

## **CHAPTER VII**

### **CRITICAL SUCCESS FACTORS**

This chapter presents the critical success factors that have been obtained from the progressive study of the Porter's Five Forces, SWOT Analysis and Questionnaires. The study revealed that the critical success factors for setting up a biodiesel factory in Thailand composed of raw material, technology, and human resource. The detail of each of these three key success factors would be illustrated below.

#### **7.1 Information analyses**

From the Porter's five force analysis, it could be observed that one of the emerging industry in Thailand is the biodiesel industry. The analysis showed that currently Thai biodiesel industry experiences the exceeding demand of biodiesel over the supplies. The cause that hindered the inability to supply biodiesel has been identified to be from the insufficient amount of the industry input, which is the palm oil. Together with the high set-up cost to build one biodiesel production plant, these factors contributed as the obstacles for the new comers entering this industry. Thus, for the Thai biodiesel industry, Porter's five forces analysis revealed that the bargaining power of suppliers and the new entrants' barriers of this industry are relatively high, causes the attractiveness of the industry to be doubtful.

After the industry has been externally analyzed by Porter's five forces, SWOT Analysis is employed to uncover the strategic objectives for the Thai biodiesel industry. With the nineteen identified points of the industry's strengths, weaknesses, opportunities, and threats, these points are further interchangeably analyzed to obtain the nine strategic objectives. From the nine identified strategic objectives as shown in Figure 5.4, they expose five potential key success factors of the Thai biodiesel industry. The five potential key success factors of the Thai biodiesel industry composed of government policy, technology development, raw material upsurge, production process development, and human resource development.

Having acknowledged the five potential key success factors of the Thai biodiesel industry, these factors are being weighted in term of the magnitudes of their importance using the distributed questionnaires in three methods of face-to-face interview, telephone interview and through mails. The result of the questionnaires indicated that the top three most significant key success factors are the raw material, the technology, and the human resource correspondingly.

## **7.2 The Key Success Factors**

With the Porter's Fives Forces revealing biodiesel industry overview and SWOT Analysis identifying the strategic objectives to strengthen the biodiesel industry and revealing the potential key success factors, it is with the distributed questionnaires that uncovers the Thai's critical success factors for the set-up a biodiesel factory. From the received questionnaires in the previous chapter, it revealed that the top five Thai's critical success factors of the biodiesel industry are that price of raw material, the availability of raw material, the biodiesel production process, its technology outlay, and finally the specialists and experts of the industry. These five identified subsidiary success factors could further be grouped into 3 main key success factors namely:

- Raw material
- Technology
- Human resource

The detail of each of these three identified critical success factors is described as followed:

### **7.2.1 Raw material**

From the analysis, it could be concluded that raw material is one of the most important critical success factors. It is the essential input of any manufacturing process, particularly for the Thai's biodiesel industry. With the selection of biodiesel

as one of Thailand's alternative energies based upon the basis that Thailand is an agricultural country with the capability to grow various oil-producing feedstocks; this emphasizes the important of raw material to the Thai's biodiesel industry.

Despite many oil-producing feedstocks that could be cultivated in Thailand, one of the commonly grown oil-producing crops identified to be the most productive for biodiesel production is the palm trees. From the analysis, not only palm oil yield ratio is the most productive among ten different crops, but also Thailand is familiar with the palm oil processing technology in converting palm fresh fruit into crude palm oil – a raw material used for biodiesel production. This becomes another advantage for Thailand.

Moreover, from the received questionnaires point of views, it revealed that raw material; in term both of price and availability, affects significantly on the two importance criteria of production cost and payback time. These two considerations would directly have an impact on the investment decision of the potential investors in term of whether or not they should invest in the set-up of a biodiesel factory. As a result, if the supply of raw material is not enough or the price of raw material is too high, this would resist and hold back the growth of the industry.

Consequently, with a rapid expansion of biodiesel industry; from previously with only three biodiesel producers in 2006 with a total production capacity of 615,000 litres per day to the current state of eight biodiesel producing firms producing 1,500,000 litres of biodiesel per day, the access to the feedstock becomes very difficult. Together with the unsuccessful attempt to increase palm plantations extensively by the government with an approval of the incentive budget of 1,300 million Baht, the shortage of palm fruits causes the price of palm oil to escalate continuously; up to 116.5% over a year. The price of palm oil keeps on rising until it is unaffordable by the biodiesel producers, causing the growth of biodiesel industry to be held up.

From the above, it is apparent that both the amount of raw material available for biodiesel production and the sky-rocketing price of biodiesel raw material are the barriers for the Thai biodiesel industry. They are the factors that resist the growth and the investment coming to the Thai biodiesel industry. Hence, it can be concluded that raw material; which in this case is palm oil, is a significant critical success factor for Thai biodiesel industry.

To overcome the raw material problems of shortage and escalating price, the Thai government must influence and convince the Thai cultivators to grow palm trees by providing more of the appropriate incentives; such as to guarantee the purchasing price in order to restore raw material stability for Thai's biodiesel industry.

### **7.2.2 Technology**

Besides the raw material, technology plays an important role in Thai biodiesel industry as well. From the questionnaires' result, technology affects the industry significantly in term of the know-how and the outlay. As a consequence, the type of technology used would ultimately determine the kind of production process a biodiesel factory would be employing, and also it would determine the range of the investment required of the project. Therefore, technology is definitely a critical success factor of the Thai biodiesel industry.

Currently, Thailand is encountering with the inefficiency of the production process; or in other words, the technology know-how to produce biodiesel in Thailand is still restricted. Most of biodiesel factories are employing the classic batch production process due the limitation of the local technology available. Without the potential to import the incredibly expensive machines from abroad, which at the same time provide a factory with a know-how production process, most small biodiesel producers are facing with a fluctuate production. This affects the quality of product, which essentially is the heart of biodiesel production. Without qualifying the quality standard of biodiesel product as shown in Table 3.1, biodiesel could not be sold to the market.

Moreover, at the present time, there is no local technology provider that offers the ability to produce biodiesel in a large quantity and continuously. Yet again, the technology has to be imported in order to produce large quantity of biodiesel with a continuous operation. This, however, costs expensively – causes biodiesel production cost to increase and, at the same time, multiply the set-up capital required in building a biodiesel factory.

Therefore, for the Thai biodiesel industry to progress, technology know-how and technology development to reduce the factory set-up outlay must be one of the primary concerns. With improvement in production process and better locally-produced technology, a biodiesel factory would be lowered their set-up investment required, lowered the product cost to produce biodiesel, increased their production capacity to obtain the economy of scale, their product quality would be improved, and last but not least, they would be producing biodiesel with constant operation.

To overcome the technology know-how and technology development, the different organizations must be participated. With the coordination and the participation of Thai government agency namely the Ministry of Energy, the academic institutions, and the equipments and machineries producing companies (such as Patkol Public Company Limited), biodiesel production technology would be advanced and developed in term of both the production know-how and the reduction in the biodiesel factory set-up cost.

### **7.2.3 Human resource**

For biodiesel industry, another key success factors identified is the human resource. At the moment, Thai biodiesel industry is facing a shortage of biodiesel specialists and biodiesel skilled personnel. From the questionnaires inquiring about the respondent's general background, more than 70% of the answered questionnaires engage in the biodiesel industry no more than 3 years. Only 10% of the received questionnaires engage in biodiesel industry more than 5 years. This shows that biodiesel is still very new and immature industry in Thailand.

Moreover, in the second part of the questionnaires inquiring about the internal situations' assumptions of Thai biodiesel industry, the result turns out that 90% of the answered questionnaires think that there is a deficiency in biodiesel specialists and skilled personnel in Thai biodiesel industry. Without adequate numbers of biodiesel specialists and skilled personnel present in Thai biodiesel industry, small producers would be inclined to encounter multiple challenges in setting up the biodiesel factory; one of which would be to obtain good quality biodiesel product – as suggested in Table 6.4 that human resource received the high score in this area.

Hence, to set-up a biodiesel factory that produces good quality biodiesel, biodiesel experts and experienced biodiesel recruits must be involved. As a result, both the private organizations and the Thai government must help to create a strong biodiesel workforce; where information and knowledge sharing of the biodiesel must be encouraged. One way to do this is to support researches related to biodiesel or its production to create a knowledge body. Moreover, the private organizations and the Thai government could offer more scholarships to biodiesel-experienced countries to learn more of biodiesel technology know-how. Additionally, short courses or long courses related to biodiesel or its production should be aided or subsidized by the government. Biodiesel seminars should be organized more often. Invitations of the biodiesel experts from abroad to share their experiences should be sent out. These are some ways to produce a strong biodiesel workforce in order to develop Thai biodiesel industry firmly and swiftly.