

CHAPTER VI

QUESTIONNAIRES

This chapter presents the last analytical tool used in this thesis to evaluate the biodiesel industry in order to determine its critical success factors – the questionnaires. The SWOT Analysis and its identified potential success factors would be composed into the questionnaires for distribution to the biodiesel producers for their perspectives and viewpoints. The received opinions would be used to ascertain the Thai critical success factors in setting up a biodiesel factory.

6.1 Questionnaires

For this thesis, one of the key analytical tools used to analyze a biodiesel industry is through the questionnaires. For this research, three methods of obtaining the valuable information for questionnaires' surveying are employed – face-to-face interview, telephone interview, and through the mails.

Altogether thirty-seven sets of questionnaires were handed out to four different target groups of private company, regional community, Ministry of Energy, and the co-operatives. The majority of these questionnaires-distributed organizations; thirty-five of the total thirty-seven organizations, have been obtained from a list of biodiesel producers registered with the Department of Energy Business (37). This list of the biodiesel producers compiled by the Department of Energy Business would be displayed in Appendix A.

Of the thirty-seven sets of questionnaires handed out, only twenty-one questionnaires were received; accounting for 57% of the total distributed questionnaires. The twenty-one responded organizations would be displayed in the Table 6.1. Out of these twenty-one sets of received questionnaires; two have been answered via face-to-face interview accounts for 10% of the received questionnaires, five have been answered via telephone interview accounts for 24% of the received questionnaires, and the rest of fourteen questionnaires were answered through mails accounts for 67% of the received questionnaires.

Additionally, an example of blank questionnaire would be shown in Figure 6.1. The questionnaire has been divided into 5 main aspects composing of; general information as Part 1, internal situations' assumptions of Thai biodiesel industry as Part 2, external situations' assumptions as Part 3, the competitiveness-enhancing factors as Part 4, and finally, the critical success factors weighting as Part 5. Some of the received and answered questionnaires would be displayed as samples in Appendix B.

Table 6.1: A list of organizations who have responded the questionnaires

No.	Organizations	Target group	Method
1	Bangchak Petroleum	Private company	Mail
2	The Krabi Oil Palm Farmer Co-operatives	Co-operatives	Face-to-Face
3	Mr. Preeda Chanreung	Private company	Phone
4	Neighnumthip	Private company	Mail
5	Thanapeerapat	Private company	Mail
6	Alternative Energy Plant Growers Community	Regional community	Mail
7	Mrs. Thippawan Sangnak	Private company	Mail
8	Mr. Chok Sirirattananuparb	Private company	Mail
9	Konnumkliang Community	Regional community	Mail
10	Energy Reserve Community	Regional community	Phone
11	Mr. Prasit Sripirom	Private company	Mail
12	Alternative Energy for Thailand Co-operative	Co-operatives	Phone

Source: Questionnaires

*Note: For The Krabi Oil Palm Farmer Co-operatives, the interview is conducted with Mr. Chokchai Plaiduang; Position – Biodiesel project manager of The Krabi Oil Palm Farmer Co-operatives.

Table 6.1: A list of organizations who have responded the questionnaires (continued)

No.	Organizations	Target group	Method
13	Mr. Ong-Art Saroch	Private company	Mail
14	Thanaprenithi Limited Partnership	Private company	Mail
15	MaeThang Alternative Energy Community	Regional community	Phone
16	Mr. Prasitpong Deevajin	Private company	Mail
17	Racha-Biodiesel	Private company	Phone
18	Mr. Jaroonsak Chivathammanon	Private company	Mail
19	Mr. Rapeetham Hongthong	Private company	Mail
20	Mr. Chukiaet Krittiyarungsan	Private company	Mail
21	Ministry of Energy	Ministry of Energy	Face-to-Face

Source: Questionnaires

*Note: For Ministry of Energy, the interview is conducted with Mr. Pongsak Promkawn; Position – Civil Engineer 5 of the Bureau of Biofuel Development

Questionnaire

Part 1: General Information

1.1 Type of your organization

- Ministry of Energy
- Private company
- Regional community
- Co-operatives

1.2 Experience in biodiesel industry

- Less than 1 year
- Less than 3 years
- Less than 5 years
- More than 5 years

Part 2: What are your agreements in the assumptions of the internal situations of Thai biodiesel industry?

Raw material

- 2.1 At the moment, there is a shortage of palm fresh fruit Highly agree Mod. agree Not agree
- 2.2 Crude palm oil is unaffordable by the biodiesel producers because of its high price Highly agree Mod. agree Not agree
- 2.3 The prohibition of palm oil import affects negatively on the biodiesel industry Highly agree Mod. agree Not agree
- 2.4 Government could not expand palm plantation as anticipated Highly agree Mod. agree Not agree

Technology

- 2.5 Biodiesel producers have to import the biodiesel production technologies Highly agree Mod. agree Not agree

Figure 6.1: Example of the questionnaire

2.6 To set up a biodiesel production plant, it requires a high investment capital	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
<u>Human resource</u>			
2.7 There is a shortage of biodiesel specialists and biodiesel skilled personnel	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
<u>Production process</u>			
2.8 Batch Reaction Process is the most widely used production process	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
<u>Government policy</u>			
2.9 Thai government is supporting biodiesel industry through the tax and non-tax incentives	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
2.10 B10 compulsory distribution by 2012 would promote the set-up of biodiesel production factory	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
<u>Part 3: What are your agreements in the assumptions of the external situations of Thai biodiesel industry?</u>			
Factors that <u>positively affect</u> on Thai biodiesel industry:			
3.1 Continual increased of diesel consumption would as well expand biodiesel industry	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
3.2 Cleaner and greener fuel usage would increase the importance of biodiesel	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
3.3 Future potential to export biodiesel to other countries would help Thai biodiesel industry to grow extensively	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree

Figure 6.1: Example of the questionnaire (continued)

Factors that **negatively affect** on Thai biodiesel industry:

3.4 Increased of NGV technology would decrease biodiesel consumption	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
3.5 Emerged of a better growing crop would replace palm plantation	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
3.6 Uncertainty in economic condition; such as a sudden increased in interest rate, would in affects doubtfully on the biodiesel investment	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree
3.7 Political instability situation; in term of the change in biodiesel policies from one administrative government to another, would affect negatively on the biodiesel investment	<input type="checkbox"/> Highly agree	<input type="checkbox"/> Mod. agree	<input type="checkbox"/> Not agree

Figure 6.1: Example of the questionnaire (continued)

Part 4: What are the important factors to increase the competitiveness of Thai biodiesel industry?

Raw material

4.1 Allow the import of raw material for biodiesel production Highly agree Mod. agree Not agree

4.2 Research intensively on other oil-producing inedible crops Highly agree Mod. agree Not agree

Technology

4.3 Support biodiesel technology research and development Highly agree Mod. agree Not agree

4.4 Support the manufacturing of biodiesel production technology locally to reduce the capital investment Highly agree Mod. agree Not agree

Human resource

4.5 Provide extensive training to build up biodiesel skilled labors' resource pool Highly agree Mod. agree Not agree

Production process

4.6 Promote Continuous Process Systems to improve process efficiency Highly agree Mod. agree Not agree

Government policy

4.7 Provide financial support for biodiesel producers; such as fixed-interest rate Highly agree Mod. agree Not agree

Figure 6.1: Example of the questionnaire (continued)

Part 5: What are the key success factors in setting up a biodiesel factory?

Please give a rating in term of the importance upon each of the 8 potential factors in 5 considerations. Each potential factor and each consideration weight 100 points.

Potential Factors	Maximum weight	Raw material		Technology		Human resource	Production process	Government policy	
		Availability	Price	Operation capacity	Capital requirement			Prohibit of crude palm oil	Increased of interest rate
Production Cost	100								
Profit Margin	100								
Payback time	100								
Product Quality	100								
Constant Operation	100								
Total	500								

Figure 6.1: Example of the questionnaire (continued)

6.1.1 General information

For the first part of questionnaire, two questions are posed to the questionnaires' respondents in term of their types of organizations and their experiences in the biodiesel industry to get a rough idea about the respondents' information. Of the twenty-one received questionnaires, the answers obtained are:

Type of organizations;

- 1 questionnaire, accounting for 5% of the total received questionnaires, is from Ministry of Energy
- 14 questionnaires, accounting for 66% of the total received questionnaires, are from the private company
- 4 questionnaires, accounting for 19% of the total received questionnaires, are from the regional community
- 2 questionnaires, accounting for 10% of the total received questionnaires, are from the co-operatives

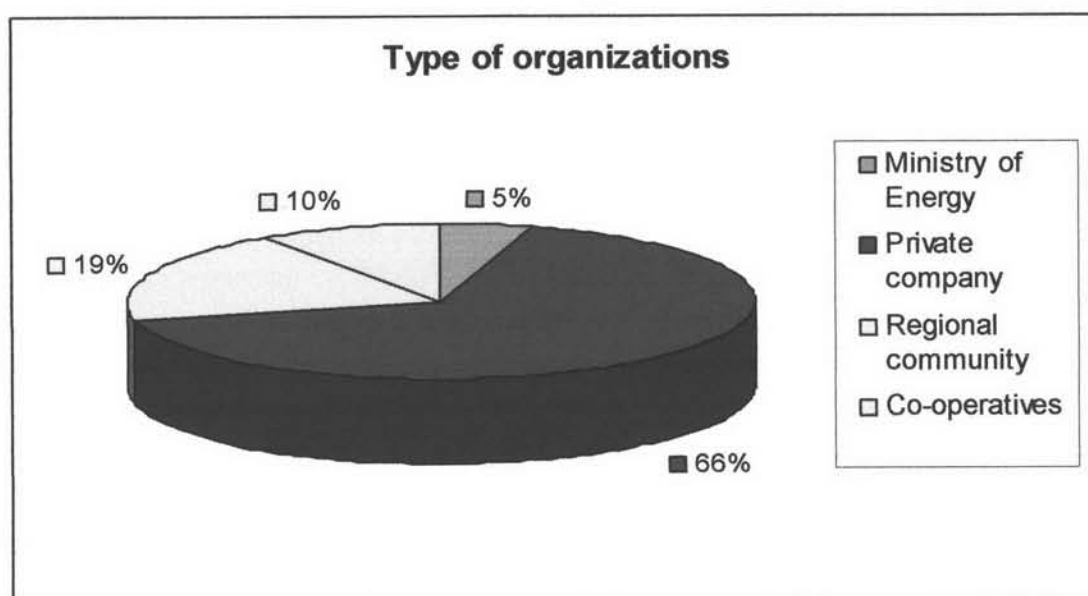


Figure 6.2: Type of organizations answering the questionnaires

Experience in biodiesel industry;

- 5 questionnaires or 24% engage in biodiesel industry less than 1 year
- 10 questionnaires or 47% engage in biodiesel industry less than 3 years
- 4 questionnaires or 19% engage in biodiesel industry less than 5 years
- 2 questionnaires or 10% engage in biodiesel industry more than 5 years

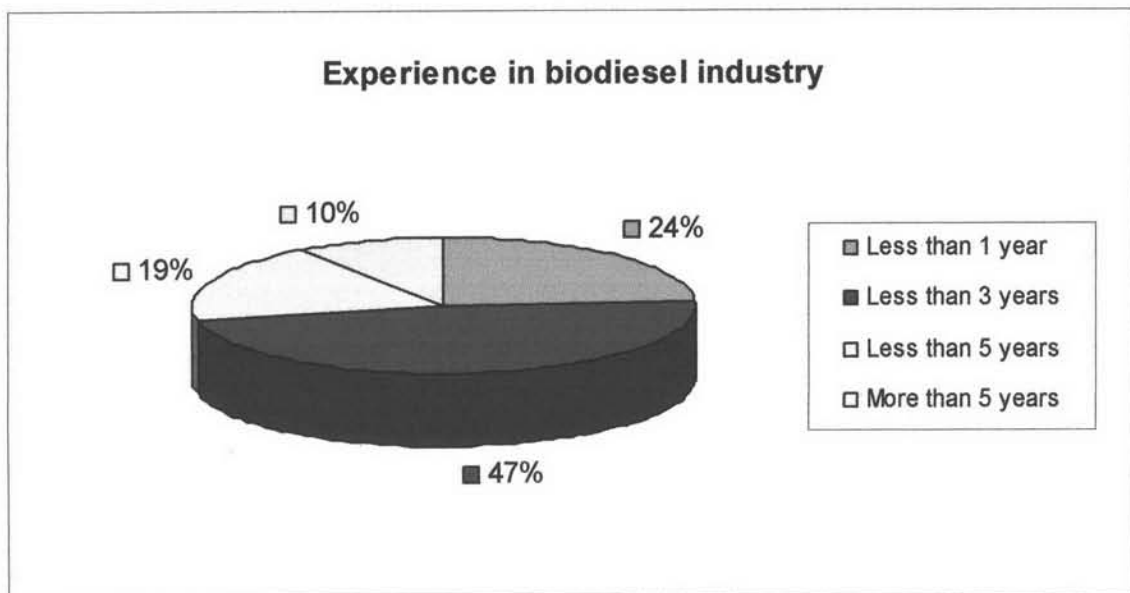


Figure 6.3: Experience in biodiesel industry of the interviewees

6.1.2 Internal situations' assumptions of Thai biodiesel industry

For the second part of the questionnaires, the questionnaires' distributed organizations were inquired in term of their perceptions on each of the identified assumptions regarding the internal factors affecting the Thai biodiesel industry. The received point of views from various biodiesel-related organizations would be contributed towards an evaluation of the current Thai biodiesel situation. The internal situations' assumptions of Thai biodiesel industry result would be illustrated in the following table; Table 6.1.

Table 6.2: Summary of agreements and disagreements of the identified internal situations' assumptions regarding the Thai biodiesel industry

	Internal factors	Highly agree	Mod. agree	Not agree	Points
Raw material	At the moment, there is a shortage of palm fresh fruit	8	10	2	26
	Crude palm oil is unaffordable by the biodiesel producers because of its high price	12	8	1	32
	The prohibition of palm oil import affects negatively on the biodiesel industry	9	7	5	25
	Government could not expand palm plantation as anticipated	9	9	3	27
Technology	Biodiesel producers have to import the biodiesel production technologies	1	7	13	9
	To set up a biodiesel production plant, it requires a high investment capital	3	11	7	17
HR	There is a shortage of biodiesel specialists and biodiesel skilled personnel	7	12	2	26
Prod. process	Batch Reaction Process is the most widely used production process	1	18	2	20
Govt. policy	Thai government is supporting biodiesel industry through the tax and non-tax incentives	9	5	7	23
	B10 compulsory distribution by 2012 would promote the set-up of biodiesel production factory	11	5	5	27

After the information is gathered, the analysis of the obtained data would be the next step. In order to identify the top four agreeable internal assumptions of the Thai biodiesel industry from both the private and governments sectors, the weighing system of each assumption is introduced. For the 'highly agree' answer, two points would be given. For the 'moderately agree' answer, one point would be given. For the 'not agree' answer, no point would be given. The total points would be calculated in the right column of Table 6.1.

For the result, from the entrepreneurs and experts point of views the top four of the agreed assumptions of the internal situations of Thai biodiesel industry are:

1. Crude palm oil is unaffordable by the biodiesel producers because of its high price; with 32 points.
2. Government could not expand palm plantation as anticipated; with 27 points.
3. B10 compulsory distribution by 2012 would promote the set-up of biodiesel production factory; with 27 points.
4. At the moment, there is a shortage of palm fresh fruit; with 26 points.

6.1.3 External situations' assumptions of Thai biodiesel industry

For the third part of the questionnaires, each of the questionnaires' distributed organizations was put forward questions concerning the external factors affecting the Thai biodiesel industry. The received viewpoints would yet again be used as a guideline towards an evaluation of the current Thai biodiesel situation. The result of the external situations' assumptions would be shown as followed in Table 6.2.

Table 6.3: Summary of agreements and disagreements of the identified external situations' assumptions regarding the Thai biodiesel industry

	External factors	Highly agree	Mod. agree	Not agree	Points
Positively affected	Continual increased of diesel consumption would as well expand biodiesel industry	12	9	0	33
	Cleaner and greener fuel usage would increase the importance of biodiesel	16	5	0	37
	Future potential to export biodiesel to other countries would help Thai biodiesel industry to grow extensively	7	10	4	24
Negatively affected	Increased of NGV technology would decrease biodiesel consumption	2	10	9	14
	Emerged of a better growing crop would replace palm plantation	6	5	10	17
	Uncertainty in economic condition; such as a sudden increased in interest rate, would in affects doubtfully on the biodiesel investment	5	7	9	17
	Political instability situation; in term of the change in biodiesel policies from one administrative government to another, would affect negatively on the biodiesel investment	12	6	3	30

Similarly with the internal situations' assumptions, after the information of the external situations' assumptions is gathered, the analysis of the obtained data would be conducted. The weighting system of each assumption is as well employed to identify the top four agreeable assumptions from both the private and governments

sectors. For the 'highly agree' answer, two points would be given. For the 'moderately agree' answer, one point would be given. For the 'not agree' answer, no point would be given. And, the total points would also be calculated in the right column of Table 6.2.

From the questionnaires answered, the top four of the agreed assumptions of the external situations of Thai biodiesel industry are:

1. Cleaner and greener fuel usage would increase the importance of biodiesel; with 37 points.
2. Continual increased of diesel consumption would as well expand biodiesel industry; with 33 points.
3. Political instability situation; in term of the change in biodiesel policies from one administrative government to another, would affect negatively on the biodiesel investment; with 30 points.
4. Future potential to export biodiesel to other countries would help Thai biodiesel industry to grow extensively; with 24 points.

6.1.4 The competitiveness-enhancing factors

For the competitiveness-enhancing factors part of the questionnaires, several assumptions intended to increase Thai biodiesel industry competitiveness are inquired to the interviewees in order to determine the intensity of the impact of each identified assumption. These assumptions are categorized into five different aspects of raw material, technology, human resource, production process, and government policy. From the questionnaires, the results obtained are shown as follow:

Table 6.4: Summary of agreements and disagreements of the identified competitiveness-enhancing factors of the Thai biodiesel industry

	Factors	Highly agree	Mod. agree	Not agree	Points
Raw material	Allow the import of raw material for biodiesel production	11	3	7	25
	Research intensively on other oil-producing inedible crops	11	8	2	30
Technology	Support biodiesel technology research and development	18	3	0	39
	Support the manufacturing of biodiesel production technology locally to reduce the capital investment	19	2	0	40
HR	Provide extensive training to build up biodiesel skilled labors' resource pool	13	8	0	34
Prod. process	Promote Continuous Process Systems to improve process efficiency	11	8	2	30
Govt. policy	Provide financial support for biodiesel producers; such as fixed-interest rate	14	5	2	33

Correspondingly with the above, after the information of the identified assumptions is gathered, the analysis of the obtained data would be conducted. The weighting system of each assumption would be employed to identify the top four agreeable assumptions from both the private and governments sectors. For the 'highly agree' answer, two points would be given. For the 'moderately agree' answer, one point would be given. For the 'not agree' answer, no point would be given. And, the total points would also be calculated in the right column of Table 6.3.

From the questionnaires answered, the top four of the agreed assumptions of the competitiveness-enhancing factors of Thai biodiesel industry are:

1. Support the manufacturing of biodiesel production technology locally to reduce the capital investment; with 40 points.
2. Support biodiesel technology research and development; with 39 points.
3. Provide extensive training to build up biodiesel skilled labors' resource pool; with 34 points.
4. Provide financial support for biodiesel producers; such as fixed-interest rate; with 33 points.

6.1.5 The key success factors weighting

For the last and important part of the questionnaires – the key success factor weighting, organizations were asked to give their rating to each of the identified potential critical success factors that they think is important in setting up a biodiesel factory. For the rating, each of the potential critical success factors weighs a total score of 100 points. The 8 identified potential critical success factors consist of availability of raw material, price of raw material, operation capacity, capital requirement, human resource, production process, prohibit of crude palm oil, and lastly, increased of interest rate.

For the criteria selection, despite there are many criteria that might be used to determine the critical success factors, only some important factors relating to the new set-up factory would be asked. The 5 key considerations that are employed in this critical success factors determination consist of production cost, profit margin, payback time, product quality, and constant operation. The score of the critical success factors decision-making are shown in Table 6.4.

Table 6.5: Biodiesel industry potential critical success factors weighting

Potential Factors	Maximum weight	Raw material		Technology		Human resource	Production process	Government policy	
		Availability	Price	Operation capacity	Capital requirement			Prohibit of crude palm oil	Increased of interest rate
Considerations									
Production Cost	100	49	57	41	54	45	48	38	36
Profit Margin	100	44	46	39	47	36	41	39	37
Payback time	100	48	49	41	47	35	42	39	43
Product Quality	100	52	47	47	46	51	58	32	32
Constant Operation	100	52	51	45	41	43	52	45	36
Total	500	245	250	213	235	210	241	193	184
Rank		2	1	5	4	6	3	7	8

According to the table above (Table 6.4), the result turns out that the price of raw material has the highest scoring weight of 250 points. Came in the second place, it is the availability of raw material with a total score of 245 points. For the third place, it goes to the production process with a total score of 241 points. Next, the capital requirement falls in the fourth place with a total score of 235 points, and followed by operation capacity with a weight of 213 points. Human resource came in sixth place with a total weight of 210 points. Seventh place goes to the prohibition of crude palm oil with a weight of 193. For the last place, it is the increased of the interest rate with a total score of 184 points.

From this weighting system, the result shows the comparative importance of each of the eight identified potential critical success factors. Despite all the eight identified potential critical success factors have the effects over the Thai biodiesel industry, some of these factors are more significant than the others. This is apparent from the weighting system. The result indicates that the Thai's critical success factors in setting up of a biodiesel factory include price and availability of raw material, technology know-how (production process) and outlay (technology development), and finally human resource (biodiesel specialists) correspondingly.