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Research Article

Factors influencing power generation investment in Laos

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Abstract

This paper aims to study factors influencing power generation investment by Thai business entrepreneurs in Laos. Two major factors were found to influence decisions and these are physical and societal factors and competitive environment factors. The forms of investment consist of joint venture, mixed venture, wholly owned enterprise, and portfolio investment. The study covered over 100 power generating entrepreneurs including very small power producers (VSPP), small power producers (SPP) and independent power producers (IPP) who have contracted with the Electricity Generating Authority of Thailand (EGAT). Research tools included close-ended and open-ended questionnaires; variable measure; statistics used in factor analysis; and binary logistic regression analysis in order to find an equation in selecting forms of investment. Physical and societal factors consist of five minor factors relating to political, legal, economic, geographical and cultural factors. Competitive environment factors include price advantage, marketing advantage, innovation advantage, number and comparative capability of competitors and competitive differences by country.

According to our research, the most influential factor towards investment is the legal factor wherein the government of Laos issues laws assuring foreign investors in repatriating capital and dividends. In addition, the Lao government issues laws governing tax exemption or waivers relating to project construction, infrastructure and certain activities regarding process and industrial activities that use modern technology. There are also laws concerning tax exemption on imported machinery, tools, spare parts and relevant vehicles including raw materials that are unavailable or inadequate in the country. The second major reason is cultural factors. The similarity between Lao and Thai north-eastern dialect provides for direct communication without the need for an interpreter. The third factor is geographical influences. Dense forests cover the northern and eastern areas of Laos with plentiful water flows

throughout the year. Referring to competitive environment factors, the most influential factor is technology and innovation advantage, and competition differences by country. Unlike complicated coal-fired or other thermal power plants, electricity production using hydro power is simple and clean. The large amount of water resources throughout the year and mountainous location of Laos enables the construction of dams to generate a great deal of electricity, when compared to Thailand, Cambodia and Vietnam. In addition, Laos also has bountiful forests and water resources throughout the year which are essential for producing electricity, a major export product to Thailand and Vietnam. The second factor is price advantage. The price of electricity, generated by entrepreneurs in Laos and sold to EGAT is comparatively cheaper due to the low fixed costs associated with using hydropower. The third factor is the major advantage in marketing. Power demand in Thailand, China and Vietnam is expected to be three-times higher in next 10 years, providing good opportunity for the electricity market.

Keywords: energy, hydropower, Thailand, VSPP, SPP, IPP, EGAT, Thailand

Introduction

The cost of generating electricity has increased sharply due to an increase in demand, combined with fluctuating prices of gasoline and natural gas. This cost increase is likely to continue in the near future with a consequent negative impact on the cost of living of Thai people. The Electricity Generating Authority of Thailand (EGAT), as the key government authority for power generation in Thailand, has sought several ways to lessen such a crisis by increasing power generating capacity as well as power plant efficiency, especially coal-fired power plants. According to EGAT, it is anticipated that the maximum power need in 2021 will reach 48,958 MW, or 116% from current basis (based on peak electricity demand in March, 2008) [1]. Building new power plants is not an easy fix due to several regulatory measures. For example, regulations now require impact studies, there is a scarcity of fuel sources, coupled with increasing awareness about global warming, etc. Additionally, there are few economically viable sites remaining for hydropower in Thailand. Therefore, EGAT is looking for an alternative approach to supply sufficient power by using the electricity generating potential in neighbouring countries, such as Laos, Myanmar and Cambodia. EGAT currently purchases power supply from hydro in Laos at over 5,000 MW per year, or 22.53% of the current maximum power demand [2].

Consequently, investing in power plants in neighbouring countries is an inevitable decision for EGAT. However, constructing new power plants both in Thailand and in neighbouring countries is a complicated task due to the significant construction costs, currently at about 20-30 billion Baht per plant. In addition, EGAT has been allocated a smaller budget from the government as result of the public finance principle to constrain the nation's public debt. EGAT, therefore, has to depend on its own investment. In addition, fund raising tends to be difficult in such a situation and EGAT has to look to the private sector to fill this role. EGAT and its subsidiaries are increasingly looking at joint investment and fund raising in international financial markets.

Literature Review

The objective of this research is to study factors that influence four forms of investment, i.e. joint venture, mixed venture, wholly owned enterprise and portfolio investment, by Thai business entrepreneurs in power projects in Laos and to find out the relation on probability equation in selecting forms of investment. The research will also provide an overall picture of

power generation investment in Laos. The locations of the majority of the businesses are in Vientiane or districts near the border of Thailand, especially where there are water resources or rivers. From an examination of 101 businesses, types of business were found to consist of wholly foreign owned enterprise, joint venture, mixed venture and portfolio investment. The study will emphasize the relationship of the major ten factors encouraging investment in Laos which can be applied for improvement of the investment policy of the Thai and Lao governments in future collaboration. The findings of this study are in accordance with Zhang [3], who concluded that the market of the host country (Laos) still has a gap which is overlooked by most competitors and can be considered as an opportunity for investors to increase their market share.

This study aims to provide relevant research in order to demonstrate the foreign direct investment (FDI), the factors that influence FDI, electricity and power generation business research and external influences consisting of physical and societal factors and competitive environment. By reviewing empirical data that focuses on the relationship between the form of direct investment by Thai business entrepreneurs and the external factors which are influenced by all the variables, this study will also serve to improve future agreements between the Thai and Lao governments and their policy on bilateral trading.

Trevino *et al*., [4] described the factors that determine the types of investment in a foreign country as external environment, geography of the host country and knowledge of the investors in their own business.

Research by Hennart and Park [5] and Smarzynska [6], found that the most influential factor determining selection of form of investment and increasing the competitive advantage of multinational businesses are ownership of the technology considered as the advantage in possessed resource, based on Dunning's theory [7, 8] and a strong business relationship with the network of local enterprises in the host country considered as an advantage in business management. This is in line with the research by Gleason, Lee and Mathur [9] as well.

The geographical advantage has only one factor which is the government policy that provides trade and investment privileges to multinational enterprises, which is in line with Dunning's theory [7, 8]. The theory regards the factor on trade and investment privileges to foreign enterprises as one of the four criteria in considering investment in a foreign country. Goodnow and Hansz [10] mention that the host country aiming to attract more foreign investment will establish government policy on tax privileges and interest rates, as well as other privileges.

The research of Chiang [11], illustrates that foreign enterprises investing in developing countries will receive customs privileges. Laos is a landlocked country bordering Thailand, China, Vietnam, Myanmar and Cambodia and is therefore a land bridge to trade and investment and a land link and gateway to the neighbouring countries.

Grosse and Trevino [12], suggested that entrepreneurs venturing/working in a foreign country must study the language and develop communication skills while expanding the business in order to avoid problems resulting from culture gap.

Hofstede [13] and Chen and Hu [14], suggest that culture is made up of shared values, therefore foreign investors must apply appropriate management approaches based on cultural dissimilarity.

Chiang [11], illustrated that the government is promoting direct investment which brings in technology and knowledge transfer as well as increased employment, resulting in a good image for the country. However, this result contradicts the research by Kotler [15], which presented the limitation of direct investment due to the risk of expropriation. Recent studies have recognized that firms invest in foreign countries not only to exploit but also to develop their firm-specific advantages or acquire necessary strategic assets in the host country [16, 17]. These studies suggested that a firm's firm-specific advantages would arise not only from the possession of proprietary assets but also from the capacity to acquire, or the efficient coordination of, the complementary assets owned by other firms in a host country [7, 8, 16].

Methodology

The tools applied in this research are open-ended and close-ended questionnaires. Statistics applied are Likert type scale, factor analysis and binary logistic regression analysis, as well as probability equation in selecting forms of investment. This paper will analyze binary regression analysis between independent variables and dependent variables. Independent variables as shown in Figure 1 are:

- Political policies,
- Legal practices,
- Cultural factors,
- Economic forces,
- Geographical influences,
- Major advantage in price,
- Major advantage in marketing,
- Major advantage in innovation,
- Number and comparative capability of competitors, and
- Comparative differences by country (Daniels and Radebaugh, [18], p. 48).

Dependent variables are two forms of investment, i.e. joint venture and mixed venture, wholly owned enterprise and portfolio investment.

Information relating to investment by electricity generating businesses could be obtained by literature review and other relevant research. Attitude survey would cover the investment of electricity generating business from EGAT's specialists such as Deputy Governor of Electricity Generating Division, Deputy Governor of Power Control System Division, Director of Power System Planning Department, as well as the private sector for instance, Managing Director of Ratchaburi Electricity Generating Holding Public Company and Managing Director of EGCO Public Company.

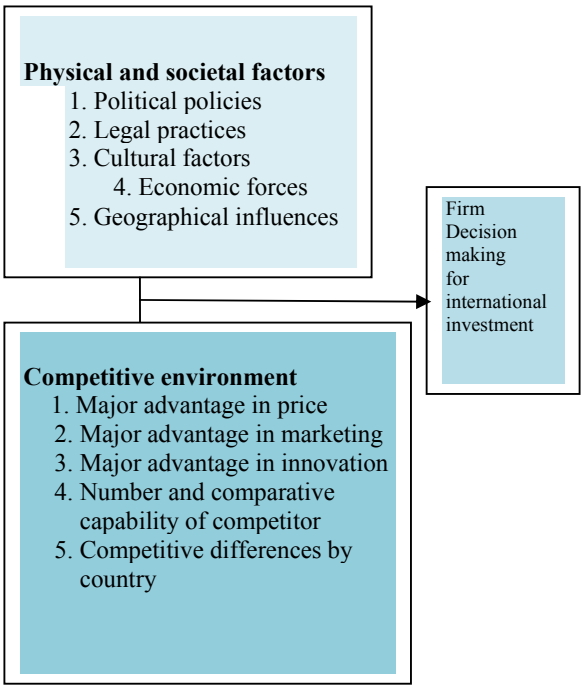

Figure 1. Physical, Societal and Competitive Factors.
(From Daniels and Radebaugh, [18])

All 69 variables were categorized and grouped. The survey instrument used in the study is a form of Likert type scale questionnaire. The questionnaire included three parts. The first part contained a covering letter describing the aim of the survey to assure the experts that no negative action would be taken against their business. The second part consisted of demographic questions for general investment with close-ended questions. Included in this were five questions asking for the factors that influence decisions in the power generation business to ensure that the model used in this study is agreed to by experts. The third part contained sixty nine statements regarding the independent variables of this study. Each expert was asked to state his or her agreement or disagreement with the statement using the five point Likert type scale.

Following the questionnaire survey, follow-up interviews were undertaken and the collected data analyzed by factor analysis method, according to the method of Reese and Lochmuller, [19]. Factor analysis was used to uncover the latent structure (dimensions) of a set of variables. It reduced attribute space from a larger number of variables to a small number of factors and is a non-dependent procedure that there was no assumption that a dependent variable was specified.

Results and Discussion

The Cronbach alpha estimation describes how highly the items in the questionnaire are interrelated. Cronbach's alpha is the most popular test of inter-item (internal) consistency reliability. Alpha equals 1.0 when all items measure only the true score and there is no error component. Cronbach's alpha can be interpreted as the percent of variance the observed scale

would explain in the hypothetical true scale composed of all possible items in the universe. Alternatively, it can be interpreted as the correlation of the observed scale with all possible other scales measuring the same thing and using the same number item**.** To analyze the data collected for this study, The Statistical Package for Social Sciences (SPSS) program version 15 was used for result analysis. Eighty one questionnaires were received from the contacted private companies with the response rate of 80% (81/101).

In this study Cronbach's alpha coefficient of over 0.898 was obtained, which is more than 0.6, thus it has reliability.

Table 1. Physical and societal factors.

	Means (Ranking)	***Standard deviation***	***Means (by Scoring)***
Political policy	*3.67(1)*	*1.414*	*3.89(4)*
Legal practice	*3.17(2)*	*1.127*	*4.17(1)*
Cultural factors	*2.32(5)*	*1.596*	*3.92(2)*
Economic forces	*3.01(3)*	*1.299*	*3.86(5)*
Geographical influences	*2.83(4)*	*1.282*	*3.91(3)*

Table 2. Competitive environment factors.

	Means (Ranking)	***Standard deviation***	***Means (byScoring)***
Major advantage in price	*3.52(1)*	*1.450*	*3.83(2)*
Major advantage in marketing	*3.32(2)*	*1.105*	*3.71(3)*
Major advantage in innovation	*2.67(4)*	*1.500*	*3.88(1)*
Number and comparative capability of competitors	*2.88(3)*	*1.259*	*3.53(4)*
Competitive differences by country	*2.62(5)*	*1.521*	*3.88(1)*

The factor analysis method was used to analyze the correlation between groups of variables and total variance using principle component analysis in extraction method. The results are shown in Table 3 below.

Table 3. Factor analysis of all variables.

Factors	Component 1	Component 2	Component 3	Total cumulative
Political policies	4, 5, 7, 8, 9(38.250%)	1,2,3 (12.873%)	9,10,11 (11.787%)	62.909%.
Legal practices	1,2,3,4, 5, 6, 7, 11 (62.357%)	8,9,10 (9.188%)	-	71.545%
Cultural factors	1,2,3,4,5,6 (62.174%)	-	-	62.174%
Economic forces	2,3,4,5 (44.000%)	1,6,7,8(13.593 %)	9 (11.563%)	69.156%
Geographical influences	3,4,5,6,7,8 (43.705%)	1,2,9(13.475%)	-	57.179%
Major advantage in price	1,2,3,4	-	-	58.093%
Major advantage in marketing	2,3,5,6 (47.876%)	1,4 (17.86%)	-	65.737%
Major advantage in innovation	1,2,3 (50.289%)	4(26.59%)	-	76.879%
Number and comparative capability of competitor	1,2,3,4	-	-	54.897%
Competitive differences by country	1,2,3,4,5	-	-	52.702%.

Table 4. Independent Factors in the Equation.

		B	S.E.	Wald	df	Sig.
Step 1a	Political	-1.294	0.507	6.507	1	0.011
	Legal	0.552	0.536	1.062	1	0.303
	Culture	-0.272	0.498	0.297	1	0.586
	Economic	-0.195	0.474	0.169	1	0.681
	Geographical	-0.029	0.478	0.004	1	0.952
	Price	-0.265	0.571	0.215	1	0.643
	Marketing	0.141	0.468	0.091	1	0.763
	Innovation	-0.146	0.451	0.104	1	0.747
	Competitor	0.050	0.412	0.015	1	0.903
	Competitive	-0.171	0.576	0.088	1	0.767
	Constant	2.518	0.521	23.36	1	0.000

The political factor has a significance of 0.011 (less than 0.05) so the political factor is the most influential factor for selection of form of investment. However, the political variables that influence the form of investment also need to be considered. To determine these variables, the results in Table 5 show that there are two significant influences in the case of Laos, one being the country's accession to the World Trade Organization and the second being the establishment by the Lao government of the National Land Policy Committee to facilitate the development of a comprehensive land policy framework.

Table 5. Independent Political Variables in the Equation.

		B	S.E.	Wald	df	**Sig.**
Step 1a	Political 1	1.918	1.176	2.660	1	0.103
	Political2	-3.057	1.415	4.668	1	0.031
	Political3	0.263	0.875	0.090	1	0.764
	Political4	-0.823	1.030	0.638	1	0.424
	Political5	0.042	1.024	0.002	1	0.967
	Political6	1.318	0.854	2.383	1	0.123
	Political7	-0.574	0.811	0.501	1	0.479
	Political8	-0.888	0.946	0.881	1	0.348
	Political9	-3.202	1.568	4.170	1	0.041
	Political10	1.536	1.090	1.986	1	0.159
	Political11	1.331	1.095	1.477	1	0.224
	Constant	10.490	4.133	6.443	1	0.011

Summary of Hypotheses Testing

Table 6 summarizes the various hypotheses used in this research, showing both the sub-factors and the variables.

Table 6. Summary of Hypotheses.

Hypotheses	**Sub-factors**	**Variables**	**Detail**
1.1 The physical and societal factors are important to the power generation investment decision making of Thai power generation business investor in Laos.	Political factors	Political11	The Government of the Lao People's Democratic Republic recognizes the right of private enterprise ownership.
	Legal practice	Legal2	The Government and the law of the Lao People's Democratic Republic assure foreign investors of the right to repatriate capital and dividend.
	Cultural factors	Cultural4	The similarity between Lao and Thai north-eastern dialect provide a direct communication without an interpreter.

208	Economic forces	Economic3	Direct investment in electricity generating in a foreign country is directly related to the country's future security.
	Geographical influence	Geographical2	Dense forests cover the northern and eastern areas with plentiful water flows throughout the year.
1.2 Competitive environment factors are important to the power generation investment decision making of Thai power generation business investor in Laos.	Price	Price2	The price of electricity, generated by entrepreneurs in Lao PDR, sold to EGAT has low cost due to the low variable cost by using hydropower.
	Marketing	Marketing1	Power demand in Thailand, China, and Vietnam will be three-times higher in next 10 years, providing good opportunity for electricity market.
	Innovation	Innovation3	Hydro technology is simple and clean. It is not complicated like other fossil power plants.
	Comparative capability of competitor	Competitor1	The competitors are more than 60 potential electricity generators that can build their own plants.
	Competitive difference by country	Competitive4	The large amount of water resources throughout the year and mountainous location of Laos enables them to construct dams to generate a great deal of electricity compared to Thailand.
2. Influence factor related to the selection of the form of power generation investment in Lao PDR.	Political factors	Political 2	The World Trade Organization (WTO) completed the working party meeting for the accession of the Lao PDR.
		Political 9	The Government of Lao PDR established the National Land Policy Committee to facilitate the development of a comprehensive land policy framework.

Summary of Findings

The major factors studied in this research included the following physical and societal factors: political policies; legal practices; cultural factors; economic forces; and geographical influences. An additional factor is the competitive environment factor which consists of the following: major price, marketing and innovation advantages; number and comparative competency of competitors; and competitive differences by country. Models and equations to forecast Thai power generation entrepreneurs' decisions in selecting forms of investment in electricity production businesses are also created. The study further indicates the influential factors toward the entrepreneurs' investment decision. The summary of this research study will be practical in creating cooperation guidelines and strategic plans in developing more than a hundred Thai electricity producers' investments with the intention of expanding electricity production investment in Laos in the future. Direct investment in electricity production is a huge investment compared to other direct investments. This additionally influences the nation's electricity security which will encourage investment in Laos. Direct investment in Laos not only creates the nation's earnings (one of the country's developing factors), but it also encourages superior collaboration of both countries in the future. Moreover, the result of this study can be used in creating or developing collaboration between the governments of Thailand and Laos which is the foundation of the electricity production connection for Indochina in the future.

The results of this study can also be applied to survey Thai electricity producers' attitudes and demands concerning investment in such a business in other neighbouring countries, such as Myanmar and Cambodia where the resources are considered suitable for electricity production. Currently, there are few studies of direct electricity production investment in Thailand and Laos. This study can therefore be a research model for fundamental industry studies to determine influential factors toward other investments, such as automobiles and textile industries (both in and out of the country). Applying equations in forecasting forms of investment is beneficial in order to determine the relationship between the forms of investment selection (a significant variable of physical and societal factors) and the competitive environment factor. The accuracy of this methodology is 80%, which is appropriate to analyze the forms of electricity production investment in the future.

Limitations of the Study

Certain Thai electricity producers declined to provide information due to their lack of information sources and limited experience in investing in a foreign country. Plus, a number of questionnaires were only partially completed. Therefore, the information was imperfect. However, the study shows that investment in the future is not only valuable for electricity producers, it also opens opportunities for additional industries to invest in the electricity production business.

The variables used in the research are limited to this study's timeline and thus have been taken from previous studies, as well as the literature. There are only a few studies relating specifically to investment analysis of electricity production businesses in Thailand; therefore, direct investment information was taken from other business research.

Recommendations

Physical and societal factors, as well as the competitive environment factor are studied in this research in order to observe the decision correlation for investing in Laos. Five minor factors from each major factor are analyzed in regards to how they influenced the decision in selecting forms of investment. The entire relevant forms of investment, such as joint venture, mixed venture, wholly own subsidiaries and portfolio investment are considered as decision variables. Binary logistic regression is subsequently applied as an equation in forecasting the selection of investment. The influential factors toward direct investment from the investment factor model in international investment of Daniels and Radebaugh [18] are used in this research process in order to create a relationship model. Additional study is suggested for further research that may take place in the future to cover other dimensions. The preceding studies and analysis only focused on potential Thai power generation business entrepreneurs who have the opportunity to invest directly in Laos, while potential private sectors in large industries, such as cement, mining, and heavy industries are not included. Therefore, further research may consider including all potential Thai entrepreneurs who have the opportunity to invest directly in electricity production business in Laos. The study may also want to cover the influential factors toward investment and selecting the forms of investment in neighbouring countries such as Myanmar, Cambodia and Vietnam. Similarity, as well as differences, in the influential factors toward forms of investment selection of each country could be compared and analyzed, in order to promote future collaboration in Indochina.

Conclusions

The most influential factor toward investment is the legal practices factor in which the government of Laos issues laws assuring foreign capitalists in repatriating capital and dividend. Moreover, the Lao government determines laws concerning tax exemption or waivers relating to project construction, infrastructure and certain activities regarding processes and industrial activities that use modern technology. Additionally, laws concerning tax exemption in importing machines, tools, spare parts and relevant vehicles (including raw materials that are unavailable or inadequate in the country) are issued. The second most important factor is culturally based. The similarity between the Lao and Thai northeastern dialect provides direct communication without having to use an interpreter. The third factor is geographical influences. Dense forests cover the northern and eastern areas with plentiful water flows throughout the year.

Referring to competitive environment factors, the most influential factors are the technology and innovation advantage and the competition differences by country. Unlike complicated coal-fired or other thermal power plants, electricity production using hydropower is simple and clean. The large amount of water resources throughout the year and the mountainous location of Laos enables the construction of dams to generate a great deal of electricity compared to Thailand, Cambodia and Vietnam. In addition, the Lao PDR also has bountiful forests and water resources throughout the year which are essential to producing electricity (a major export product to Thailand and Vietnam). The second factor is major advantage of price. The price of electricity that is generated by entrepreneurs in Laos and sold to EGAT has a lower cost due to the low fixed cost of using hydropower. The third factor is a major advantage in marketing. Power demand in Thailand, China and Vietnam will be three-times higher in the next 10 years; consequently, this presents a good opportunity for the electricity market.

Regarding investment forms, 85.2% of entrepreneurs chose joint venture and mixed venture, which indicates the entrepreneurs' attempt to avoid investment risk in the electricity production business. Suggestions that entrepreneurs made during the course of this study for the Thai government are that most would like the government to take a major role in creating investment cooperation between the two countries, as well as building a good relationship and issuing concrete laws encouraging investment. Their suggestions for the Lao government are that most entrepreneurs want the government to issue laws focusing on stability for business operation without intervention. In addition, prompt and transparent investment approval and understandable finance in repatriating capital and profit are required. Longer-term concessions are also suggested for investment assurance.

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