ajtm SBM-ITB The Asian Journal of Technology Management
www.sbm.itb.ac.id/ajtm

The Asian Journal of Technology Management Vol. 2 No. 1 (2009) 19-27

Government Intervention to Encourage the Increase of Innovation Activities: The Case of Automotive Component Industry

Erry Ricardo Nurzal*, Pudji Hastuti
Researchers in the Centre of Technology Innovation Assessment, BPPT

ABSTRACT

The increasingly globalizing and very tight competition in the world market nowadays requires companies to increase their competitiveness to maintain and strengthen their position. One of the efforts has to be taken into consideration by companies is innovating sustainably. Evidence shows that companies characterised by innovation have above-average productivity and become leader in the industry. Firms innovate either to produce technologically new products or services, or to produce technologically improved products or services. To produce technologically new and improved products or services, firms need to undertake some innovation activities. Innovation activities are all those scientific, technological, organizational, financial and commercial steps, including investment in new knowledge, which actually, or are intended to, lead to the implementation of technologically new or improved products or processes. Small and medium enterprises face some problems to innovate. Government. intervention is needed to manage the problems, and is expected to increase innovation in the industry.

Innovation activities discussed in this paper are focused on those occurred in small and medium enterprises in the automotive component sector as one of the sectors will be developed by the government. In the first part is the introduction which presents problem background. Then, the explanation about methodology and followed by the purpose of the study. The next part is results and discussion. Finally, the paper provides recommendation on intervention necessarily to be taken by the government in order to increase innovation activities in the industry.

Key words: Government Intervention, Innovation Activities, and Automotive Component Industry

1. Introduction

Amidst the increasingly tight and globalizing competition, industries are required to acquire competitiveness in order to raise and sustain their business. The efforts conducted by companies to produce the products with high quality and competitive price have led them to innovate. Some studies revealed that the innovative firm is the one that can survive and even take a lead in the industry.

Innovation activities performed by companies can be with the purpose to sustain company's competitiveness to protect their market share, or to pursue company's

* Corresponding author. Email: dikaalvin@yahoo.com

competitiveness to have a strategic position towards their competitors. For those reasons, companies carry out product and process innovation. The manufacturing of technologically new products or products with significant technological improvements and the implementation of technologically new process or process with significant technological improvements are called technological product and process innovation (OSLO MANUAL, 1997). To implement technologically new or significantly technologically improved products or processes, firms undertake innovation activities.

Maintaining and increasing the competitiveness of small and medium enterprises (SMEs) have become the focus of many countries around the world. It can be seen through their efforts to introduce innovation activities to these enterprises and encourage them to perform the activities. The growing attention to SMEs is based on some reasons, i.e. the number of SMEs as the biggest part of the businesses in a country, the employment of the huge amount of workforce by SMEs, and the SMEs significant contribution on the country economic growth.

Similar to the condition commonly occurs in the other developing countries, the technological capability of the Indonesian industry, small and medium enterprises specifically, is very low. Under this poor condition, the automotive components manufactured by the local small and medium enterprises have to compete with the products, which can be easily found in the market, from neighboring countries such as Taiwan, China and Thailand. For this reason, some efforts need to be taken to increase the innovation activities in order to foster the local firm technological capability. Government, through the implementation of the policies, plays important role to encourage the increase of innovation activities in the enterprises as well as their own efforts. Government intervention by formulating and implementing the appropriate policies is expected to create an innovative and very competitive industry.

This paper discusses the innovation activities conducted by industry/firm, one of the innovation system elements, with the focus on automotive component SMEs as one of the industries the government intends to develop. In the first part of the paper is the introduction which provides the problem background. The explanation on the methodology used comes in the next part and followed by the explanation on the purpose of the study. Then, the result and discussion will be presented. Finally, this paper will propose a recommendation on the intervention the government need to be considered in order to promote the increase of innovation activities in the automotive component industry.

2. Methodology

To discuss the innovation activities and the supporting government policies, primary and secondary data are required. Primary data is needed to track the innovation activities carried out by small and medium automotive component enterprises and the influence of the government policy on these activities. The data were collected by interviewing the champion companies of automotive component. These firms are spread in some automotive component industrial centers in Bandung, Tegal and Sidoarjo. While the secondary data is very useful to recognize the policies implemented by the government in order to promote innovation activities. Policy analysis method was used to get the policy alternatives on promoting the innovation activities. It was first started with the problems identification requiring the government intervention. Then, it's continued further by finding the source of the problem. Analysis on the existing policies and determination of policy alternatives to solve the problems come next. The implementation of this method involved the related stakeholders.

3. Objective

The objectives of this study are:

1) To identify and analyze the innovation activities in automotive component industry,
2) To identify and analyze the existing policies, technology policy in particular, to urge innovation activities, and
3) To provide policy alternatives to urge the innovation activities.

4. Results and Discussion

There are several things that will be discussed in this part. Firstly, there will be the explanation on the innovation activities and the problems faced. Next, it is the analysis on technology policies related to innovation activities. The policy alternatives to urge the innovation activities will be presented in the last part.

4.1 Innovation Activities and Problems

As defined in the OSLO Manual by Organization for Economic Cooperation and Development (OECD, 1997), technological product and process innovation activities are all those scientific, technological, organizational, financial and commercial steps, including investment in new knowledge, which actually, or are intended to, lead to the implementation of technologically new or improved products or processes. Some may be innovative in their own right, while others are not novel but are necessary for implementation (OSLO Manual, 1997).

Seven types of innovation activities mentioned in the OSLO Manual are:

a. Research and experimental development.
   The detail of research and experimental development is discussed below.
   - Research and experimental development comprises creative work undertaken on a systematic basic to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications (as defined in the Frascati Manual, 1993).
   - Construction and testing of a prototype is often the most important phase of experimental development. A prototype is an original model (or test situation) which includes all the technical characteristics and performances of the new product or process. The acceptance of a prototype often means that the experimental development phase ends and the other phases of the innovation process begin (Frascati Manual, 1993).
   - Software development is classified as R&D as long as it involves making a scientific or technological advance and/or resolving scientific/ technological uncertainty on a systematic basis.

b. Acquisition of disembodied technology and know-how.
   Acquisition of external technology in the form of patents, non-patented inventions, licenses, disclosures of know-how, trademarks, designs, patterns and computer and other scientific and technical services related to the implementation of technological product and process innovations, plus the acquisition of packaged software that is not classified elsewhere.

c. Acquisition of embodied technology and know-how.
   Acquisition of machinery and equipment with improved technology performance (including integrated software) connected to technological product or process innovations implemented by the firm.

d. Tooling up and industrial engineering.
   Tooling up and industrial engineering include the changes in the production and quality control procedures, methods and standards and associated software required

to produce the technologically new or improved product or to use the technologically new or improved process.

e. Industrial design
Industrial design includes plans and drawings aimed at defining procedures, technical specifications and operational features necessary to the production of technologically new products and the implementation of new processes.

f. Manufacturing start up
This may include product or process modifications, retraining personnel in the new techniques or in the use of the machinery, and any trial production not already included in R&D.

g. g. Marketing for new or improved products
It's defined as the activities in connection with the launching of a technologically new or improved product. These may include preliminary market research, market tests and launch advertising, but will exclude the building of distribution networks to market innovations.

From the survey on some small and medium enterprises, it is found that despite of the technical change both in product and in process, there were not, in fact, many innovation activities carried out by firms. The only innovation activity undertaken by small enterprises was the most modest one, i.e. tooling up (improving the equipment's technological performance) and industrial engineering (making some changes or engineering on the existing equipment or machinery). Such technical change on product and production process was not something new to firms. It occurs very often to adapt with the recent development and to make the process of production go faster.

Some medium enterprises carried out the higher level innovation activities like performing research and experimental development and purchasing (acquisition) of machinery with improved technological performance. But the latter was conducted only by one or two biggest enterprises with the highest amount of workers and the highest sales volume among the surveyed enterprises.

Tabel 1. Innovation Activities in Small and Medium Automotive Component Enterprises

Firm	**Innovation Activities**						
	Experimental research and development	Acquisition of disembodied technology	Acquisition of embodied technology	Tooling up & industrial engineering	Manufact. start up	Industrial design	Marketing
MP1				√			
KL1				√			
KL2				√			
MK1	√		√	√			
MK2	√			√			
KL3				√			
KL4				√			
KL5				√			
KL6				√			
KL7				√			

Source: Survey Results on Innovation Activities (2005)

Tabel 2. Obstacles to Innovation Activities

Perusahaan	Kendala
MP1	Knowledge gap, cost too high, lack of sources of finance, demand risk
KL1	Cost too high, lack of finance, partnership, demand risk
KL2	Economic risk, lack of skilled personnel, lack of finance, partnership
MK1	Knowledge gap, cost too high
MK2	Cost too high, lack of finance
KL3	Lack of skilled personnel, knowledge gap, lack of finance, partnership, demand risk
KL4	Cost too high, lack of finance, knowledge gap
KL5	Knowledge gap, cost too high, cost too high
KL6	Lack of finance, knowledge gap
KL7	Economic risk, cost too high

Source : Survey Results on Innovatiion Activities (2005)

From Table 1, it can be seen clearly that the innovation activities in the industry are still too low. There are some main reasons for this condition as shown in Table 2. First, the low tecnological capability of the firms, inlcuding the know-how of the personnel to support the innovation activities. Second, the investment required to perform innovation activities is so high that firms are not able to make it due to lack of financing. Third, there is a risk of the low demand on innovated product. If these things take place, innovation is not resulted in the appropriate return on investment to firms.

On the subject of innovation sources that encourage firms to undertake technical changes, almost all of the enterprises mentioned fairs/ exhibition and buyers. Other information sources mentioned by some enterprises were supplier and competitors. An interesting fact revealed from the survey is that no single firm considered research and development institution or laboratory as the important innovation sources for the company. Two enterprises that used the service from laboratory for their innovation activities were those belong to medium enterprises.

The low amount of innovation activities performed by small and medium enterprises also occurs in some other countries, including in the European countries. According to the data on European Trend Chart on Innovation (2004), firms in this group usually do not invest much in research and development. Factors hampering innovation activities faced by firms come from the internal and external of firms. Some external obstacles often mentioned by firms are financial factor like lack of seed capital to innovate, lack of skilled personnel or lack of relevant training schemes or subsidies to hiring innovation manager, and lack of technological capability. While the reluctance to innovate and lack of learning attitude were the internal obstacles that hamper innovation in SMEs. These can be in the forms of the resistance to change, to learn and to cooperate, inability to cope with the uncertainty, result and time of innovation, and lack of awareness to identify opportunities on new technology and cooperation, and the benefit resulted from them.

The fact that there were only small amount of innovation activities in small and medium enterprises was used by the government as the argument for an intervention. This intervention is taken by formulating the policies to encourage firms to innovate and to assist them to overcome the obstacles to innovate. For this reason, the government in European countries has designed three types of innovation program for small and medium enterprises, i.e. innovation program for SME based on their sectors and technology fields, innovation program in

accordance with SME technology competences, and innovation program in accordance with the SME business development phase. In addition, programs designed to overcome the obstacles for the firms to innovate are especially aimed to: 1) encourage the industry awareness on the importance of innovation and identify their innovation potential, 2) increase their expertise and competence to innovate, 3) assist the industry in acquiring human resources required to innovate, 4) increase market intelligence to make new product and technology developed by industry to be accepted by market, 5) reduce the obstacles to cooperate with public R&D institution and universities, 6) ease the cooperation with other firms.

Policy to arise the awareness on the importance of innovation can be in the form of award presentation to the most innovative firm (implemented by Czechoslovakia and Greece), or by holding a national competition to select the firm with the best performance (implemented by French, Ireland and England). The bottom up programs to increase the capability to innovate includes training and consultancy service or financing program focused on knowledge transfer between R&D institution and SMEs. These programs may also help to provide the industry with reliable human resources to carry out innovation activities. The difficulty faced by SMEs to develop new products being accepted in the market can be encouraged through the program of providing free consultancy service and market information (Czechoslovakia), market research subsidy scheme (Cyprus), and on-line business providing information on market and improvement of performance and competitiveness (UK). Policy can be used reduce barriers for industry to cooperate with research institution includes incentive to promote cooperation between research institution and industry (Norway and Slovenia), bottom up financing program to support the cooperation between industry and research institution (Switzerland), or the establishment of science park (Romania and Slovakia). Cooperation among the existing research institutions, public R&D institution and universities in particular, may also overcome obstacles to innovate due to the low technological capability owned by industry. Research institutions, with their pool of knowledge, qualified human resources and facilities, may become one of critical innovation sources to the industry. Study on the researches financed by public funding (Nelson, 1986; Acs et al, 1992; Mansfield, 1991; Mansfield, 1995; Senker, 1991; Faulkner & Senker, 1994; Pavitt, 1991; Nelson & Rosenberg, 1994; Beise & Stahl, 1998) revealed that researches carried out in the Research and Technology Organization have positive effect to firm innovation.

4.2Government Policies

In the national medium term development plan (Rencana Pembangunan Jangka Menengah Nasional) 2004-2009, science and technology programs are focused on six priority fields, i.e.: 1) food self reliance, 2) health and medicine technology, 3) new and renewable energy sources, 4) transportation technology and management, 5) information and communication technology, and 6) defense and security technology. It can be concluded that among these six focuses, technology development in automotive component industry is under the field of transportation technology and management.

Realizing that there were some weaknesses on the national medium term national development plan, either in the side technology producer and user or in the side of intermediary, the Office of State Ministry for Research and Technology introduced five incentive programs, i.e. incentives on basic research, applied research, science and technology capacity improvement on production system, acceleration of science and technology diffusion and utility, National Strategic Priority Research (RUSNAS). The aim of these incentives is to accelerate the

growth of technological innovation, to stimulate research in order to produce commercially high value innovation, to encourage the acceleration and enlargement of innovative product commercialization, and/or to strengthen the domestic technological and industrial competitiveness.

Technology policy related to the encouragement of innovation activities in automotive component industry, the instrument that can be used is the incentive for the improvement of production system science capacity, that is all the efforts to improve the potential of adoption, adaptation, and technology development for the high value competitiveness of the products and/services by optimizing input, process and industry management. The introduction of this incentive is directed to stimulate investment in research, development, and engineering in the industry with the purpose to facilitate the interaction between science and technology supplying institution and industry. This incentive is also able to help industry coping with financial obstacle and low technological capability in undertaking innovation.

If it is analyzed further, this incentive is also aimed to increase public research and development institutions. It can be seen clearly from the definition of 'instrument'. In the guidance on incentive program, it is stated that the term of incentive defined as policy instrument introduced by The Office of State Ministry for Research and Technology to accomplish its mission to provide the opportunity and to motivate the research and development institutions and researchers in carrying out their research, managing the problem systematically hampering innovation growth, and stimulating the adoption of innovation results by business practitioners/industry/society. Based on this definition, it is clear that the research institution meant here is the state/public institution. In addition, this incentive is directed more on researches to solve problems that hamper innovation growth. However, the problem faced by the automotive component industry that really requires special attention is the development matter to encourage innovation activities.

4.3 Policy Alternatives

As already known publicly, all the activities starting from technology design and production to technology marketing are carried out in the industry. Therefore, in order to promote and encourage innovation, it would be much better if the incentive is aimed directly to the industry, since the sources of innovation are on the industry, not in public R&D institution.

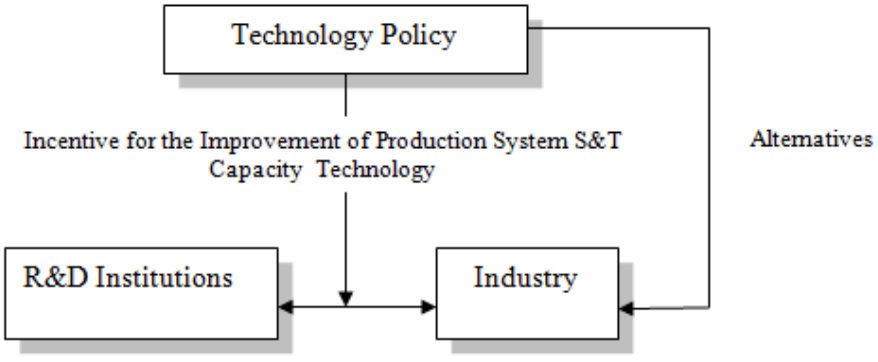

Figure 1. Target of policy alternative to encourage innovation activitie

Moreover, innovation activities in automotive component industry may be occurred unscheduled basis. On the other hand, the existing incentive is based on certain schedule starting from March and has to be accepted on November. This situation may hamper innovation activities in firms. For this reason, it is necessary to arrange this incentive similar to bank financing where fund may be available at any time it's needed.

The improvement work of the similar policy has been carried out by Greece as the effort to formulate innovation policy in a user-friendly manner. The change is made on the proposal application from industry which previously with fixed deadlines into open deadlines, and the time reduction of the evaluation and proposal approval. The steps in the improvement of incentive application were also carried out by Sweden. The process perceived previously as complicated and time consuming was changed into the simpler and shorter one, with the purpose to attract the attention of more participants.

5. Recommendation

In order to increase technology innovation in industry, government through the Office of State Ministry for Research and Technology, in fact, has introduced five incentive programs with the aim to accelerate the growth of technology innovation, to stimulate research in producing commercially high value innovation, to encourage the acceleration and broadening of innovative product commercialization, and/or to strengthen domestic competitiveness of technology and industry. For the case of automotive component industry, incentive for the improvement of production system science and technology capacity is the most appropriate one. But, if it's analyzed further, this incentive has the purpose more on enlarging the public R&D institution, not on the industry, while, in fact, the innovation sources of small and medium enterprises are generally in the industry itself.

To encourage the innovation activities in automotive component industry, it is perceived that some adjustments are required:

- The time period of the incentive distribution needs to be more flexible – can be applied at any time
- It would be better that the incentive is aimed to raise the industry capability, not the public research and development institution as the innovation sources are available in the industry.

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