Accelerating Economic Development through Technopark: The staging of National Science-Technopark Formation Process in Indonesia

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Abstract. Technopark has become a widely cited term when discussing about innovation and technology. The world economy concept has been shifting from traditional based economy to knowledge based economy. This concept fosters an understanding of technopark, functioned as a seedbed of innovation to gain regional development, which is later popularly implemented. There are phases in technopark development in achieving its entire function. In the developing countries, technopark is assumed to be still in its infant phase. Indonesia is one of the developing countries that have declared the policy of technopark establishment in its national mid-term development plan document of 2015-2919. However, a number of national governmental agencies has already taking the role of technopark, even before the policy was issued. The objective of this paper is to explain the technopark stage level in Indonesia as well as to evaluate the assumption on technopark stage in developing country. The method used is case study on two Indonesian national technoparks which will be assessed through two characteristics that forms a technopark, such as physical and functional dimension. The result indicates that the assumption is not entirely correct. Indonesia’s national technopark, despite in its early phase organizationally, has already shifted from its early phase towards development phase functionally. 

Keywords: technopark, economic development, staging of development

1. Introduction

Technopark development as a means to drive regional development has become policy that was being implemented in many countries [8, 10, 15, 16]. Technopark is defined as an area development with the concept of economic and social development which consists of a centre of science activities, production activities (industry and businesses) which are linked to accelerate the development of innovation, diffusion and learning [3, 4, 7, 14]. The increase of its application in many countries is in line with the increase of necessity for innovation and technology as a result of the collaboration among innovation creator, such as university and research institutions, and the industry. The successful phenomena of technopark such as Silicon Valley, route 128 and Cambridge in driving regional economic growth by attracting industrial investment, scientist and entrepreneur, has triggered and inspired the implementation of such technopark in many other countries [7, 12, 19].

Regional authorities and technopark management will adjust the mission and vision of its development [2, 19]. Thus, it addresses the reason of variations in area development, organizational structure, research focus and industrial partner to the area. However, there are general pattern in
technopark development stages. In high income and developed country, the development of technopark does no longer focus on boosting local and regional economy, but on diffusing the innovation that will globally influence social-cultural. Silicon Valley’s major products such as computer, digital watch, laser and cordless telephone have become the common lifestyle in the current era [19]. This advanced stage development was suspected differently with the development stage in the developing country due to the economic development phase, primarily in Southeast Asia which is still in the transitional phase between institution and infrastructure necessity to innovation [17].

Indonesia becomes one of the developing countries in South East Asia that has recently includes technopark development policy to its National Mid-Term Development Plan (RPJMN) of 2015-2019. The central government is committed to develop and revitalize technopark to drive the development of innovation. Even though the policy for developing new technopark has only been issued in 2015, a number of national agency such as Indonesian Institutes of Science (LIPI) and The Agency of Assessment and Application of Technology (BPPT) has been already been functioned as technopark. There was a presumption that there is a difference in the development staging between the organization and the function. Therefore, it is necessary to analyze the technopark development stage from organizational and functional perspective to improve and also explain stage development achievement especially in developing country in moving towards innovation driven economy.

Revealing the technopark development stage will be beneficial for both the developer and also the local government to maximize investment and other basic necessity for supporting innovation creation in the area [5, 19]. This paper will try to explore technopark developments from the physical development and organizational-function perspective. The qualitative study method will be utilized on two national technoparks in Indonesia, which are the NTSP-BPPT and CSTP. This paper is divided into a couple of sections for complete exploration result, such as: preliminary section, literature review which emphasizes on technopark evolution process from both physical and function perspective, research method, general view of Indonesia’s policy on technopark, followed by result’s review. The result’s review reveals that there is indeed a different staging between technopark physical and functional development. Even though the physical development is still in infant phase, the function development has already reached development phase. Supports in the form of acceleration facility and easiness in establishing independent body, physical development and operational cost funding, have been able to drive the national level of technopark.

2. Methods
The method used in this study is qualitative study case on multiple case. Multiple case studies are beneficial to explore more broadly the studied cases [18]. The case in this study is National Technopark in Indonesia. National technoparks are central government initiated technoparks as a location for research result incubation and its development as commercial products [7]. National Science Technopark-BPPT (NSTP-BPPT) and Cibinong Science Technopark-LIPI (CSTP-LIPI) are the two case studies selected for this paper. In the 2015-2019 RPJMN, it was stated that both bodies are the central government priority in the effort for innovation development. CSTP-LIPI even becomes one of pilot projects for Indonesia’s Technopark [7].

The exploration of information was conducted through in depth interview with NSTP’s management, exploring the kind of support was granted by the government, by private sectors and the public; providing benefits for the local and regional public towards the technopark itself.

Stage analysis is being conducted by evaluating the development stage of both NTSP by physical and functional criteria (presented in table 1). There are three stages in each criteria which are initial, developmental and advanced stage. In the initial stage, the technopark is still in the physical and area mission development. The development stage means that technopark is already has mission performing its function as innovation creator. Advance stage means that the area is able to do spin-off to other area.
Table 1. Development Staging of Technopark

| Physical Development Staging | Initial | Developmental | Advanced | Source |
|------------------------------|---------|---------------|----------|--------|
| Organizational Structure     | The organization structure is still a sub to the main body | Independent organization structure | The organization already expanded and it has other network structure | Martínez-Cañas & Ruíz-Palomino, 2011 |
| Physical Construction        | On progress of building construction | The building has already been built | Expanding building construction in other region | Martínez-Cañas & Ruíz-Palomino, 2011 |
| Clustering                   | Organizational Proximity | Specific area | Innovative Milieu-spin off technology | Capello, 1999; Nahm, 2000 |
| Location                     | Remote area | Urban corridor | Metropolitan area | Nahm, 2000 |

Function Development Staging

| Initial | Developmental | Advanced | Initial |
|---------|---------------|----------|---------|
| The variety of industry | SME local product | SME local product and High-tech industry | High-tech Industry with global market | Amirahmadi & Saff, 1993; Goldstein & Luger, 1990; Rhee et al., 2010; Zhang, 2005 |
| Mission | Reducing poverty | Local and regional economic development | Branding and creating international market and also property development | Rhee et al., 2010; Zhang, 2005 |
| Activities | Business incubator | Incubator, R&D (seedbed innovation) | Incubator, R&D, Technology transfer, land leasing | Zhang, 2005 |
| Networking | Local industries | Regional and national industries and also universities | Global industries and universities-collaboration between STP in other countries | Martínez-Cañas & Ruíz-Palomino, 2011 |

3. Results and Discussions

The development of CSTP and NSTP-BPPT become the top priority agenda in the national mid-term development plan of 2015-2019. To support the program, the assessment of physical factor is required to discover the development staging of national technopark organization and building construction. In general, the CSTP and the NSTP-BPPT are not yet an independent organization. The organizational structure is still a part of its main organization. The CSTP is a sub organization centre of innovation while NSTP-BPPT is still attached to the Centre of Technology Policy Assessment. The construction of the building is still in progress with varying of mansion type and the target due date. The CSTP is planning to build pilot plant for biotech, building tenant, guest house, community and business centre.
and also for Cibinong Innovation Convention Centre until 2021. The NSTP-BPPT is still focusing on construction of tenant building until 2019. The location of its building is on remote area (far from their main organization/ headquarter). The Indonesia Institute of Science (LIPI) is the main organization for CSTP located in South Jakarta. The Agency of Assessment and Application of Technology becomes the main organization for NSTP-BPPT located on Central Jakarta.

Functionally, Technopark assessment is useful for revealing the benefit of establishing national technopark for innovation and economic development. CSTP and NSTP BPPT are under coordination of the National Research Institute and become reference for other organization in R&D development in Indonesia. The function of both technopark is focused on optimizing collaboration between the research centers inside the technopark area with other organization outside technopark area (depicted in table 2). The mission is not on poverty reduction, but on regional economic development by applying incubator processes to create new entrepreneur. Networking and cooperation among actors has reached national scale. The type of business cooperation has been penetrating to high-tech industry such as biotech, biopharmaceutical and ICT.

**Table 2. Indonesian National Technopark Development Stage**

| Physical Criteria | CSTP | NSTP-BPPT |
|-------------------|------|-----------|
| Organization structure | Organization structure is still attached to The Centre of Innovation LIPI | Organization structure is still on planning phase. Currently, NSTP is still just an activity program in the Centre of Technology Policy Assessment-BPPT. |
| Construction building | Construction of building such as pilot plant for biotech, building tenant, guesthouse, community & business centre and also Cibinong Innovation Convention Centre targeted to be finish in 2021 | Focused on construction of tenant building, targeted to be finished in late of 2019. |
| Clustering | The building complex in the Technopark area will benefit from the transportation and collaboration efficiency, | The building complex in the Technopark area will benefit from transportation and collaboration efficiency, |
| Location | Located on Cibinong. The distance of Cibinong and its main organization (LIPI) is 46 km. | Located in South Tangerang, 33 km from its main organization (BPPT) in Centre Jakarta |
| Function Criteria | CSTP | NSTP-BPPT |
| Variety of Industry | Focusing on increasing the sustainability of traditional SME and also industrial technology services, it also supplies the technology for high tech industry such as biotech and biopharmaceutical. | Focusing on producing new entrepreneur and industrial technology services for agro industry, manufacture and ICT sector. |
| Mission | Increasing the number of new entrepreneurs who use technology produced by LIPI and to increase knowledge and | Commercialization hub to push the usage of technology produced by BPPT by the industry and to produce new entrepreneur. |
Physical Criteria | CSTP | NSTP-BPPT
--- | --- | ---
Activities | Business incubator activated by providing co workspace for new entrepreneur, technology services to the SME connecting them to the technology creator in LIPI, accommodate training for SME as well as for new entrepreneur, intellectual property and business licence consultation. | Tenant Incubator, providing training for SME and new entrepreneur, giving access to financial institution to fund their business.

Networking | Universities, industry, government and community organization such as farmer community both local and national | Universities, industry, government

### 4. Conclusion

The main purpose from a region for developing technopark is for driving the growth on innovation and commercialization of technology by connecting and achieving its creator to its user, having different development stage between each other. The condition will depend on the mission and the development scenario of technopark management [18]. In the developed country, technopark development has already reached advanced stage focusing on high-tech industry. Its product diffusion globally influences socio-cultural development. According to Rhee (2010) technopark stage in developing country is still in its infant phase, but this opinion is not entirely true [15].

Indonesia as a developing country has national technopark that is still in the infant phase of physical development stage. However, its functional development stage has reached development phase. The functional development achievement is more advance compared to its physical development, as the technopark has already performed its function in spite of being a sub agency of a main institution. The main institution as a national research institution has been able to give some leverage on some of the technopark functions such as hub service between technological innovations to industry, or incubator for SME, though some of its building and laboratories are still under construction.

Based on those the identification of Indonesia’s National Technopark development staging, then agency reformation and building construction should become the first development strategy executed by the management. Independent organization will spur the innovation of creation by establishing a conducive environment for the employees [1]. Central government’s support shall assist in forming NSTP as an independent structure under a main body, along with providing funding for physical development and operational cost to drive the development of technopark national level.

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