TRANSFORMING BUSINESS INCUBATORS TO SCIENCE AND TECHNOLOGY PARKS: A REVIEW OF PROGRAMS AT THE SCIENCE TECHNOLOGY PARK LIPI

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Abstract

A technology transfer process increases research capacity so that inventions can be used by communities and industries. In Indonesia, the Centre for Innovation LIPI, as a technology transfer office, does this by instituting incubators. The Indonesian government create science and technology parks (STP) as facilitators of a knowledge infrastructure. Incubators have become a core element of STP programs to encourage development. This paper describes the development of business incubators and technology in STPs. This is a qualitative study that reviews the activities involved in technology transfer. The study discusses transforming business incubators to science and technology parks in an interactive technological environment in STP LIPI, which acts as an intermediary for commercialization.

Keywords: business incubators, Science Technology Park, transforming, transfer technology

JEL Classification: O32, O34, M13

INTRODUCTION

Research institutes contribute actively to a nation's scientific capacity building. They also have a responsibility to increase research capacity so that inventions that have been generated can be used in the community and by industries: this is known as the technology transfer process. Technology transfer has been characterized as the adoption of innovation that relies heavily on national innovation systems and government policies with an extensive range of effectiveness (Abetti, 2004; Wahab, 2012). In Indonesia, the Centre for Innovation LIPI as a technology transfer office also engages in these activities, one of which is in the formation of technology incubators.

The development of technology transfer by the Indonesian Institutes of Sciences (Lembaga Ilmu Pengeta-

huan Indonesia [LIPI]) instigated by Government Regulation No. 20 of 2005 concerning intellectual property technology transfer. This regulation has been reinforced by Indonesian Presidential Regulation No. 27 of 2013 on the development of entrepreneurial incubators that are to enable improvements to national competitiveness. The purpose of these regulations is to disseminate knowledge and technology and increase the capacity of communities to master and utilize the benefits of science and technology (Pusat Inovasi LIPI, 2014).

The primary goal of business incubators is to facilitate economic development by promoting entrepreneurship, innovation, employment opportunities, and growth. Most of the incubators are operated directly by national or local authorities to achieve the goal. Specialised incubators have been established by universities and by private sector organizations (European Commission, 2002). LIPI's specialty is incubators based on technology.

To achieve the goal of increasing capacity of science and technology, there is a necessity to ensure the availability of input factors; these include science and technology policies that will encourage the development of technopreneurship, as well as facilitation strategies for novice entrepreneurs through a business incubator. Incubator development and the improvement of technology transfer are activities that should be increased to enable development of new technology-based companies in Indonesia. These companies are a path to the future, bringing economic independence and attracting qualified human resources to the country and, in turn, provide tax revenue for the state (Pusat Inovasi LIPI, 2014).

The Indonesian government has begun to encourage a 'knowledge-based economy' by implementing Science and Technology Park (STP) as an element of the knowledge infrastructure. The incubators differ from STPs because they are created to support companies in their start-up phase (Tola & Contini, 2015). The National Medium Term Development Plan 2015-2019 (Rencana Pembangunan Jangka Menengah Nasional [RPJMN]) has set a goal of establishing 100 technology parks in regencies or cities, and science park in every province. The Science and Technology Park in the Cibinong Science Centre and Botanical Garden (CSC-BG) is one of the STP administered by the Centre for Innovation LIPI. The aim of establishing this STP is to support and increase the ability to innovate, to improve competitiveness and to optimise the interaction and utilization of the resources universities, research institutions, and the business world.

A science and technology park, in brief, is a center of excellence or a kind of space where productive activity result from the collaboration of governments, academics, business, and the community. An organisation may be referred to as an STP if it meets the following requirements: there are local resources, facilities to process those resources, outstanding human

capital, a research and development centre, a business incubator, easy of access, a medical and educational centre, right policies and an efficient bureaucracy (Kusharsanto & Pradita, 2016). Therefore, business incubators and technology parks owned by LIPI can be developed into an STP. This paper describes such as development, with case studies from LIPI.

This article reviews the interactive transformational environment in the development of technology transfer in STP LIPI and the process of facilitating commercialization of results of research and development. The purpose of this study is to seek information related to research topics transforming business incubator to Science Technology Park. The other target is to find the potential environment development of technology transfer in STP LIPI and process of performance in facilitating commercialization of R&D results. This paper is expected to be an input for a potential source of information in the development of science and technology, as well as the nature of the process implementation.

LITERATURE REVIEW

Incubators

Incubators have become a distinct stage in the process of technology transfer. Incubation is not only for developing aspects of a new company's business but also to ensure that the technology adopted by a firm is ready to be accepted by the public. The concept of incubation according to the literature has evolved over the years. Until now, there have been three generations of incubators, which are characterized by different services in business support. First generation of incubators provide basic physical space and shared facilities. The second generation of incubator provides more specialized business support services, such as mentoring in activities. The third generation of the incubator, appearing in the late 1990s with the assistance of the internet revolution and informatics, is characterized by the availability of networks to share knowledge on how and the promotion of best practices among entrepreneurs (Salvador, 2010).

There is no precise definition of an incubator: the concept of an incubator that often used is that it is any organization that is helpful in the 'hatching' and development of new firms (Chan & Lau, 2005). However, Bergek & Norrman (2008) proposes the main components that separate incubators from others, which are selection, business, and mediation shown in Table 1.

Table 1. Incubator Model Components

Incubator Model		
Selection	Business Support	Mediation

Source: Bergek & Norrman (2008)

Most of the incubators worldwide are nonprofit, and depend on direct funding (in cash) and indirect funding (in subsidized services) from their sponsors, which are central, regional and local governments, economic de-

velopment organizations, foundations, universities, and colleges, or combinations of such organizations (Abetti, 2004).

An incubator can be considered as a container or area that supports start-up and fledgling companies (Peters, Rice, & Sundararajan, 2004). However, any understanding of incubation refers to the same primary characteristics, including a sound intellectual base, business-boosting administrations, and networking (Bøllingtoft, 2012). The incubator can also be classified regarding geography, business policy instruments, industrial sectors involved, competitive scope, the source of technology, markets and other criteria (Barbero et al., 2012).

Entrepreneurship becomes a benchmark for assessing the commercial conditions of a state. Entrepreneurship, when linked to an incubator, in general, benefits a new company or a beginner who needs guidance in developing their business. Organisations represented in incubators could be current organizations or agencies undergoing a conversion period (Tola & Contini, 2015). The existence incubator also affects the growth of innovation and entrepreneurship.

In addition to entrepreneurs, another actor who plays a role in the work and organization of an incubator is the incubator's manager. Incubators are not only to facilitate any assistance for development but also to provide office space, shared equipment and administrative services (Bøllingtoft, 2012). The significance of incubators originates from any association that enables and systematizes a venture's creation and start-up procedures, and provide such ventures with a wide choice of integrated services, such as business support services and integration and networking possibilities (European Commission, 2002). The incubator was instrumental in the development of entrepreneurship in any field of research that will support economic and social development (Etzkowitz, 2002). Incubators were established with the main purpose to facilitate economic development by promoting entrepreneurship, innovation, employment opportunities, and growth. For this reason, most of the incubators are operated directly by the national or local authorities. Specialized incubators have been establishing by universities or private sector organizations (European Commission, 2002).

Indonesian Institute of Science (LIPI) is the governmental authority for science and research in Indonesia. As the development of national capacities in the field of science and technology, a scientific institution in Indonesia has also experienced growth and development. Center for Innovation LIPI, was established in June 2001, this center is one of LIPI's research department. As an intermediary institution, Center for Innovation LIPI also plays a role in making technology incubation. A LIPI technology incubator is an intermediary institution that engages in coaching, mentoring, and developing a participant's (tenant) enterprise. A LIPI technology incubator strives to

create and develop new businesses that have economic value and are highly competitive by utilizing the advances developed by science and technology. LIPI technology incubator plays a role in bridging between research institutions to community or industry.

In LIPI, the technology incubator program is intended to provide services for inventors or innovators, internally and from the public, and also for business and technology-based innovation in Indonesia. The program is designed to give birth to new opportunities for new entrepreneurs in technology-based business. Through this program, there are various activities to strengthen the capacity of management to use technology and innovation to create a climate for the growth and development of new businesses.

In practice, the experts in an incubator advisory service can help with business planning, market planning, marketing research, business development strategy, new product development, financing strategy, website development and optimisation, human resource development, and bookkeeping. Assistance to a new company, in general, is for two to five years (Tola & Contini, 2015) but the period may be adjusted depending on the readiness of the company.

Science and Technology Park

The term of 'Technology Park', 'Technopolis', 'Technopole', 'Technology Precinct', and 'Research Park' can be a relief as the term of 'Science Park'. Science and Technology Park (STP) have become an essential element of a national innovation system (Zou, 2014). An STP can be defined as a center of excellence or a kind of space where productive collaboration between governments, academics, business, and the community can take place (Kusharsanto & Pradita, 2016). An STP is a form of diffusion of innovation and technology (Tola & Contini, 2015). Activities undertaken in an STP are intended to build bridges between research centers and their public, which in this case (LIPI) is an industry. Usually, industry spending on R&D is meager, and STPs have become an opportunity for research centers to provide the innovative technology (Zou, 2014). STP is a business support initiative and technology transfer that supports start-up companies, incubation activities, and innovation-led development, high growth, knowledge-based businesses (Parry and Russell, 2000). Start-up company is a major component of the economy of a nation.The development of technology-based starts up the company into one of a raft of the main goals of economic development and science and technology.

The use of science and technology parks, as facilitators of innovation, has spread during the second half of the twentieth century (Link & Scott, 2003). An STP, the Stanford Research Park, was established in 1951 in California, followed by the Cornell Business and Technology Park in 1952 and the Research Triangle Park in 1959 (Link & Link, 2003; Link & Scott, 2007; Wessner, 2009). Science Technology Parks originated from research in universities

that required industry support for its development. The Stanford Research Park's initial objective was not to create new businesses but to do research on innovation (Tola & Contini, 2015). The term 'science park' is more usual in Europe, but 'research park' 'is more common in the USA and 'technology park' is more common in Asia (Link & Scott, 2007).

An STP is the practical application of the concept that efforts must be made in regional and other areas to connect science and business to create new employment opportunities and to use modern scientific achievements in high technology to generate new products (Razovic & Mimica, 2013). The main characteristics of an STP often differ, but the European Commission uses the following indicators (European Commission, 2014):

a) Area of the parks and their built-up area.
b) Some hosted companies and the number of employees.
c) Rent and services that STPs provide, either by month, a year or in general.
d) Type and range of services that the parks offer.
e) Type and range of professional services that either the park or companies offer
f) Funding for capital and operating purposes.
g) Investment projects attracted to the region by the parks and/or in cooperation with other institutions, such as research centers and regional agencies.

Science Technology Parks serve to spur and support start-up companies, incubation, and innovation development to support economic growth. STPs also facilitate technology transfer by attracting companies from a technology sector and promoting companies' growth. Activities undertaken at an STP are based on business knowledge, in a business environment that allows specialized and close interaction with relevant experts who can review progress for their mutual benefit (Parry & Russell, 2000). For the external collaboration, STP also added the performance of research and applying for patents. All activity of the STPs is doing by the professionals. A managed park has a full-time manager whose main function is to oversee the park's activities and organizations and aims to increase the competitiveness of business and knowledge-based institution (Westhead & Batstone, 1999; Sofouli & Vonortas, 2007).

The STPs often state that their principal mission is to transfer technology from a research environment to the marketplace (Phillips, 2003). The manager of an STP should enable technology transfer in the STP as a form of technology diffusion. The management of an STP will assist researchers to develop ways for the research result to be used on an industrial scale. In this way, the STPs help industry to utilize the results of research.

RESEARCH METHODS

This study was conducted by using qualitative research methods, reviewing the literature dealing with incubators and STPs in the technology transfer of research results, in Indonesia, and especially in LIPI. For an efficient review of the literature, we used a data-mining technique; we collected and synthesized pertinent reports, policy documents, journal articles, and information from unpublished sources. The journal articles were browsed and selected based on relevance to the topic and using keywords such as technology transfer, technology licensing, a start-up company, and intellectual property. Other material came from the Centre for Innovation LIPI, government and private institutions, and from online sources.

RESULTS AND DISCUSSION

Incubators and STPs have become an international phenomenon (Phan, Siegel, & Wright, 2005). It became a reflection of national and regional policy regarding research and technology to boost the economic growth. The current economic system of a country is often associated with the presence of incubators and STPs. Incubators and STPs have in common that they are a place to develop that will be to the advantage of the public. Innovation, creativity, and knowledge as economic resources are the three-element of establishment the STP and incubator. Establishing incubators and STPs comes from a desire to increase the rate of economic growth of a country (Ratinho & Henriques, 2010). Many research institutions have established incubators and STPs to foster the creation of start-up firms based on technologies developed by research institution (Link & Scott, 2003).

Science and technology parks and incubators are often the results of public-private partnerships (Phan et al., 2005). It provides for alleviating the gaps between funding, research, and information on the science and technology policy. STPs imply that many stakeholders (for example, community groups, regional, and state governments) have enormous influence over reviews their missions and operational procedures. The stakeholders can also be universities (academicians), firms (business), and the society. Hence, STPs are also referred to as places to bring together the elements of an Academicians-Business-Government-Society (ABGS).

Science and technology parks and incubators not only bring expertise, but also help to identify markets for the innovation, provide on intellectual property protection, offer business development skills, identify surrogate entrepreneurs and venture capitalists (Franklin, Wright, & Lockett, 2001). The duties and functions of STPs and incubators are as intermediary institutions in the downstream from research and development results. It is a business support and technology transfer initiative that support incubation, entrepreneurship, development of innovation, knowledge based business that may develop the knowledge creation.

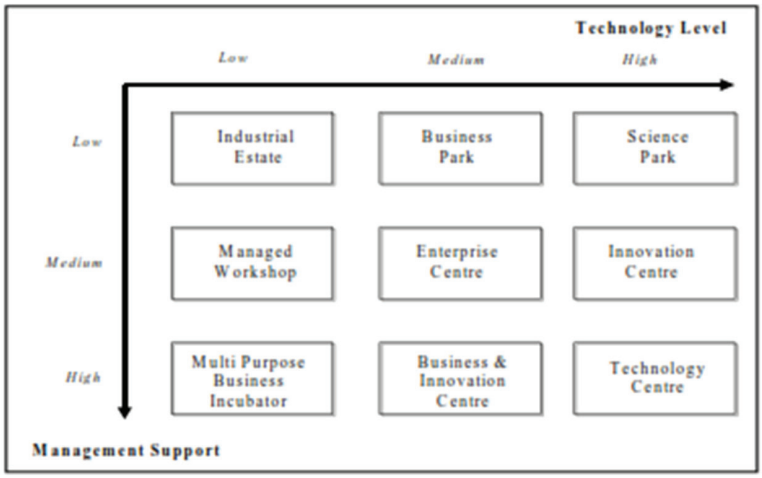

Figure 1. Typology of Business Incubators
Source: European Commission (2002)

The incubator model is similar to the STPs structure. It is an important tool of a technology policy fostering the development of the new technology-based firm. The European Commission (2002) reports the relationship between different incubator modalities and other SME promotion structures that include a physical space element, illustrated in Figure 1.

Industrial estates in the top left-hand corner of the matrix have a non-selective intake, provide little or no management support and have no particular criteria for business activities and technology content. At the bottom right-hand corner, technology centers have highly selective admission criteria, provide 'hands-on' management support, and have a highly specialized expertise in technology. Business incubators are positioned close to the bottom right-hand corner of the matrix because they provide a high degree of management support to tenants and usually, although not always, cater for technology-based enterprises. The mainpurpose of business incubators is to facilitate economic development by promoting entrepreneurship, innovation, employment opportunities, and growth. Moreover, most of the incubators are operated directly by the national or local authorities. Incubators started by government authorities and agencies are often associated with STP.

Even so, some previous studies mention that incubators differ from STPs in that they are created to support companies in their start-up phase (Tola & Contini, 2015). The differences are based on the differing concepts of incubators and STPs in several countries. The incubator concept should not be used for an organization such as science parks and technology parks (Bergek & Norrman, 2008). The idea of an incubator is to bridge or close the gap between the conceptof a new company and the company's viability.

Most research centers and STPs do not offer technical assistance to SMEs, which is the mark of an incubator program (Tola & Contini, 2015).

The Centre for Innovation LIPI was established in 2001 and links research centers and industries. At its inception, the Centre for Innovation LIPI did not have technology incubator facilities. This new incubation facility has been owned by the Centre for Innovation since 2013. As an incubator, it is engaged in the development of the technology-related business. At least 18 technological innovation has been adopted after finding a strategic partner, that is, start-up companies that became tenants at the Centre for Innovation LIPI and able to get the necessary help. The tenants use LIPI technology and, through the incubation process, it is applied directly to a start-up company. Through this program, various activities to strengthen the management capacity to do so as technology and innovation to create a climate for growth and development of new businesses based on technological innovation.

In 2014, the President of the Republic of Indonesia initiated a program, called *Nawacita*, to give priority to a program that assures Indonesia's economic sovereignty and independence. One of the requirements of the program is the establishment of 100 science and technology parks (Widodo & Kalla, 2014). This program is intended to generate national and regional competitiveness. This shows that government has begun to appreciate the implications and necessity of a "knowledge-based economy" (Kusharsanto & Pradita, 2016). Moreover, there are also other policies in previous years that support technology transfer in Indonesia.

The Indonesian Government has promulgated several regulations to emphasize the urgency of building and developing STPs, there are:

- The Act No.18 of 2002 about the National System of Research, Development, and Application of Science and Technology
- The Act No. 3 of 2014 about Industry
- The Act No. 17 of 2007 about the National Long-Term Development Plan 2005-2025
- The Act No. 32 of 2004 about Local Government
- The Act No. 26 of 2007 about Spatial Planning
- The Act No. 17 of 2003 about State Finances
- Government Regulation No. 28 of 2008 about National Spatial Plan
- Joint Regulation between Minister of Research and Technology and Minister of Home Affairs No. 3 of 2012 and No. 36 of 2012President's Regulation No. 32 of 2011 on Master Plan for the Acceleration and Expansion of Indonesian Economic Development
- President's Regulation No. 2 of 2015 about National Medium Term Development Plan Year 2015-2019

These regulations serve as a guide and underlie the implementation of the STP program. Science and technology parks serve as a guide for research institution about meeting more closely the needs of industry (Massey, Quintas & Wield, 1992). The founding of STP, managed by the Centre for Innovation, began with LIPI's engagement in activities to do with technology incubators. Incubators are often the core of STP (Saublens et al., 2008). Another study also showed that one of the components of an STP is an incubator (Razovic & Mimica, 2013).

The development of new technology-based companies as well as developing a culture technopreneurship through technology and business incubation. STPs have traditionally focused on the creation and nurturing of new businesses (incubation), typically incorporating incubator facilities at their campus (OECD, 1997). In 2016 the Centre for Innovation LIPI helped to create some start-up companies through the incubation facilities at its STP.

An STP is a meeting point of science and entrepreneurial initiative at the regional level that encourages collaboration between entrepreneurial firms and other entities (Razovic & Mimica, 2013). The new companies that are built in STP are more likely to have connections with local society because the research results produced by the STP are usually based on local needs. Science and Technology Parks are important in the regional area because they give the surrounding area an economic boost (Bellgardt et al., 2014). STPs have played a significant role as technology transfer mechanism, a source of relevant research result, and support for economic growth (Link & Scott, 2007).

One recommendation that can be made from a review of LIPI's STP activities is that STPs can establish networks that facilitate innovation in science and technology and its applications. A region-wide system that facilitates innovation from the results of R&D in many fields also enables and encourages more start-up companies. An STP can coordinate dispersed resources to aid the local economy and to increase industrial development.

CONCLUSION

A program for transforming a business development incubator into a science and technology park needs to pay particular attention to the local environment; none are quite the same. This paper reviews the stages of development that are required when using technology in incubation projects to provide socially useful outcomes, such as regional development, commercialization services, and diversification programs.

Transfer technology that increases know-how is still rarely implemented well and this can be ascribed to the lack of communication and collaboration between both parties. This lack of efficiency can be deduced from the slow progress from start-up to capitalization, to achievement. A science and technology park is a community that

needs to collaborate and synchronize the process necessary for the creation and nurturing of new businesses.

This review can generalise that the circumstances for successful incubation depend on the incubator's funding model, the available support from the state and from other stakeholders, the availability of infrastructure necessary for local businesses, the availability of seed funding for start-ups, the degree of acceptance by the local community of a culture of innovation, other key industries in the area, the government policy framework, and the possibilities for economic growth.

REFERENCES

Abetti, A. P. (2004). Government-Supported Incubators in the Helsinki Region, Finland: Infrastructure, Results, and Best Practices. *The Journal of Technology Transfer*, *29*(1), 19–40. doi: 10.1023/b:jott.0000011179.47666.55.

Barbero, J. L., Casillas, J. C., Ramos, A., & Guitar, S. (2012). Technological forecasting & social change revisiting incubation performance: How incubator typology affects results. *Technological Forecasting & Social Change*, *79*(5), 888–902. http://doi.org/10.1016/j.techfore.2011.12.003.

Bellgardt, F., Gohlke, J., Haase, H., Parzonka, R., & Schicketanz, J. (2014). Triple helix and residential development in a science and technology park: the role of intermediaries. *Triple Helix, 1*(1), 1-14. http://doi: 10.1186/s40604-014-0010-1.

Bergek, A., & Norrman, C. (2008). Incubator best practice: A framework. *Technovation, 28*(1), 20-28. doi: https://doi.org/10.1016/j.technovation.2007.07.008.

Bøllingtoft, A. (2012). Technovation. The bottom-up business incubator : Leverage to networking and cooperation practices in a self-generated, entrepreneurial-enabled environment. *Technovation*, *32*(5), 304–315. http://doi.org/10.1016/j.technovation.2011.11.005.

Chan, K.F., Lau, T., (2005). Assessing technology incubator programs in the science park: The good, the bad and the ugly. *Technovation, 25*(10), 1215–1228. http://doi.org/10.1016/j.technovation.2004.03.010.

Etzkowitz, H. (2002). Incubation of incubators: innovation as a triple helix of university-industry-government networks. *Science and Public Policy, 29*(2), 115-128. doi: 10.3152/147154302781781056.

European Commission. (2002). Benchmarking of Business Incubators, Final Report, DG Enterprise, Centre for Strategy and Evaluation Services, February.

European Commision. (2014). Setting up, managing and evaluating EU science and technology parks. Brussels: European Commission. http://dx.doi.org/10.2776/73401.

Franklin, S. J., Wright, M., & Lockett, A. (2001). Academic and surrogate entrepreneurs in university spin-out companies. *The Journal of Technology Transfer, 26*(1), 127-141. doi: 10.1023/a:1007896514609.

Kusharsanto, Z. S., & Pradita, L. (2016). The important role of science and technology park towards Indonesia as a highly competitive and innovative nation. *Procedia - Social and Behavioral Sciences*, *227* (November 2015), 545–552. http://doi.org/10.1016/j.sbspro.2016.06.113.

Link, A. N., & Link, K. R. (2003). On the Growth of U.S. Science Parks. *The Journal of Technology Transfer, 28*(1), 81-85. doi: 10.1023/a:1021634904546.

Link, A. N., & Scott, J. T. (2003). U.S. Science parks: the diffusion of an innovation and its effects on the academic missions of universities. *International Journal of Industrial Organization, 21*(9), 1323-1356. https://doi.org/10.1016/S0167-7187(03)00085-7.

Link, A. N., & Scott, J. T. (2007). U.S. University research parks. *Journal of Productivity Analysis*, *25*(1), 43–55. http://doi.org/10.1007/s11123-006-7126-x.

Massey, D., Quintas, P., & Wield, D. (1992). High-Tech Fantasies: Science Parks in Society, Science, and Space. New York: Routledge.

Organization for Economic Cooperation and Development. (1997). Technology incubators: Nurturing small firms. paper DSTI/STP/TIP(97)4. Paris: OECD.

Parry, M., & Russell, P. (Eds.). (2000). The planning, development, and operation of science parks. UKSPA.

Peters, L., Rice, M., & Sundararajan, M. (2004). The role of incubators in the entrepreneurial process. *The Journal of Technology Transfer, 29*(1), 83-91. doi: 10.1023/B:JOTT.0000011182.82350.df.

Phan, P. H., Siegel, D. S., & Wright, M. (2005). Science parks and incubators : Observations, synthesis and future research, *20*, 165–182. http://doi.org/10.1016/j.jbusvent.2003.12.001.

Phillips, R. (2003). Application of the technology and innovation park concept in the developing world: Dimensions and considerations. *Knowledge, Technology & Policy, 15*(4), 46-60. doi: 10.1007/s12130-003-1006-8.

Pusat Inovasi LIPI. (2014). Panduan Inkubator Teknologi. Bogor: Pusat Inovasi LIPI.

Ratinho, T., & Henriques, E. (2010). Technovation. The role of science parks and business incubators in converging countries: Evidence from Portugal. *Technovation*, *30*(4), 278–290. http://doi.org/10.1016/j.technovation.2009.09.002.

Razovic, M., & Mimica, Z. (2013, May). "Science and Technology Park and Regional Development. "The tenth International Conference: "Challenges of Europe: The Quest for New Competitiveness." [Online]. Available: http://conference.efst.hr/proceedings/TenthInternationalConferenceChallengesOfEurope-ConferenceProceedings-bookmarked.pdf.

Salvador, E. (2011). Are science parks and incubators good "brand names" for spin-offs? The case study of Turin. *The Journal of Technology Transfer, 36*(2), 203-232. doi: 10.1007/s10961-010-9152-0.

Saublens, C. (pr.), Bonas, G., Husso, K., Komarek, P., Koschatzky, K., Oughton, C.,Santos Pereira, T., Thomas, B., & Wathen, M. (2008), Regional Research Intensive Clusters and Science Parks, European Commission Report, European Communities, Brussels.

Sofouli, E., & Vonortas, N.S. (2007). S&T Park and Business Incubators in Middle-Sized Countries: The Case of Greece. *Journal Technology Transfer*, *32*, 525-544. http://doi: 10.1007/s10961-005-6031-1.

Tola, A., & Contini, M. V. (2015). From the diffusion of innovation to tech parks, business incubators as a model of economic development: The case of " Sardegna Ricerche.", *176*, 494–503. http://doi.org/10.1016/j.sbspro.2015.01.502.

Wahab, S. A., Rose R. C. & Osman, S. I. W. (2012). Defining the concepts of technology and technology transfer: A literature analysis. *International Business Research*, *5*, 61-71. http://dx.doi.org/10.5539/ibr.v5n1p61.

Wessner, C. (Ed.). (2009). Understanding research, science and technology parks: Global best practice. Washington DC: The National Academies Press.

Westhead, P., & Batstone, S. (1999). Perceived benefits of a managed science park location. *Entrepreneurship & Regional Development, 11*(2), 129-154. doi: 10.1080/089856299283236.

Widodo, J. & Kalla, J. (2014). Jalan Perubahan untuk Indonesia yang Berdaulat, Mandiri, dan Berkepribadian: Visi, Misi, dan Program Aksi.

Zou, Y., & Zhao, W. (2014). Anatomy of Tsinghua University Science Park in China: institutional evolution and assessment. *The Journal of .Technology Transfer, 39*(5), 663-674. doi: 10.1007/s10961-013-9314-y.