Comparative Analysis Of Indonesia's Universities Perception In Aspects Of National Innovation

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Abstract: Innovation performance in the university will impact a nation's innovation performance. This paper attempts to compare and analyze the internal perspective of Indonesia's universities across different region of Indonesia's universities. To do so, perceptive questionnaire is developed and spread to Indonesia's universities. In this study, Indonesia's universities are clustered based on their regional area location, while the questionnaire is developed based on five aspects of national innovation that consists of value-added, innovation readiness, competitiveness, innovation partnership, and user's readiness. The result shows that Indonesia's universities perception is not different among each other, otherwise they tend to have high confidence on their innovation products' achievement in providing value-added and competitiveness level, but have a low level of innovation partnership in performing their internal innovation process.

Keyword: Indonesia's Universities, Comparative Analysis, Value-Added, Innovation Partnership, Competitiveness, User's Readiness, Innovation Readiness

1. Introduction

Innovation is considered as an important aspect of a nation as it indicates the country's prosperity and the competitiveness level (OECD, 1999). In the national level, the innovation performance is driven by the innovation system – a set of institution who interacts in the production, diffusion, and use of new and economically useful, knowledge, and technology (Lundvall, 1992); (Nellson, 1993). An innovation system, generally, consists of the triple helix elements of Academic-Business-Government, by which their element's collaborations are expected to realize an innovative environment (Etzkowitz and Leydesdorff, 2000).

One stream of the Tripe Helix thesis states that university, as a part of academic element, can play the leading role in innovation in increasingly knowledge-based society (Etzkowitz and Leydesdorff, 2000). In Indonesia, specifically, the role of university to the national innovation performance has been acknowledged. As developed in Indonesia's innovation system, university play a role as the source of knowledge, technology, and new inventions that could be diffused to the industry for increasing the added value of the national industry (BPPT, 2011). This reason, thus, backs up this study premises, which is assumes the innovation performance in the universities will be positively affects a nation's innovation performance.

The aim of this paper is to analyze the perception of Indonesia's universities toward the feasibility aspect of national innovation. The feasibility aspect of innovation further is developed based on relevant characteristics of innovation process and innovation products. Based on literature study, five feasibility aspect is emerged, namely value-added, innovation readiness, competitiveness, innovation partnership, and potential user's readiness. Furthermore, this study intends to understand the different perspective across different universities in Indonesia. To do so, Indonesia's universities are categorized based on their regional area location.

2. Theoretical Framework

2.1. Innovation in the University and the Impact to the Innovation System

In the knowledge intensive economy, universities are increasingly acknowledging as the key player to the regional development process (Shaw and Allison, 1999). Furthermore, universities as both research and education institutions play prominent role in the national innovation system and regional innovation system (Charles, 2006). This importance comes from their roles in the knowledge generation and transfer process, in the form of knowledge, technology and new inventions that can increase value of the industry (Charles, 2006).

In Indonesia, the innovation system is structured based on seven sub-systems that consists of research and education system, industry system, demand system, intermediary system, political systems, general framework system, and infrastructure system (BPPT, 2011). Universities as a part of research and education system are expected to play a role as the source knowledge, technology, and inventions that could be diffused to the industry

(BPPT, 2011). In other terms, universities are expected to act as the source of innovation.

Taking the discussion as the point of the departure, the main theses in the study is that we intend to measure the innovation product of the universities. However, reviewing existing literature on the measurement of innovation product in the universities, there are wide range spectrum of potential universities contributions to the innovation process, thus, traditional commercial indicators are insufficient to measure the innovation product of universities (Vielba et al., 2009). Firstly, the universities are considered as possible source of innovation for the firms, includes the mobile capital, training, and services (Molas and Gallart et al. 2002). Secondly, the role of universities as technology transfer offices usually insufficient detailed (Molas and Gallart et al. 2002). In this study, thus, we limit the definition of innovation products as defined by Indonesia's Ministry of Research, Technology, and Higher Education as the result of research, development, engineering, and application that produces novelty that can be applied and beneficial for commercial, economic, and social.

2.2. Feasibility Aspects of National Innovation

Indonesia's government has implemented national innovation system, specifically by collaborating with its Triple Helix actors, namely university and industry. To assess the achievement of national innovation efforts, feasibility aspects of national innovations are developed. Five feasibility aspects are constructed based on the innovation concepts, namely of value-added, innovation readiness, competitiveness, innovation partnership, and potential user's readiness as describes as follows.

2.2.1 Innovation as Value Added Activity

Innovation has a closed relationship with value creation process. Innovation is believed as the source of value creation and the innovation process includes the activities that create value (Romain and Gabriel, 2015). Value creation, itself, is defined as the invention or enhancement of assets and skills to create a usage value of products, services, and systems to be seen as a new and relevant to the potential users (Lepak et al., 2007). Meanwhile, innovation is defined as "*the production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres"* (OECD, 2004). Based on the definition, both value creation and innovation share the same keywords such as value added and novelty. This definition, further, underlies this study's assumptions, by which considering the value creation or value added as a result of the innovation process.

In this paper, specifically, the value added is observed on a strategic and an organizational level (Romain and Gabriel, 2015). In the strategic level, the value added indicators are developed based on Indonesia's law that consists five indicators:1) the importance to the nation, 2) the importance of the public's basic needs,3) the relevance to the development target (middle-term and long-term development, 4) the relevance to the priority program, and 5) the impact to economic development. Meanwhile, in the organizational level of the value-added indicators are developed based on the structure of Indonesia national innovation system (NIS) consists of 1) academic value added, 2) public value added, 3) and business value added.

2.2.2. Innovation as a Global Competitiveness Measurement

The concept of competitiveness can be seen from the three levels of firms, industry, and nation (Industry Canada, 1995). In the firm level, competitiveness is measured by the profitability, high efficiency, high productivity, and market share (Solliero and Castanon, 2005). In the industry level, competitiveness can be seen through different measurement, i.e. performance measurement which analyze how well the industry performs in comparison to the competitors, competitive potential measurements that relates with the availability and quantity of inputs that produce superior performance, and competitive process measurements (Solliero and Castanon, 2005). In the national level, the concept of competitiveness is very broad and involves a high number of factors. The World Bank (2002), thus constructs the *Global Competitive Index* that construct of five broad indicators, namely general performance, macroeconomics and market dynamics, financial dynamics, investment infrastructure and climate, and intellectual & human capital. In complement, the *Growth Competitive Index* is developed as a tool to estimate the growth perspective of competitiveness for the coming five years. This index is composed of three indicators, namely technology index, public institutions index, and macroeconomic index.

The concept of knowledge driven economy has pushed the closed relationship between competitiveness and innovation. In this concept, it is believed that the generation and the exploitation of knowledge plays the role in the creation of a wealth (Solliero and Castanon, 2005). In other words, the competitive strategy of a nation is becoming more centered on knowledge to facilitate the extension of the knowledge base and its transformation for all types of economic activities. This growing need also pushed the existence of national innovation system to promote innovation level in the country.

2.2.3. Technology and Innovation Readiness Level

Technology Readiness Levels (TRL) are a systematic measurement system that support the assessments of the maturity of a particular technology. Generally, as introduced by NASA, TRLs comprises of nine levels, where each level is relevant with each other and become the basis of the next level (Mankins, 1995). However, in the development, variations of TRL models exist by including five basic levels: a) basic research in new technologies and concepts of technologies, 2) focused technology development by addressing specific technology and its potential applications, 3) technology development and demonstration of specific application, 4) system development, 5) system launching and operations (Mankins, 1995). Technology Readiness Level is focusing on the technology development as the object of assessment. However, innovation activities are not only focusing on the technology development process, but also the business development process. Therefore, innovation readiness level (IRL) is introduced to complement the technology readiness level.

Innovation Readiness Levels (IRL) are developed to fully assess the maturity of innovation process that are comprises of five key aspects of innovation: technology, market, organization, partnership, and risk (Lee et al., 2011). The Innovation Readiness Level is considered as the continuation of TRL by continuing the technology development process to the market evolution process as an important phase in the innovation process.

2.2.4. Innovation Ecosystem as a Form of Innovation Partnership

It is proposed that innovation process is conducted within an innovation ecosystem. Innovation ecosystem itself is defined as a set of innovation actors that comprises of the users of innovation, the producers of innovation, the intermediary organizations, and the supportive organizations (Smits and Kuhlmann, 2004). Specifically, Wang (2009) identifies the innovation ecosystem by categorizing the actors into two main activities, namely the producer of innovation that have a role in the innovation creation process and the users of innovation that directly or indirectly gain benefits of the innovation process.

Innovation ecosystem is generally associated with the Triple Helix Model of Innovation. Triple Helix Model of Innovation refers to a set to of interactions between academia, industry, and governments to foster economic and social development (Etzkowitz and Leydesdorff, 2000). The basic premises of the model are the university engages in the basic research, the industry implement the research result to their commercial products, while the government regulating the market (Leydesdorff and Meyer, 2006). In the triple helix model of innovation, bilateral interaction is proposed to exist between university, industry, and government.

2.2.5. User's Acceptance of Innovation

Innovation is intended to be accepted and used by the users in order the innovation can be beneficial. Two famous theories are related with potential user's readiness, namely Technology Acceptance Model and Diffusion of Innovation.

Technology Acceptance Model (TAM) as proposed by Davis (1989) suggests that a number of factors will influence the user's decision to use the new technology, which is Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness is defined as the degree to which a user believes that a particular new technology would enhance his/her job performance, while Perceived Ease of Use is described as the degree to which a user believe that a particular new technology would be free of effort (Davis, 1989). In the development, Technology Acceptance Model (TAM) has been continuously studied and expanded.

Meanwhile, diffusion of innovation is a theory that has been proposed by Rogers (2010) to explain how, why, and at what rate new ideas and technology spread. Relates with the diffusion process of innovation, five stages of user's adoption process are introduced that consists of knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2010). Based on the Innovation Process curve, the adopters of innovation are distinguished into five categories, namely innovators, early adopters, early majority, late majority, and laggards. These categories, further, is used, to distinguished the user readiness level.

3. Methodology

This study focuses on comparing the perception of Indonesia's universities toward the result of national innovation system. The study is conducted based on quantitative research, by which primary data was acquired to understand the differences of Indonesian's university perception based on perceptive questionnaire. The statements within the perception questionnaire are developed based on five feasibility aspects of national innovation system. Furthermore, Indonesia's universities perception become the main object of the study from whom the primary data was gained.

The perceptive questionnaire is developed based on five feasibility aspects of national innovation systems, namely value-added, innovation readiness, competitiveness, innovation partnership, and potential user's readiness. Each feasibility aspects are made into statements and to be assessed by the respondents by using Likert scale from 1 (very disagree) to 5 (very agree). The basic assumption is that the lower scale of respond reflects to the lower

perspectives of respondents, and vice versa. In other words, if a specific a statement has a lower scale means that the respondents has not yet achieve the aspect in the context to their innovation process and innovation's products.

In this paper, Indonesia's universities are classified into 2 groups based on the regional area: 1) Java Bali, 2) Sumatera, Kalimantan and Papua. This classification is used to understand the different perception of Indonesia's universities between different region and to confirm whether there will be perspective gap between across universities groups.

4. Results

Based on the regional grouping of Indonesia's universities, there are 2 groups based on the regional area: 1) Java Bali, 2) Sumatera, Kalimantan and Papua. The comparative analysis is performed toward five aspects of national innovation, namely value-added (both strategic level and organizational level), innovation readiness, competitiveness, innovation partnership, and potential user's readiness. The result of comparative perceptions between different university groups, they are not difference significantly. Otherwise, they tend to have high confidence on their innovation products' achievement in providing value-added and competitiveness level, but have a low level of innovation partnership in performing their internal innovation process.

5. Discussion

5.1. Value-Added Aspect

Based on the result, value-added aspect is considered to have the highest perception across different university groups with the average value in high score both in the strategic level and the organizational level. This result represents Indonesia's universities confidence on their innovation products to provide a value both for strategic level in terms of a nation and for organizational level (academic, public, or business levels). This also reflects the success performance of innovation process within the university which is the value creation and the value added.

5.2. Innovation Readiness Aspect

Based on the result, innovation readiness aspect has a positive perception across different university groups with the average value in middle to high score. This result reflects Indonesia's universities confidence to delivers the innovation products with higher level of readiness, both using Technology Readiness Level (TRL) and Innovation Readiness Level (IRL). In Indonesia, it has been a common thing for the university to assess their yearly innovation products by using TRL analysis. By comparing the university groups, Java Bali University Groups still has the lowest score perception of innovation readiness aspect, which means the university groups have not delivers the innovation products with a high readiness level.

5.3. Competitiveness Aspect

Based on the result, competitiveness aspect shows a positive perception across different university groups with the average value in middle to high score. The result shows the perception of Indonesia's universities that their innovation process has resulted the innovation products that can be beneficial to the society whether in the level of firms, industry, or even a nation. In the firm level, the innovation products are expected able to increase firm's profitability, efficiency, productivity, and market share. In the industry level, the innovation products are able to increase the industry performance. In the national level, the innovation products are likely be able to enhance the quality and performance of macroeconomics, market, and human capital.

5.4. Innovation Partnership Aspect

Based on the result, innovation partnership aspect shows the lowest perception compares to the other aspects with the average value in low score. By comparing the university group, that all university groups have a similar perception toward the innovation partnership with the range in lowest score. This result show that, generally, Indonesia's universities have not fully involved the external innovation actors within the university's innovation process. In other words, currently, university's innovation process only depends on the internal innovation capability. This is contrary to the world's trends which is to open up the innovation process and use external resources and capabilities to boost the internal innovation capacity or commonly known as Open Innovation (Chesborough, 2003). The Open Innovation theory suggests that the university should use inflows and outflows innovation's resources through some form of innovation partnership.

5.5. User's Readiness Aspect

Based on the perception analysis result, user's readiness aspect exhibits a negative perception across five different university groups with the average value in middle score. By comparing the university groups, it is shown

that all university groups have a relatively similar perception toward the user's readiness. This result means that, generally, Indonesia's universities has low confidence that the potential users will accept their innovation products.

6. Summary and Further Research

The result shows that Indonesia's universities perception is not different among each other, otherwise they tend to have high confidence on their innovation products' achievement in providing value-added and competitiveness level, but have a low level of innovation partnership in performing their internal innovation process.

Some further studies are proposed to this study's limitations. Firstly, this study only focuses on the comparing perception analysis based on the university's point of views. For further research, it will be interesting to confirm the results from the external point of view, for example industry and government. Secondly, it is interesting to deepen the study based on the result. For example, as it is known that Indonesia's universities are lack of innovation partnership, it is interesting to develop the optimal model of innovation partnership in Indonesia's universities. Thirdly, the study only focusing on five aspect of feasibility, thus further research could be performed by incorporating other innovation aspects.

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