterangan
SD	**Sumber Daya**	**LJ**	**Layanan Jasa**	**SS**	**Sistem Seleksi**	**S**	**Strategi**	**TM**	**Tujuan dan Manajemen**
SD1	Kemampuan dalam Inovasi dan komersialisasi	LJ1	Asistensi dalam melakukan pengembangan dan Alih Teknologi	SS1	Memiliki timberi inisiatif tinggi	SS1	Kemampuan memilih pengembangan industri menuut kemampuan inti dari lembaga induk	TM1	Tujuan organisasi yang jelas
SD2	Sistem Manajemen yang baik	LJ2	Memiliki pengetahuan tehadap poperasi bisnis dan hukum	SS2	Pengeldaan proyek yang baik	SS2	Kemampuan mengembangkan bisnis dan promosi	TM2	Kebijakan Pemerintah yang mendukung
SD3	Manajer yang memiliki jiwa kewirausahaan baik	LJ3	Jasa Perkantoran	SS3	Memiliki potensi pekembangan yang baik	SS3	Merekrut Perusahaan berbasis pengetahuan atau berbasis pengembangan jasa	TM3	Sistem Pengelolaan Inkubator yang komprehensif
SD4	Memiliki hubungan baik dengan lembaga induk	LJ4	Kemampuan menyelesaikan persoalan dengan cepat	SS4	Memiliki sumber pendanaan yang sesuai	SS4	Memperkuat promosi terhadap aliansi strategis dari inkubator	TM4	Visi
SD5	Memiliki Kemampuan mengelola bisnis	LJ5	Layanan jasa internal	SS5	Penetapan kriteria seleksi tenant	SS5	Mendorong staf untuk menginisasi bisnis	TM5	Kebijakan pengembangan industri yang sesuai
SD6	Dukungan Komunitas	LJ6	Konsultasi finansial	SS6	Penetapan kriteria kelulusan tenant	SS6	Jejaring dengan lembaga penelitian	TM6	Perencanaan, kebijakan dan prosedur yang jelas
SD7	Dewan pensihat	LJ7	Mentoring dan Pengembangan jejaring	SS7	Penetapan kriteria seleksi teknologi yang diinkubasi	SS7	Pengembangan dan penguatan pendidkan bidang teknologi yang dibutuhkan oleh industry	TM7	Konsensus Para Pemangku kepentingan
SD8	Kemampuan finansial bertahan dalam jangka 3-5 tahun	LJ8	Akses pada pendanaan dan dukungan lainnya	SS8	Evaluasi Seleksi bisnis dan Strategi yang akan dikembangkan	SS8	Jejaring bisnis	TM8	Administrasi keuangan pemerintah yang mendukung
SD9	Dukungan dari *stakehdder*					SS9	Melakukan proses *recruitment* manajer profesional sebagai bagian dari pengelola inkubator		
SD10	Pendanaan untuk Wirausahawan					SS10	Perencanaan untuk menarik investor		
SD11	Kemampuan Pengelola Inkubator					SS11	Kedekatan dengan Universitas		
SD12	Fasilitas dan Lokasi					SS12	Analisis Kelayakan		
SD13	Umur dan ukuran dari inkubator.					SS13	Merekrut wirausahawan memiliki mutu baik		
SD14	Adanya dukungan prasarana (pasar, teknologi, pelayanan kredit, pelatihan dan lain-lain)					SS14	Faktor keberlanjutan		
SD15	Pendinaan Awal dari Pemerintah					SS15	Peta Keberhasilan Alumni Inkubator		
SD16	Dewan Sponsor					SS16	Kebijakan pengelolaan Inkubator		
SD17	Konsultan Lokal					SS17	Pemilihan jenis inkubator yang diarahkan pada usaha unggulan		
						SS18	Peluang Pasar		

Adapted from: Chiu (2007), Hubeis (2011), Kuo (2001), Lalkaka(2000), Smilor (1987), Mbewana (2006), Verma (2004)

Based on the analysis results of self-assessment in Figure 2, Center for Innovation LIPI has a dominant value in service variable (75%) although the other two incubators have a gap of value that is not too big (62.5%). The thing that becomes the distinguishing factor is that center for innovation has a service development scheme and technology transfer because the center for innovation has clear technology transfer procedures and access to 50 research centers that can support technology development.

Unlike the aspect of goals and management, Bandung Techno Park has high understanding (87.5%) compared to Solo Techno Park (62.5%) and LIPI (37.5%). The findings indicate that low understanding of this factor is influenced by organizational management of LIPI Incubator, which has not become an independent institution but it is still a program, so that there is an overlap in the implementation of incubation with other routine activities that become other tasks and other functions in the organization. This situation affects the level of involvement in incubator management, which is not accompanied by a unanimous understanding of aspect of goal and management. Similarly, what happens to other aspects is the result of self-assessment of each incubator institution.

Main Component Analysis

As mentioned in data processing, validity and reliability test of the questionnaires has been done to produce valid and invalid data. For resource criteria, variable of innovation ability, good management system, ability of incubator's manager, incubator's age, and sponsor board include in invalid data (58.8%). For service criteria, variable of assistance, quick problem solving, internal services, financial consultations, and access to funding include in invalid data (62.5%). For selection system criteria, variable of funding sources, tenant selection criteria and business evaluation include in invalid data (37.5%). For goal and management criteria, only incubator management system variable that includes in invalid data (12.5%) and strategy criteria of 50% include in invalid data. So in continuing analysis, invalid data would not be included in the next calculation. Based on the interpretation of the factor matrix, the results obtained are presented in Table 2-6

Table 2 Factors which Influence Incubator Management: Resource Variable

No	Factor	Variable	Eigenvalue	Loading Factor	Variance %
1	F1	SD3	5,534	0,843	46,11
2	F1	SD5	5,534	0,816	46,11
3	F1	SD9	5,534	0,714	46,11
4	F1	SD12	5,534	0,762	46,11
5	F2	SD15	2,405	0,928	20,041
6	F3	SD7	1,138	0,764	9,48
7	F3	SD14	1,138	0,701	9,48

Table 3 Factors which Influence Incubator Management: Service Variable

No	Factor	Variable	Eigenvalue	Loading Factor	Variance %
1	F1	LJ7	2,970	0,906	42,434
2	F2	LJ2	1,172	0,877	16,743
3	F2	LJ	1,172	0,784	16,743

Table 4 Factors which Influence Incubator Management: Selection System Variable

No	Factor	Variable	Eigenvalue	Loading Factor	Variance %
1	F1	SS2	4,461	0,737	55,756
2	F1	SS3	4,461	0,955	55,756
3	F1	SS6	4,461	0,748	55,756
4	F2	SS1	1,082	0,896	13,521
5	F2	SS7	1,082	0,752	13,521

Table 5 Factors which Influence Incubator Management: Strategy Variable

No	Factor	Variable	Eigenvalue	Loading Factor	Variance %
1	F1	S1	5,519	0,818	50,171
2	F1	S11	5,519	0,932	50,171
3	F1	S16	5,519	0,756	50,171
4	F1	S18	5,519	0,739	50,171
5	F2	S4	2,319	0,706	21,081
6	F2	S8	2,319	0,819	21,081
7	F2	S9	2,319	0,837	21,081
8	F3	S2	1,137	0,816	10,33
9	F3	S3	1,137	0,905	10,333

Table 6 Factors which Influence Incubator Management: Goal and Management Variable

No	Factor	Variable	Eigenvalue	Loading Factor	Variance %
1	F1	TM1	4,036	0,861	50,455
2	F1	TM4	4,036	0,796	50,455
3	F1	TM5	4,036	0,843	50,455
4	F2	TM6	1,509	0,788	18,867
5	F2	TM7	1,509	0,950	18,867
6	F3	TM2	1,221	0,872	15,259
7	F3	TM8	1,221	0,716	15,259

From variable of resources studied with main component factor analysis, three factors are obtained, namely the first factor (F1), which is the most dominant factor, has *eigenvalue* of 5.534 and can explain the total diversity of 46.114%. This factor consists of SD3 = manager who has a good entrepreneurial spirit, SD5 = has the ability to manage business well, SD9 = support from stakeholders, and SD12 = facilities and location. The second factor (F2), which is called supporting factor, has an *eigenvalue* of 2.405 and can explain the total diversity of 20.041%. The third factor (F3), which is called an additional factor, have an *eigenvalue* of 1.138 and can explain the diversity of 9.28%.

From variable of service studied, after analyzing the main component factor, two factors are obtained, the dominant factor is sub-variable LJ7 = mentoring and network development. While from selection system variable, it is obtained 2 component factors with sub-variable SS2 = good project management, SS3 = has good development potential, SS6 = determination of graduation requirements

of tenant as dominant factor. For strategy variable, there are 3 main component factors, with S1 = ability to choose industrial development according to core ability of holding institution, S11 = proximity to university, S16 = Incubator management policy, and S18 = Market Opportunity. For purpose and management variable, there are 3 main component factors, with sub-variable TM1 = Clear organizational goals, TM4 = Vision, TM5 = Appropriate industrial development policy as the dominant factor in determining the success of incubator management.

From the research results, each factor in the variable gives the proportion of cumulative diversity as follows: Resources = 75,635%; Services = 59.177%; Selection System = 69.277%; Strategy = 81.584%; Goals and Management = 84,582%. According to the perception of the respondents in this research, this indicates that each of these factors can influence the success in incubator management according to the cumulative diversity value, and the rest is influenced by other factors which are not included in the research model.

The dominant factor is limiting the choice for incubators in developing their ability. Objective and management criteria that have dominant factor in goal and vision indicates that those three incubator agencies should pay more attention to the activities of enhancing the understanding of agency's goals and vision for personnel involved in incubator management, just as LIPI which has low ability to understand those factors. Similarly, other dominant factors are the focus of incubator management, not only in LIPI but also in other incubators.

With the dominant factors that must be owned and met by incubators, development and management will have a primary focus on improving the capability of incubator in assisting and creating technology-based start-up industries.

CONCLUSIONS

From three types of incubators tested, namely LIPI, Solo Techno Park, and Bandung Techno Park, self-assessment profiles of each incubator are generated. LIPI is excellent in criteria of service and selection system, Solo Techno Park excellent in purpose and management, and Bandung Techno Park is excellent in goal and management, as well as strategy and resources. LIPI is very weak in purpose and management, Solo is weak in strategy and selection system, and Bandung is quite weak on the selection system. Broadly speaking, Bandung has better self potential compared with two other incubators.

From three incubators tested in the aspect of incubator management, it is generated managers who have good entrepreneurship, business management skill, support from stakeholders, facilities and location are the dominant factors in resource criteria. As for service criteria, mentoring is the dominant factor. For selection system criteria, factors of project management and good development potential as well as the determination of tenant graduation requirements become the dominant factor. On criteria of strategy, the ability to choose industrial development based on the core ability of holding institution, closeness with university, policies of incubator management and market opportunities are the dominant factors. Clear organizational goals and appropriate vision and policy of industrial development are the dominant factors on goal and management criteria. The dominant factors above are the dominant factors that must be met by the incubator institution in supporting its achievement in creating technology-based start-up industry.

SUGGESTIONS

Based on the results of the research that has been done, further research is required to describe the factor of incubator management in each incubator institution, specifically related to the roadmap and the achievement of each incubator.

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