Innovation Management Framework in Academic Institutions

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Abstract – Innovation production becomes a most important mission in the Institution of Higher Learning in Malaysia (IHLs). The vast volume of innovation products in IHLs requires for a systematic innovation management model (IMM). The IMM provides a platform for innovators to manage the development of innovation products effectively. It also helps for sharing, promoting and re-use of innovations between IHLs-IHLs and IHLs-other organizations. This paper discusses the preliminary study of framework and strategy for effective IMM framework that can be implemented in IHLs. Three important elements in IMM are suggested: innovation management process cycle, the organization of innovation stakeholders and the functions of innovation management portal.

Keywords: Innovation based economy, innovation management, innovation process cycle.

1. Introduction

In general, the innovation process is not only focuses for the development of new science and technology products. It also considers for the process of improvement of the existing products by applying new technique or technology in order to achieve more benefit for consumer. In fact, innovation can be just an idea or knowledge from innovators which can be used for people to improve their quality of life. A new economy model has been introduced by Malaysian’s government which is based on the innovations. As agreed by many practitioner and scientists, technology and innovation must be managed in a proper procedure [7].

Some efforts must be executed to ensure that the Malaysians could capitalize on the innovation based economy. For instance, the public sectors such as institution of higher learning (IHLs) as well as research and innovations firms need to assist the government to achieve the innovation based economy objective. IHLs can promote the innovation activities and therefore a new innovation environment and paradigm can be created all around the country. A large volume of incentives are also been given to the private sectors to realize the mission.

The innovations can be categorized into three; technology, product and services [7]. However, high quality product and services are developed based on new technology. A successful innovation product is one that can give profit to the innovators, and therefore a good management of innovation process is highly required. A major concern for many organizations is the need to prove that innovation management actually adds more value to development process. The organizations especially corporate sectors expect that with a proper standard for innovation management can increase the profit gained, market network and a step a head from their competitors.

Innovation is the most important element in entrepreneurship. Entrepreneurs have to do research in order to get the new resources and then develop a new high quality product innovation. The agency that highly related to research activity is IHLs. Therefore, entrepreneurs and industry that involve in innovation activity should collaborate actively with IHLs. In 2009, Malaysia has more than 60 IHLs which are involved in research and development activities [8]. 20 IHLs are owned by government (public university) and others are owned private organizations.

To encourage the successful of innovation activities, four (4) government universities are chosen as a research university; Universiti Malaya, Universiti Sains Malaysia, Universiti Putra Malaysia and Universiti Kebangsaan Malaysia. The characteristics for the research university are: quantity and quality of researchers, quantity and quality of research project, the number of postgraduate students, the quality of postgraduate students, the number of innovation activities, professional services, collaborations/networks and supporting facilities [8].
Normally, IHLs produced two types of innovations: tangible (e.g. electronic devices, health kits etc.) and intangible (e.g. software, education modules etc.) products. As recorded at Ministry of Higher Education of Malaysia, until June 2009, there are 12,523 research projects are implemented in all public universities [8]. From that number, 4.4% (543 product innovation) have been commercialized and another 313 are highly potential to be commercialized. However, to have a smooth collaboration process between entrepreneurs, IHLs and industries, a systematic framework of innovation process management is required.

Innovation based economy is believed to help the Malaysian government to overcome global economy crisis. The government has to shift the productivity paradigm in order to ensure that the country economy can be survived and sustained. In the globalization environment, the previous economy model could not give a momentum to increase the competitiveness level between Malaysia and other develop countries such as Japan, South Korea, US and China as well. Obviously, all sectors of economy including government, industry, academic, NGOs etc have to work collaboratively and must use the information and communication technology to facilitate their daily operations.

The paper discusses the fundamental framework for IHLs to develop an effective innovation management model (IMM) that can be adapted in respectively organizations. The IMM then should be implemented and supported by information technology systems. The rest of the paper is organized as follows: next section discusses some related works in innovation management. The detailed innovation management model proposed is discussed in Section 3. Conclusions and future works are placed in Section 4.

2. Related Works

In 21st century, the economy that based on intellectual capital has become very popular in many developed countries. Many models have been introduced in order to assist the process of innovation in hope that a high quality innovation product can be produced and commercialized. [4] has suggested that, the country that hopes to enter the innovation based economy should have adequate numbers of knowledge discoverers, application designers and innovation drivers. The organization that intends to produce high quality of innovation product should be composed of employees at many levels such as degree, master, PhD or professional certificates.

To achieve the successful of collaboration between external bodies such as commercial sectors, IHLs should have a Center for Innovation and Knowledge Management [6]. The center also should focus on research and develop of new standard and practice code that could be used by innovators in IHLs. Furthermore, the center can deploy and promote the experts from IHL as well as their innovation products to others around the world.

The IHLs need to establish the Chief Information Officer (CIO) [5]. The CIO will organize all aspects of innovation and knowledge management planning. This includes university policy about innovation, entire plan of information systems development and strategy to promote the innovation products for commercialization. Besides that, the universities that involve rapidly in research and innovation activities should encourage their innovators to improve their knowledge in information and communication technology [3]. No doubt that, this technology would help the innovation teams to increase the effectives of innovation process and management.

[1] has developed a tool for innovation management known as Product Service Systems (PSS). The tool is tested with a case study titled “Simulation Product Service of Material and Energy Flow in Production Facilities”. PSS is developed with three major characteristics: to reduct and optimize the use of resources, customers oriented and sustainable, economic and environmental friendly. Determination innovativeness level is very important for government to analyze the performance impact of innovation based economy. Therefore a specific tool is required to determine this value. [2] has developed a tool that can be used for evaluating the level of innovativeness in an organization or country. They used fuzzy systems characteristics which are applied in decision making processes. There are three main inference modules that are used for evaluating the level of innovativeness: rules database, inference mechanism and output membership function of the model. The tool has been experimented to the enterprises of the 16 regions of Poland.
3. IHLs Innovation Management Framework

Clearly, all management processes have their own fundamental elements framework to be considered. Innovation management is not one single discipline, and it is an integration of numerous fields of study such as computer science, management, business and engineering. A good IMM framework should be more focused on a set of main roots such as process model, organizational structure and information technology based tool in order innovation management in IHLs to manage the related task effectively. Figure 1 exhibits the interaction between these elements that should be considered in IMM framework for IHLs environment.

![IMM FRAMEWORK](image)

**Figure 1: The IMM Framework**

### 3.1 Innovation Management Process Cycle

Normally, innovation activities involved the process, documentations, practices and standard. In IHLs, innovation process can be in cyclic as depicted in Figure 2. Four common activities of innovation process, named as innovation development, innovation storage, innovation distribution and innovation commercialization. Those activities/stages must be executed based on the objective and policy of the IHLs innovation management. At the origin of the technological innovation process is development; innovation development could be the creation, construction, design or implementation of a product. Those sub-activities are executed by the people in related interest group in IHLs. Sometimes the innovation projects are involved with different concern groups. In this stage, brainstorming or detailed discussion about innovation object is carried out. The development process is the result of creative process that is very difficult to plan. Therefore, this stage is very critical and innovator team should give more focus.

Innovation artifacts come in two forms tangible and intangible products. The examples of tangible product are new innovation of medical kit, a mobile phone, documents hardcopy etc. Meanwhile, the examples of intangible products are documents softcopy, computer program codes or modules, emails, datasets etc. All of these artifacts must be stored appropriately. Innovation storage is accomplished when the development activity is finished. The innovation artifacts are being stored in a proper ‘warehouse’ and therefore they could be accessed, mining and organized. Furthermore, the information of the innovation products must be recorded in the information system that can be accessed online. The management of innovation center needs to provide the special information system for this purpose.

Innovation distribution is the dynamic exchange of innovation product between the innovators and the consumers/industries. Among of the sub-activities involve in this stage are share, transfer, apply and disseminate. Nowadays, the innovation market is very broad; therefore the process of innovation product distribution emerges as one of the most important task. Innovation distribution can be executed in conventional way or electronically with collaborative environment that facilitated by ICT technology.

The last stage in the proposed IMM process cycle is commercialization and can be considered as a benchmark of the successful for innovation process. This stage includes promotion, selling, evaluation and profit management. Commercialization will successful when a process of technological entrepreneurship is established. Technological entrepreneurship involves the activities that create new resource combinations to make innovation possible, bringing together the technical and commercial worlds in profitable way [7].
3.2 Innovation Management

Stakeholders

Another element that is considered in innovation management process is stakeholders. In general, the stakeholders provide culture, leaderships and measurement of the management. The stakeholders create the environment for team works, sharing characteristic and paradigm shift in order to gain benefit of all. A clearly defined of stakeholders also could produce a leadership platform to communicate efficiently with top management level in IHLs. To evaluate or audit the process of innovation management effectively, the organized stakeholders must be established. The proposed innovation management stakeholders in IHLs can be categorized as (Figure 3):

- Innovators – innovators can be lecturers, research officers and postgraduate students which are attached under faculties, institutes or centers in the university. Innovators are formed under a group with a specialize research interest;
- Faculties/Centers/Institutes – these entities are cost center that are establish in the university. Normally, the cost center have its own budget to manage their day-to-day operational;
- Research Management Center – all operations that relate to research and innovation in university are managed by this center.
- University Management – University Management is an executive body that manages all aspects in operation and development of university. The members of University Management are including Vice Chancellor, all Deputy Vice Chancellor, Registrar and Bursary;
- Commercialization Center – liaison with industry and performing for collaboration with other external agencies.

3.3 Innovation Systems Functions

A good framework of any information management process is to have a systematic communication infrastructure and information structure between stakeholders. In the proposed IMM framework, there should be the innovation information portal that could be used by the stakeholders in order to share or disseminate the information regarding to innovation developed. Furthermore, the portal can be operated as the information management system for innovation product process. This portal should have the database system and also could be used (log-in) by
other users from industry or agencies that collaborate with internal stakeholders. Figure 4 shows the context of innovation information management systems.

The modules or functions of innovation management portal/systems should facilitate all the operations involved in the innovation management process cycle. Therefore, for each stage in the cycle, the general functions that could be included are as follows:

- Development stage – the module for updating the information related to innovation product process development;
- Storage stage – the module that comprise all tasks related to procedure of innovation product storing and the algorithms for mining and organizing of product information;
- Distribution stage – all related functions that could facilitate the operations of product information sharing, transferring or disseminating to other parties in stakeholders. The module also could be used by other parties such as industrial people or experts from other institutions;
- Commercial stage – the module in this stage should assist the stakeholders for enforcing the process of commercialization. The module will provide all aspect operations regarding to commercialization such as promoting process, before and after sales services and financial management systems.

4. Conclusions

Innovation management in IHLs is emergent persistently in the right direction, although more actions and needs to be done. The standard framework for innovation management process advocates that developing innovation product will be better informed and thus bring about more effective and sustainable development. Furthermore, the developed of innovation management framework would help the government to enhance the innovation and creativity based economy.

This paper proposed a new practical framework for innovation management model that can be used in Malaysian IHLs. We have defined a comprehensive cyclic innovation management process model that consists of four (4) main activities; innovation development, innovation storage, innovation distribution and innovation commercialization. The stakeholders in innovation management are also identified and therefore it could help the management process can be executed in more properly. The study shows that the innovation management should be fully facilitated by the information technology systems. Currently, we are designing a web based application tools to support all activities involved in the proposed IMM.

References:


