Analyzing the Strategy of Sustainable Competitive Advantage in Taiwan’s Photovoltaic Industry

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ABSTRACT

Solar energy is one of the most popular resources in recent years. It has seemed as the best alternative for solving energy problem and protecting global environment. Moreover, many countries are very enthusiastic about the development of PV industry. Therefore, the purpose of this research is to find out the best strategy for Taiwan’s photovoltaic (PV) industry. First, Taiwan PV industry was analyzed by using SWOT. Second, the Analytic Network Process (ANP) structure was formed and modified by Expert Depth Interview. Then, the questionnaires were designed and sent to experts. Finally, the authors used the returned questionnaires to calculate the weighting and select the best strategy for Taiwan PV industry. The research results showed that the diversification strategy was the most appropriate. With this consequence, the manager of PV industry can take this strategy in order to maintain the sustainable competitive advantage in PV industry of the world.

Keywords: Analytic Network Process (ANP) Algorithm, Expert Depth Interview, Solar Energy, Sustainable Competitive Advantage, SWOT Analysis

INTRODUCTION

With the development of human civilization, the environment has been damaged gradually. Until recent years, we start to know how important it is to have a clean and pure environment. With the agreement of Kyoto protocol, using the alternative energy has become the trend for governments in different countries to pursue the resources which can be used naturally. So far, many renewable resources have been developed, such as wind power, tide power, solar energy, and geothermal power and so on (Bahnemann,
2004). Among these, solar energy is the most popular because it has many advantages like no noise, no harmful emissions, low maintain cost, and we can enjoy the sunlight anywhere (Bahnemann, 2004; Gueymard, 2004). Moreover, solar energy is currently the most important renewable energy source because of its abundance and accessibility (Chang, 2009). Therefore, it has seemed as the best alternative for solving energy problem and protecting our environment. Many countries are very enthusiastic about the development of PV industry, regarding it as the goal for assisting energy in mid term and the main energy in long term. Most of these countries have been conducting it by law and subsidization. So far, many countries like Japan, Germany, and USA have become the top three countries in producing photovoltaic products. Other countries like Taiwan and China are left behind but they will catch up one day.

In conclusion, previous studies have discussed this issue, but didn’t apply scientific method to develop an appropriate strategy. The contribution of this research is to find out the appropriate strategy by using scientific method to suggest Taiwan PV firms applying it when facing the world competition.

Taiwan PV Industry

Taiwan PV industry has been developed since 1980, but it didn’t become prosperous at that time because Taiwan was focusing on the development of semiconductor industry, and the flat-panel. Nowadays, with the success of these two industries, the industry cluster has formed and the shipment of knowledge spillover can be beneficial to each firm. Furthermore, the production procedure of solar cells is similar to the semiconductor and flat-panel, thus, it has sufficient human resources, technologies, and capital for Taiwan to enter the photovoltaic industry. Since 1999, the Bureau of Energy (BOE), Ministry of Economic Affairs (MOEA) has been conducting much subsidization to support the PV industry. On the other hand, The Industrial Technology Research Institute (ITRI) also provided technical skill to the industry in the same time. Also, with the consciousness of environmental protection increased recently, many firms have started to enter this industry.

So far, there are about 183 firms who have entered the PV industry (Taiwan Photovoltaic Industry Association, 2008). According to Photonics Industry and Technology Development Association (PIDA), the output of Taiwan PV industry was 170 billion NTD in 2006, 608 billion NTD in 2007, and it’s still increasing. It’s expected that PV industry will continue booming in the next decades.

But there are still some problems about Taiwan PV industry, like insufficient material from the upstream, incomplete industrial structure, and threats from other countries. Those mentioned above are the important issues need the government and firms to discuss.

Resource Based Theory

Barney (1991) pointed out two assumptions and a framework for analyzing sources of competitive advantage. First, this model assumes that firms within an industry (or group) may be heterogeneous with respect to the strategic resources they control. Second, this model assumes that these resources may not be perfectly mobile across firms, and thus heterogeneity can be long lasting. Barney also pointed out three examples (Strategic planning and sustained competitive advantage, Information processing system, sustained competitive advantage, positive reputation and sustained competitive advantage) in order to explain how this framework might be applied. The framework is shown in Figure 1.

Wu (1996) identified the resources as capital and capabilities. Capital means all the elements belong to a corporate, which can use it or control it. He also identified the capital into two categories: tangible capital and intangible capital. Tangible capital means all the plants, lands, and equipments belong to a corporate, while intangible capital such as reputation, intellectual property rights (IPRs), license, trademark and so on, which are not physical but have the same status compare to the tan-
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