

**MARKET ENTRY STRATEGY FOR SUPPLYING
BIOGAS TECHNOLOGY TO VIETNAM BREWERIES**



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ABSTRACT

The purpose of this thesis is to find out business opportunities for foreign biogas technology companies in the target market-Vietnam breweries. The researcher ended up with recommendations on the most profitable market segments and appropriate market entry strategies.

Qualitative method was applied for conducting the research. The qualitative data consisted of observation and seventeen in-depth interviews with key stakeholders, information from clean technology conferences and webinars.

The results revealed that 160 out of 163 breweries in Vietnam have not utilized biogas yet. Three main reasons for not using biogas yet are heavy investment, technical concerns and unsuccessful cases in Vietnam. All respondents indicated that return on investment is the most essential criterion for decision making. Technically, biogas fluctuation, safety and harm to other equipment are prominent concerns. There are three giant beer producers in Vietnam, accounting for 95% of the market share, of which, the two state owned corporations are expanding most. Many breweries are planning to move their plant outside cities because of the decision 64/2003/QD-TTg.

The most profitable segments are breweries and subsidiaries from the two state owned corporations (segment 1), and other breweries with capacity of more than 20 million liters per year (segment 2). The researcher recommends two appropriate entry modes: turnkey project and BOT contract. Separate independent turnkey project is suitable for newly established breweries of segment 1 and segment 2. In BOT contract entry mode, the biogas company should cooperate with a local beer technology company to utilize their network. A single BOT contract is appropriate for older breweries in segment 2, while a series of BOT contracts fits those older breweries of segment 1 to take advantage of the same owner. The initial marketing access should be through the partner, Vietnam Biogas Association, Vietnam Beer - Alcohol - Beverage Association, publications of the Ministry of Industry and Trade, and online advertising.

Key words: Biogas technology, Vietnam beer market, UASB, wastewater, renewable energy, Vietnam brewery

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LIST OF ABBREVIATIONS

AIA	ASEAN Investment Area
ANZ	Australia and New Zealand Banking Group Limited
APBL	Asia Pacific Brewery Limited
ASEAN	Association of Southeast Asian Nations
Asiatech	Asia Development for Technology & Environment Company
B2B	Business-to-business
BOD	Biological Oxygen Demand
BOM	Board of Managers
BOOT	Build, Own, Operation, and Transfer
BOT	Build, Operation, Transfer
BT	Build, Transfer
BTA	Bilateral Trade Agreement
BTO	Build, Transfer and Operation
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CHP	Combined Heat and Power
CIP	Clean In Place
CO2	Carbon dioxide
COD	Chemical Oxygen Demand
DMU	Decision-making Unit
DNA	Vietnam National Steering Committee for UNFCCC and KP
DOE	Designated Operational Entities
DWRM	Department of Water Resources Management
EB	Executive Board
EGSB	Expanded Granular Sludge Bed
EIU	Economist Intelligence Unit
ERESSON	Eresson refrigeration JSC
Est.	Estimate
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GHG	Greenhouse gas
GWh	Gigawatt hour

Habeco	Hanoi Beer, Alcohol and Beverage Corporation
HDPE	High Density Polyethene
hl	A metric unit of volume or capacity equal to 100 liters
HRT	Hydraulic Retention Time
Huda	Hue Brewery Ltd
IMECO	Mechanical & Industrial Construction JSC
IP	Intellectual Property
IPO	Initial Public Offering
IZ	Industrial Zone
JV	Joint Venture
KP	Kyoto Protocol
M&A	Merger and Acquisition
MARD	Ministry of Agriculture & Rural Development
MIC	Ministry of Construction
MIGA	Multilateral Investment Guarantee Agency
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOLISA	Ministry of Labor-Invalids and Social Affairs
MONRE	Ministry of Natural Resource and Environment
MOST	Ministry of Science and Technology
MPI	Ministry of Planning and Investment
MRO	Aftermarket-Maintenance, Repair and Operations
MWh	Megawatt hour
OECD	Organization for Economic Cooperation and Development
OEM	Original Equipment Manufacturer
PDD	Project Design Document
PESTLE	Political, Economic, Social, Technological, Legal and Environmental
PIN	Project Idea Note
POLYCO	Polytechnical Mechanical, Thermal, Electrical, and Refrigeration Engineering Co., Ltd
PPP	Purchasing Power Parity
RE	Renewable Energy
ROI	Return on Investment
Sabeco	Saigon Beer, Alcohol and Beverage Corporation

Satra	Saigon Trade Corporation
SS	Suspended Solids
THP	Tan Hiep Phat Corporation
TOEs	Tons oil equivalent
U.S	The United States of America
UASB	Upload anaerobic sludge blanket
UK	The United Kingdom
UN	United Nation
UNFCCC	United Nations Framework Convention on Climate Change
USD	United Stated Dollar
VBA	Vietnam Brewery – Alcohol – Beverage Association
VBL	Vietnam Brewery Limited
VEPF	Vietnam Environmental Protection Fund
VFA	Volatile Organic Acids
VND	Vietnamese Dong
VNEEP	Vietnam Energy Efficiency and Conservation Office
VUSTA	Vietnam Union of Science and Technology Associations
WTO	World Trade Organization
WWTP	Wastewater Treatment Plant

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1 INTRODUCTION

This thesis aims to evaluate the feasibility and to analyze markets for supplying biogas technology to the Vietnam breweries. In the introduction part, the researcher will give the overview of what is biogas and why it is attractive for studying. Next, the author will explain why the beer industry in Vietnam was chosen. Finally, the determination of the research objectives and questions, the limitation and an introduction of the theoretical background and the chosen research approach will also be stated.

1.1 Background

In recent decades, under the pressure of exhausted fossil fuels and rising prices of oil and gas, many countries have been paying great attention to renewable energy. Biogas is one of the attractive sources among them.

1.1.1 Biogas overview

By definition, biogas is a gas captured through an anaerobic digestion process, in which organic matter is broken down in the absence of oxygen. Biogas composition contains 45-70 percent methane, 30-45 percent carbon dioxide, and other trace compounds such as nitrogen, hydrogen sulphide, halogenated compounds and organic silicon compounds, depending on the sources of feedstock (Rasi, 2009, p.9).

The substrate sources for biogas are very diverse. Biogas can be produced from most biomass and waste materials, namely energy crop, agricultural waste, livestock manure, municipal and industrial wastewater, residual sludge, municipal solid wastes (University of Florida, 2011).

The first utilization of biogas was dated back to 1896 when England used gas from sewage for lighting in a street in Exeter (Energy Revolution, 2011). Since then, the application of biogas has been developing widely. It can be simply applied raw as thermal energy or converted to electricity. On the other hand, biogas can be

upgraded to into natural gas, transportation fuel or production of chemicals and fuel cell (AEBIOM, 2008, p.5). The multi-useful utilization of biogas was briefed by Mr. Arthur Wellinger, President of the European Biogas Association in the foreword for German biogas industry website:

“To date, biogas is the only renewable energy source that is fully established technologically, producing heat, steam, electricity and vehicle fuel. It is, in the true sense of the word, a multitasking energy source. At the same time, it is a decentralized energy vector and an energy carrier that can be made available throughout Europe thanks to injection into and distribution via the natural gas grid”.

Wellinger, A., President of the European Biogas Association

(German Biogas Industry, 2011)

1.1.2 Attractiveness of Biogas

The first and main attractiveness of biogas is that it is a safe, clean, sustainable, and renewable energy resource. Considering the current situation of the world, this benefit of biogas becomes more important. According to the short-term energy outlook report in March 2011 of the U.S Energy Information Administration, the average cost of crude oil to refiners is estimated to be \$105 per barrel in 2011 (U.S EIA, 2011, p.1). Hence, there is an obvious push for utilizing non-conventional energy resources. People used to believe that nuclear power is the crucial renewable energy for the future. However, after the nuclear power crisis in Japan this March, this energy's safety is being in questioned. Currently, people are more likely seek for safer renewable energy such as wind, solar, bio-energy and so forth.

Not only is it a valuable renewable energy resource, but biogas is also one of the effective means to reduce greenhouse gas (GHG) and mitigation of global warming. The reason lies in the fact that methane in biogas, if being emitted into atmosphere, is 21 times stronger than CO₂ in terms of GHG (Tekes, 2011, p.32). By utilizing biogas, one can accomplish dual purposes of clean energy generation and environmental protection. Furthermore, from a country's point of view, developing countries can capitalize on the reduction of GHG by selling Certified

Emission Reductions- CERs to industrialized countries who want to meet their target of emission reduction. CERs, in which each unit is equivalent to one ton carbon dioxide, can be earned from the Clean Development Mechanism (CMD) emission reduction projects (CDM, 2011). For instance, China has average annual reduction of 288 million, accounting for 63.24 percent of the world's total expected average annual CERs from registered project (CDM, 2011a). It is estimated that China will generate about USD 1.5 billion from selling CERs in 2012 (Bloomberg, 2010).

Another point creates the biogas's attractiveness is that its production helps to reduce waste volume. Many societies are facing problem with the organic waste disposed from industry, agriculture and households (see the table below). Here, biogas production becomes an excellent solution for reducing waste volume and cost of waste disposal. In addition, at the end of the biogas production process, the by-product will be a biological fertilizer which in turn can be utilized.

Table 1-1 Organic Waste per capita per year

	High-Income Country	Middle-Income Country	Low-Income Country
Kg organic waste per capita per year	550	330	225

(Source: Waste Management World, 2011)

1.1.3 Reasons for choosing target market

The target market-Vietnam has an enormous potential for biogas production. Located in Southeast Asia, the country's tropical climate is an ideal condition for biogas production which requires high temperature. In addition, Vietnam is one of the attractive and emerging markets with the high economic growth rate. As of 2010, Vietnam's GDP stood at 6.8 percent, in which the agricultural sector contributed 20 percent (CIA, 2010). The large portion of the agriculture sector in the economy offers a huge potential for biogas production in this country. It is estimated that biogas energy potential in Vietnam is 6.4 million TOEs (tons oil equivalent) per year. In which, 60 percent of biogas comes from agricultural by-products and 30 percent from animal manures (Clean Tech Holland, 2011, p.2).

Vietnam beer industry promises a big and undefined market for biogas technology companies (hereby call biogas companies). There are only 3 breweries out of more than 350 breweries in Vietnam which utilize biogas extracted from wastewater treatment plant-WWTP despite the fact that this industry has huge potential for utilizing biogas with high concentration of Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) in discharged water (see the follows table) (Vietnam Business, 2011).

Table 1-2 Vietnam Brewery Wastewater Effluence (Capacity of over 100 million liters per year)

Parameter	Brewery Effluent Composition (Kg per Day)
SS	2.300-2.500
COD	10.000 – 11.000
BOD	6.500 – 7.000
Nitrogen	130-150
Phosphorous	110-130

(Source: Guide for cleaner production, 2008, p.21)

Another attractiveness of the target industry is that it has been growing rapidly. Recently, the Vietnam beer market has been witnessing a high annual growth rate of between 9 percent and 11 percent. The market is expected to increase 15 percent in 2011, regardless of economy situation. According to Japan's Sapporo beer producer, Vietnam is Asia's third-largest beer market after China and Japan (Vietnam Business, 2011). The Vietnam government plan to develop the Beer - Alcohol - Beverage industry into a vital economic sector in the decision for Development scheme for the Vietnam Beer - Alcohol - Beverage industry to 2015, vision to 2025. Along with the development of the market, more investment into beer production will be made, hence, the feasibility for biogas production will grow because of the increased wastewater.

In long-term, Vietnam breweries will have more motivation for utilizing biogas from WWTP as a partial energy self-sufficiency source. Shortage of energy and the increasing prices of electricity and conventional fuel are push factors for breweries to consider ways to reduce cost for energy and to ensure energy security. The Central Institute for Economic Management (CIEM) estimated that Vietnam natural resources may be exhausted in the next 20 year. If no new sources are found, Vietnam will basically run out of oil and gas resources by 2025. Also, Vietnam will have to import 80-100 million tons coal and 36 billion kWh electricity in 2020, and

119 billion kWh electricity in 2030. If forecasts of water shortage for hydropower generation become true, Vietnam has to import electricity at 2-3 times prices compared with domestic production (Vccinews, 2010).

The foreign companies that are interested in entering Vietnam biogas technology market and who have technical expertise in biogas technology will particularly find this research useful. This research aims not only to support the internationalization of biogas companies, but also to support Vietnam breweries with a partial energy self-sufficiency source and cleaner production.

1.2 Research questions, objectives and scope

The main objective of this study is to suggest the most profitable market segment and an appropriate market entry strategy for a foreign company to supply the biogas technology to breweries in Vietnam.

The researcher will give the overview of the Vietnam beer sector, its development plan to 2015 and vision to 2025 (in the master plan for the Beer - Alcohol - Beverage industry). The beer sector is cataloged under the Vietnam Beer - Alcohol - Beverage industry. The researcher chose only beer sector to analyze market entry strategy for supplying biogas technology. It is worth concentrating on the beer sector because the sector accounts for two third of the Beer - Alcohol - Beverage industry's industrial production value. Besides, it will receive the largest invested capital in compared with the other two sectors according to the Decision No. 2435/QD-BCT dated 21st May 2009 of MOIT for Development scheme for the Vietnam Beer - Alcohol - Beverage industry to 2015, vision to 2025 (MOIT, 2009). As long as there is the increase in the production capacity investment, the need for wastewater treatment will grow. Hence, the chance for biogas technology, which is one part in a WWTP, will rise. Furthermore, the strategy for market entry strategy to breweries may be applied for the rest of the Beer - Alcohol - Beverage industry because many beer companies also produce alcohol and beverage products.

The quality of the qualitative data will also be influenced by two main factors, the subjectivity of the researcher and how interviewees answer questions. Most of the data is collected through observing the market and personal interviews. Cultural

factors may affect the way interviewees answer questions. Whether they tell the truth or not is out of the researcher's control.

Due to the limitation, the main research question and sub questions will consequently be as follows:

Main research question

What could be the most profitable market segment and an appropriate approach entry strategy to supply the biogas technology to Vietnam breweries?

Sub questions:

- 1) What are current wastewater treatment systems in breweries?
- 2) What kind of regulations and laws might influence the supply of biogas technology to breweries?
- 3) Who are key stakeholders and how can they influence the decision of buying the biogas technology?
- 4) What are criteria for choosing target segment?
- 5) What is an appropriate business mode to enter the market?

1.3 Research approach

Based on the research questions, which are mainly aimed for understanding the potential customers' buying behavior, the researcher chose an inductive logic and qualitative method as an approach for this study because this method allows uncovering the deeper meaning and significance of human behavior and experience. The researcher designed in-depth interviews with semi-structured questionnaires which allow new questions to be brought up during the interview as a result of what the interviewees say.

The researcher carried out two steps of research. The first step used secondary information about literature review on biogas, biogas technology, market analysis and entry strategy tools, the Vietnam business environment and the Vietnam beer industry.

In the second step, the researcher conducted an empirical research in Vietnam during the 2011 summer. Before going to the target market, the researcher prepared questions for key stakeholders' interview and contacted them to arrange appointments. The researcher interviewed 17 representatives from different types

of stakeholders. The representatives of the potential beer companies provided information to understand the buying process of equipment, the costs and pricing expectations, and their concerns toward biogas technology. The researcher also interviewed some companies who have already utilized biogas from brewery wastewater treatment. The aim is to understand the efficiency of biogas and any drawbacks (if possible) when using this energy. Other stakeholders, like officials from MOIT, MONRE, were also interviewed for understanding the macro environment and regulations concerning biogas technology business in Vietnam. The researcher also attended Cleantech conferences and webinars for understanding more on clean technology business and contacting with Finnish Biogas Companies to understand their criteria and concerns when entering new market.

1.4 Structure of thesis

This thesis is comprised of six chapters. The first chapter provides the context for biogas, its applications and reasons for choosing the target market.

In the second chapter, a review on biogas utilization situation in the world and in Vietnam, biogas technology for brewery wastewater treatment and biogas yield will be presented. There is also theoretical framework for market analysis tools because this paper mainly focuses on suggesting the most profitable market segment and an appropriate market entry strategy for foreign companies to supply biogas technology to the Vietnam breweries. These market analysis tools will be stated in a logical sequence. The situation analysis comes first, with such tools as PESTLE and five forces, SWOT. Based on the understanding of the surrounding environment, the researcher points out which market segments there are in the market, and which criteria should be used for market segment selection. Stakeholder analysis will be employed in line with market segmentation for analyzing key stakeholders' attitudes and behaviors toward biogas technology. Alternative business models and entry modes will be introduced as a foundation for the researcher to decide which entry strategy should be used for supplying biogas technology to the Vietnam breweries.

The third chapter examines the research approach and the chosen method for analyzing and interpreting data. The fourth chapter is covered by an empirical part of the research. The main objective of the empirical study is to understand potential customers' needs, their buying behavior, value criteria, and expectations and concerns. Most information is generated from a trip to the target market - Vietnam. They will be presented in a logical order as theoretical framework.

In the fifth chapter, the researcher will recommend the most profitable segments, appropriate business models and market entry strategies for foreign companies to enter the Vietnam market. A summary on what was done in this thesis is covered in the fifth chapter.

2 LITERATURE REVIEW ON BIOGAS TECHNOLOGY FOR BREWERY WASTEWATER TREATMENT AND MARKET ANALYSIS TOOLS

In this section, world trend in utilizing biogas and Vietnam biogas production trend will be introduced first. Then come an overview of biogas technology for treating brewery wastewater and biogas yield. Finally, analysis tools using for the empirical data will be presented as well. Main tools are PESTLE, five forces, SWOT, market segmentation, target market segment selection, stakeholder analysis, and business model and entry mode.

2.1 Biogas technology

Understanding what products a company supplies is a crucial requirement before formulating any business strategy. This is especially true when the product is a high technology. This paper focuses on the technology to convert brewery wastewater into biogas, therefore, the researcher will introduce more technical information on biogas technology for wastewater treatment.

2.1.1 World trend in utilizing Biogas

All forms of biogas application are now utilized in the world. It is estimated that annual biogas potential in human and animal manure is 250 billion m³ and production will be 25 billion m³ by 2020. The market worldwide will reach over USD 50 billion by 2030 for plant builder, operator and supplier (Altprofit, 2011). Biogas production for electricity has been witnessing an upward trend worldwide. The production of biogas went up 7 percent during 2008 (Ren21, 2010, p.18). The follow table summarizes electricity production from biogas in some countries in 2008.

Table 2-1 Electricity Production from Biogas in Some Countries 2008

Country	Electricity (GWh)
OECD	30,000
Germany	10,000
The US	7,000
The UK	6,000
Italy	2,000
France	660

(Source: Ren21, 2010; Global status report; IEA Bioenergy task 37 country report 2009, 2010)

Currently, Germany is a leader in the global biogas industry. Before 2007, that position used to be occupied by the U.S (Ren21, 2010, p.18). In 2009, Germany's biogas (biogas, sewage gas and landfill gas) generation produced 15,081 GWh of electricity. This accounted for 2.5 percent of the total electricity consumption. At the same period, the total heat generation from biogas reached the figure of 9,046 GWh, equivalent to 0.63 percent of the total final energy consumption for heat (BMU, 2010, p.10-13). As of 2010, there are about 6,900 biogas plants in Germany (IEA Biogas, 2010a, p.2). German aims to replace nuclear energy by 22,000 Combined Heat and Power – CHP plants by 2025 (Greenenvironment, 2011).

When looking at the modern application of biogas, green gas or natural gas upgraded from biogas has been developed and utilized in many countries such as Sweden, Germany, Austria, Switzerland, and the Netherlands, France, the UK, Italy, Spain, Denmark, and some East European countries, Canada, the U.S, and some South American countries (IEA Biogas, 2010, p.6). Significantly, green gas had first fed into natural gas grid in Germany and Austria. In the field of vehicle fuel, some countries like Sweden, Germany and Switzerland have started feeding bio-fuel for their transportation (Lemvig Biogas, 2008, p.15).

2.1.2 Vietnam biogas production trend

The idea of utilizing biogas came to Vietnam from 1964, however, it quickly fell into obscurity with only 2,000 family-scale biogas units built until 1990. From 1991, under the strong assistances of the government and many international organizations, the biogas production market has won a significant development (Global Methane, 2011, p. 6-12). In 2006, Vietnam was awarded the first prize at

the 2006 Globe Energy Award for the development of biogas as an alternative energy source (VNGOP, 2007). Until 2010, more than 100.767 family-scale plants have built over the whole country thank to the program “Biogas Program for Animal Husbandry Sector” started in 2003 between the Netherland and the Vietnam government (Michanelyon-online, 2011). Besides, along with utilizing biogas for heating, there is a trend in producing electricity from biogas in Vietnam. As of 2008, biogas contributed 178 MWh to the total electricity generating capacity of Vietnam (Clean Tech Holland, 2011, p.2).

Regarding CDM, Vietnam ranked sixth in the world in terms of issued CER amount in 2009. Vietnam registered project activities account for 1.87% of the world’s total registered projects, equivalent to 83 million CERs. Of which, CERs from waste treatment and biogas recovery accounted for 18 percent of the Vietnam total CDM projects which worth 4,486,500 (Anh Tran Hai, 2009, p.8-14).

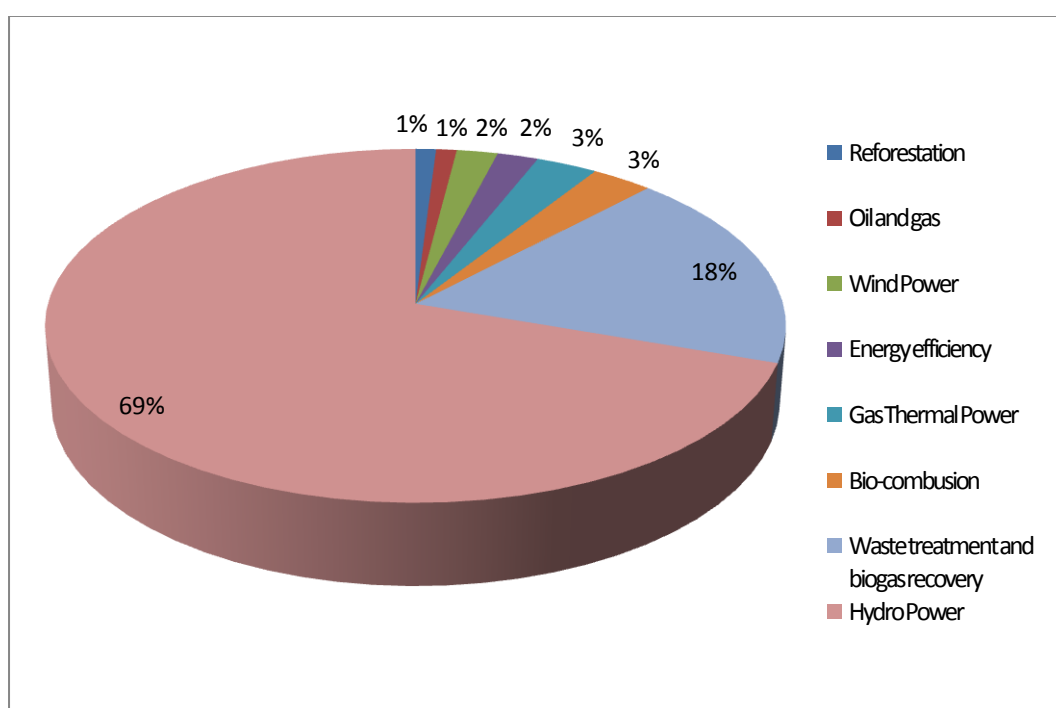


Figure 2-1 Proportion of Technologies Applicable for CDM Projects in Vietnam

(Source: Anh Tran Hai, 2009, p.14)

2.1.3 Biogas technology for brewery wastewater treatment

Brewery effluent contains a lot of organic components (express as COD) in the forms of sugars, soluble starch, ethanol, volatile fatty acids, etc. Besides, there are

also biodegradable matter in the brewery solids (expressed as TSS), namely spent grains, kieselguhr, waste yeast and ('hot') trub. The high concentration of organic component in brewery effluent is an excellent condition for biogas production. Depending on production process (raw material handling, wort preparation, fermentation, filtration, CIP-clean in place, packaging, etc), the quality and quantity of brewery effluent differs from one factory to others (Driessen & Vereijken, 2003, p.1-3).

Table 2-2 Brewery Effluent Composition

Parameter	Unit	Brewery Effluent Composition	Typical Brewery Benchmarks (per hl beer)	Typical Vietnam Brewery Composition
Flow			2-8 hl effluent	
COD	mg/l	2000-6000	0.5-3 kg COD	1700-2200
BOD	mg/l	1200-3600	0.2-2 kg BOD	900-1400
TSS	mg/l	200-1000	0.1-0.5 kg TSS	500-600
Temperature	C	18-40		
pH		4.5-12		6-8
Nitrogen	mg/l	25-80		30
Phosphorous	mg/l	10-50		22-25

(Source: Driessen & Vereijken, 2003, p.1-3, *Guide for cleaner production*, 2008, p.20)

In order to treat these organic matters, there are two biological treatment processes which can be applied, anaerobic treatment (without oxygen) and aerobic treatment (with air/oxygen supply). In anaerobic treatment, organic matter will be converted into biogas while in aerobic process it will be oxidized into carbon dioxide and water (Driessen & Vereijken, 2003).

In order to save cost and space, and reduce sludge production, anaerobic digestion and aeration digestion are integrated in beer WWTPs (Driessen & Vereijken, 2003, p. 1-3; Ha & Tin, 2005; the water treatment plant, 2011) (to understand the reasons, see more about biogas technology in appendix 1).

UASB technology was commonly applied to industrial wastewater of the breweries and beverage industry, distilleries and fermentation industry, food industry, and pulp and paper industry. Together, these four industrial sectors account for 87% of the UASB applications in the world for the last two decades (ITRI, 2003, p.3). This parallels the world trend in biogas production, as of Van Lier's investigation. The investigation illustrated that technology with sludge bed systems dominated the applied technology for world industrial wastewater

treatment for many years (see the figure below). In Vietnam, the most popular reactor used in breweries is also UASB type (Phuoc, 2007, p.324-325).

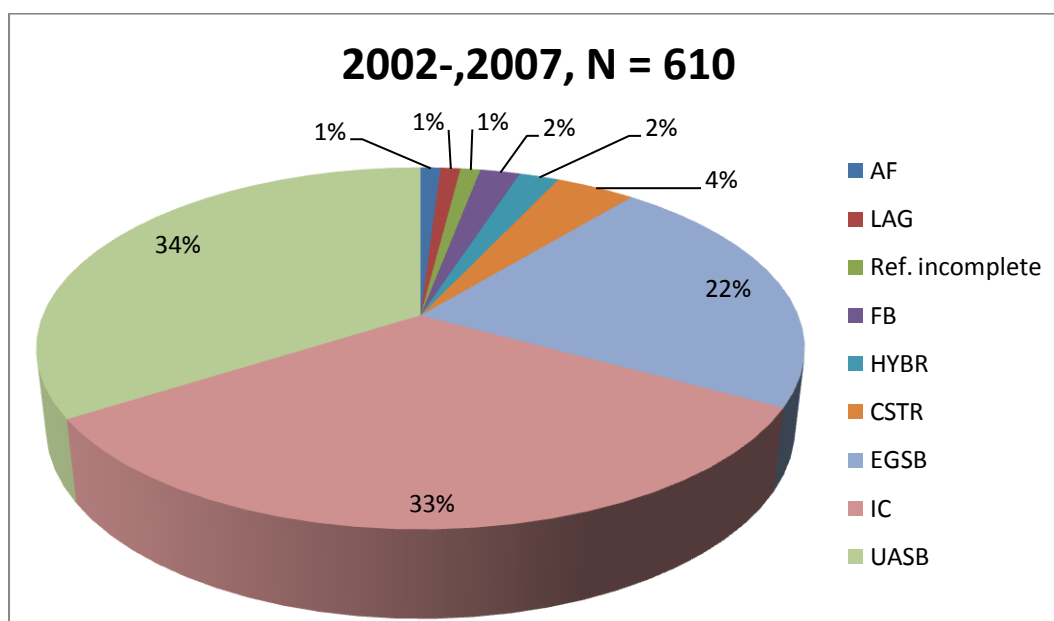


Figure 2-2 Anaerobic Technologies for Treating Industrial Wastewater in Period 2002-2007, N=610

(UASB: Upflow anaerobic sludge blanket, EGSB: Expanded granular sludge, IC: internal circulation reactor, AF: Anaerobic filter, CSTR: Continuous stirred tank reactor, Lag: Anaerobic lagoon, Hybr: Combined hybrid system, FB: Fluidized bed reactor) (Source: Van Lier, 2008, p.1139-1141).

As mentioned in the introduction, biogas generated from anaerobic digestion process contains other component like nitrogen, hydrogen sulphide, halogenated compounds and organic silicon compounds. Those compounds may affect the equipment by corrosive process. Therefore, biogas utilization system should be used to remove those compounds before using biogas for heating or electricity generation. For example, in the biogas plant designed by Zorg Biogas AG, biogas is stored at a gas holder. In the gas system, there are integrated systems for biogas drying, hydrogen sulphide removal and gas conditioning or even CO₂ removal (Zorg, 2011).

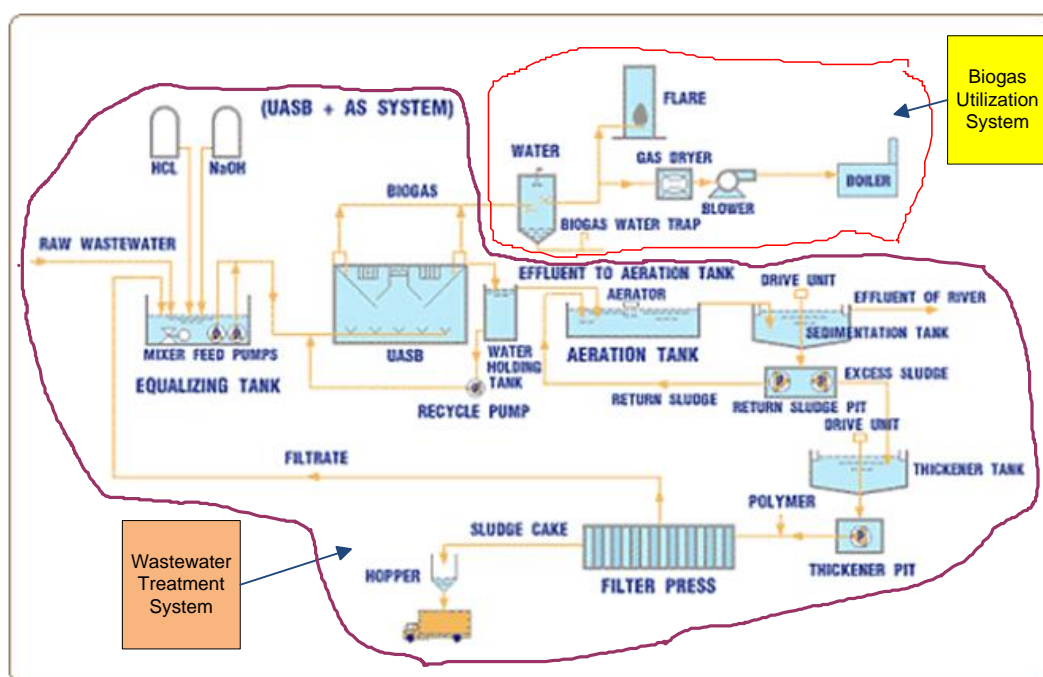


Figure 2-3 Example of Brewery Wastewater Treatment Plant

(Source: The water treatment plant, 2011)

2.1.4 Biogas yield for brewery wastewater

According to the pilot research of treating brewery wastewater, conducted by Yalçın & Neşe (2005), the COD removal efficiency is 95% and a methane yield is 0.30 m³ methane per kg COD removed. The condition is that the brewery wastewater is treated in UASB reactor in the mesophilic phase (temperature from 25-40° C), with an organic load rate of 7 kg COD/m³ per day at the 12 m/d upflow velocity with a hydraulic retention time (HRT) of 3.5 days, (Yalçın & Neşe, 2005). If, for instance, the capacity of a brewery is 100 million liters per year, the COD amounts to around 10.000 – 11.000 kg per day according to the Vietnam situation; the methane yield will be 3.000 – 3.300 m³ per day. It should be noticed that, we skip many factors affecting batch experience and real situation to calculate the rough figure for biogas yield. 100 Nm³ of biogas will discharge one ton of saturated steam into the main steam header. As a result, one day there will be 30 – 33 tons of steam (Talbot, 2011).

Director Frank Urbaniak-Hedley from Talbot & Talbot confirmed “the biogas produced from the wastewater treatment could contribute 10-15% of a brewery’s

steam requirements. A typical brewery with production of 1 mHI (one hundred million) per annum might produce waste of up to 4.5 tons of COD equivalent per day, with a potential of 2000 m³ per day of gas or 20 tones of steam” (Talbot, 2011). These statements proved the above calculation for biogas yield.

2.2 Market analysis tools

The objective of this study is to suggest the most profitable segment and an appropriate market entry strategy for foreign companies to supply biogas technology to the Vietnam breweries. Thus, apart from understanding the technical aspect of biogas technology, there is a need for knowledge on market analysis tools. In this part, the researcher will introduce the market analysis tools to be used and give the reason for applying these tools.

First of all, the researcher wants to define which kind of customer this thesis deals with. Each type of customer will have different buying behaviors and purchasing processes, which will affect the segmentation process. There are two kinds of customers, consumer customers and business customers. According to Pride & Ferrell (2010), *‘a consumer market consists of purchaser and household members who intend to consume or benefit from the purchased products and do not buy products for the main purpose of making a profit, whereas, a business market consists of individuals or groups that purchase a specific kind of product for one of three purposes: resale, direct use in producing other products, or use in general daily operations. Business markets also may be called business-to-business (B2B), industrial, or organizational markets’* (Pride & Ferrell, 2010, p.111). Here, breweries, who buy biogas technology, use it for their general daily operations of treating wastewater. Therefore, they are business customers and are a part of business market for biogas technology. In the business of biogas technology, the value that the biogas company brings for its customers is the treatment for wastewater and the green energy resource. This value is not only measured by the economic value of biogas captured, but also by the environment value of treating wastewater and reducing methane released.

In order to carry out market analysis, there is a need for B2B market research because *‘B2B market research refers to research that is undertaken entirely within*

the business world: a business – the client – wishes to research its business customers or, less commonly, its suppliers or other parties who are involved in the running of (or who contribute to) its business. Only those in business are involved. B2B research included all research where the product or service is being used in a business environment. ’ (McNeil, 2005)

The market research provides information for analyzing a company’s situation internally and externally, choosing target market segment, analyzing key stakeholder’s influences on the biogas business, and deciding which market entry strategy (business model and entry mode) should be used.

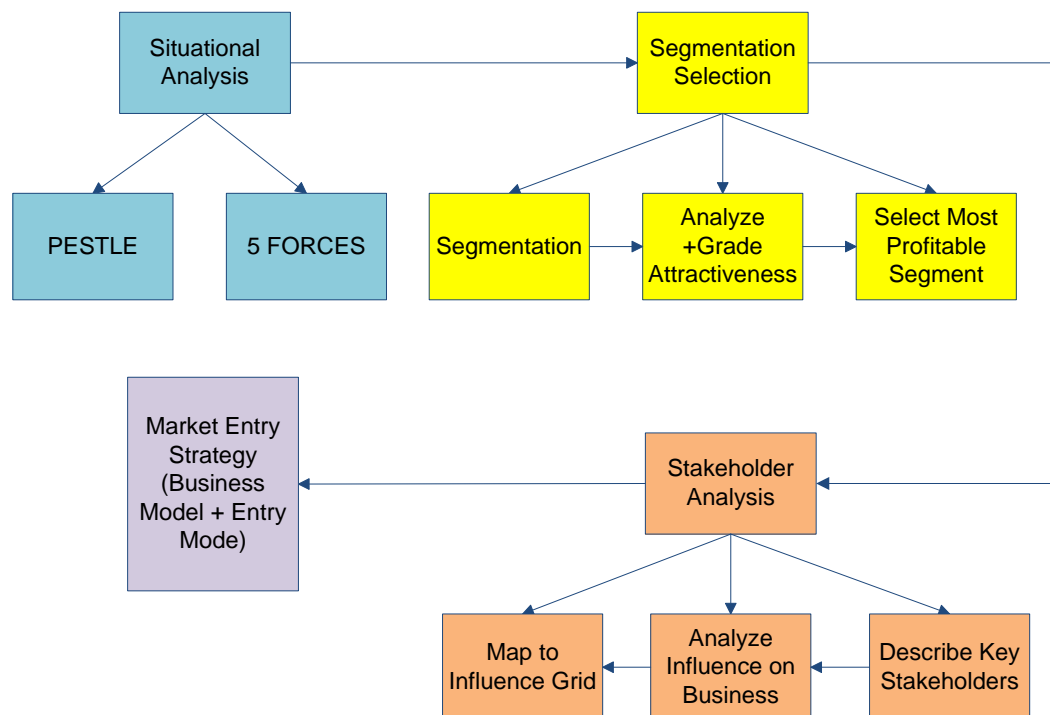


Figure 2-4 Tools for Analysis in This Thesis

2.2.1 Situational analysis

The situational analysis consists of macro, industry, and internal environmental analyses.

Macro environment analysis

The macro environment will be examined to determine influence-factors that are out of a company’s control, including economic, demographic, cultural,

technological, and/or political. The tool for analyzing macro environment is PESTLE, which concerns the following questions:

- What are the key political factors likely to affect the industry?
- What are the important economic factors?
- What cultural aspects are most important?
- What technological innovations are likely to occur?
- What current and impending legislation may affect the industry?
- What are the environmental considerations? (Marketingminefield, 2011)

On top of these questions is ‘what does this mean to the biogas technology business?’ To answer this question, the researcher will point out the inside-meaning PESTLE information to biogas technology business.

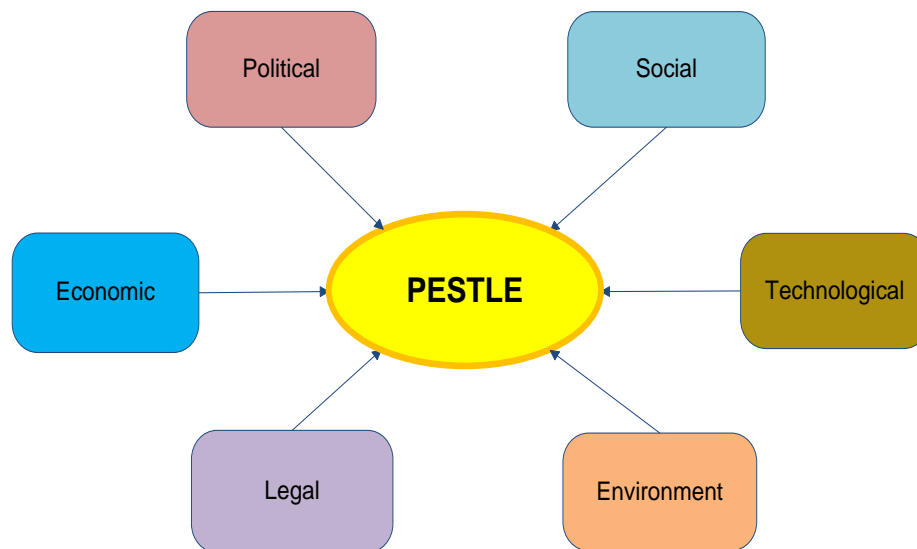


Figure 2-5 PESTLE Model

Industry environment analysis

Five forces formed by Michael E. Porter of Harvard Business School in 1979 will be used for analyzing the Vietnam biogas technology industry structure. This tool will help the researcher assess the nature of competition in the industry to answer the question ‘What market are you in?’ (AMA, 2011).

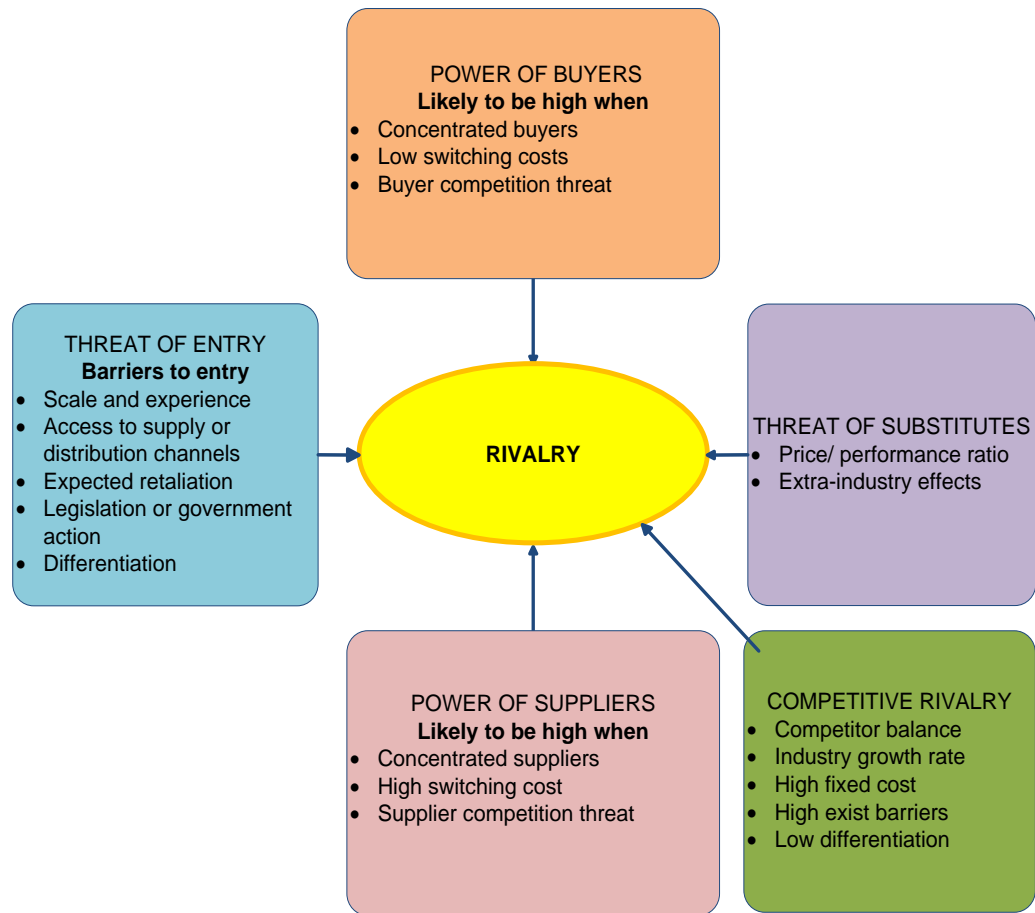


Figure 2-6 Diagram of 5 Forces

(Source: Johnson, Scholes & Whittington, 2009, p.30-35)

Internal environment analysis

The tool for examining a company is SWOT (Strength, Weakness, Opportunity and Threat), employed for analyzing a company itself. This thesis does not focus on one particular biogas company, therefore, the SWOT model will not be introduced here.

2.2.2 Market segmentation and segment selection

Most companies have limited sources to operate, so they cannot afford to serve all potential customers in the same way. Therefore, they must choose the most profitable groups of customers to target. The researcher will divide the Vietnam beer sector into segments through the market segmentation tool. First, let's have some common knowledge on what market segmentation is.

Market segmentation

Market segmentation is the process of ‘dividing a market into distinct groups of buyers with different needs, characteristics or behavior, who might require separate producer or marketing mixes’ (Kotler, et al, 1999, p.379).

‘Segmentation is a creative and iterative process, the purpose of which is to satisfy customer needs more closely and, in so doing, create competitive advantage for the company. The process of segmentation also helps identify new opportunities, for both products and marketers’ (McDonald & Dunbar, 1998, p.15).

The most widely accepted approach to segmentation is that proposed by Bonoma and Shapiro. They described the nested approach, which starts with very general, easily available information and moves to the most specific variables. The process is illustrated in the figure below.

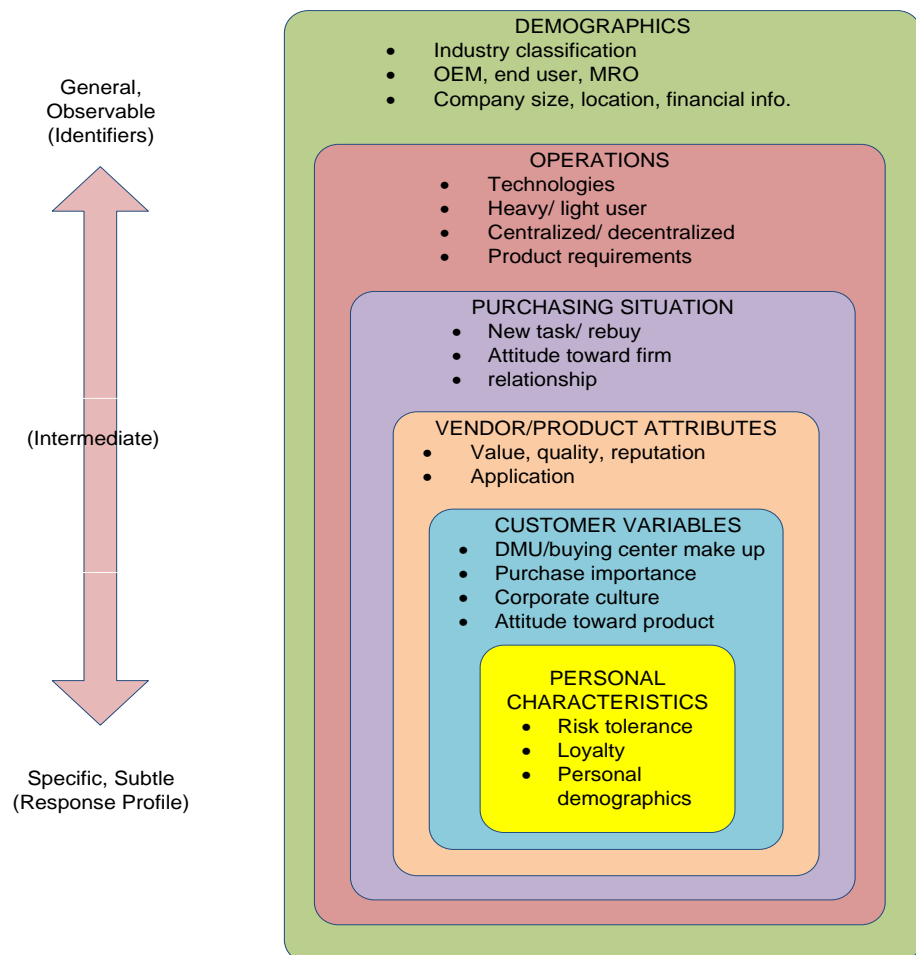


Figure 2-7 Nested Approach to Segmentation

(Source: Blythe & Zimmerman adopted from Bonoma & Shapiro, 1983)

(OEM: Original Equipment Manufacturer; MRO: Aftermarket-Maintenance, Repair and Operations)

Understanding the importance of market segmentation tool, during the secondary research, the researcher took into account how many major groups of breweries there are in the Vietnam market. The researcher notices that there are 3 large groups/segments in the Vietnam beer industry, including small, medium and large breweries.

Table 2-3 Market Segments before Empirical Research

Segment	Demographic Characteristics	Capacity
Segment 1	Large	More than 100 million liters
Segment 2	Medium	More than 20 million liters
Segment 3	Small	Less than 20 million liters

This segmentation is purely based on the demographic criterion of the target companies because the capacity or the size of the breweries will directly affect the volume of discharged wastewater and the WWTPs' capacity. There may be a need for re-segmenting after empirical research if the researcher gets more information about business customers' behaviors.

Market targeting or segment selection

After pointing out what segments there are in the market, there will be a segment selection round. '*Market targeting or segment selection is the process of evaluating each market segment's attractiveness and selecting one or more segments to enter* (Kotler, et al, 1999, p.379)'.

The researcher will employ a segment selection process offered by Freytag and Clarke (2001) to choose the best segments for biogas technology.

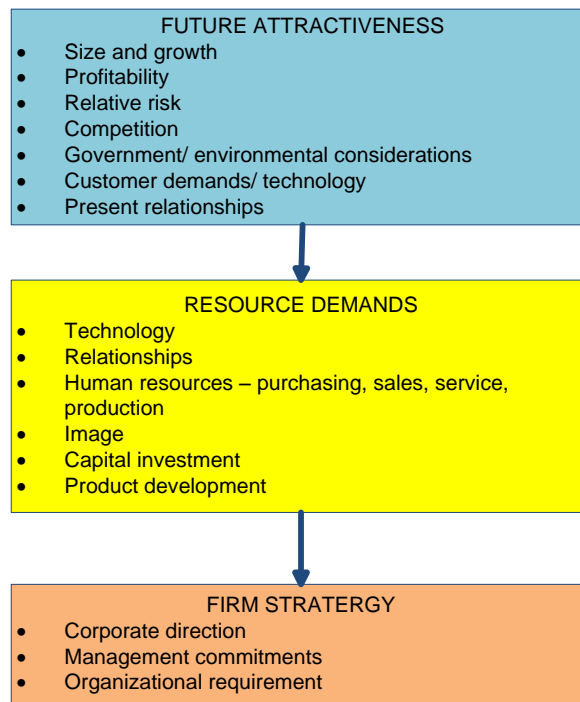


Figure 2-8 Segment Selection Process

(Source: Fregtage & Clarke, 2001)

2.2.3 Stakeholder analysis

Stakeholder analysis will be employed for understanding how each type of individuals or groups surrounding the selected segment influence biogas technology business. By definition, *‘A stakeholder can be any individual, group, or institution who has a vested interest in the natural resources of the project area and/or who potentially will be affected by project activities and have something to gain or lose if conditions change or stay the same’*. The goal of analyzing stakeholders is to develop a strategic view of the human and institutional landscape, and the relationships between the different stakeholders and the issues they care about most (Bronwen & Gawler, 2005, p.1). The researcher will identify all potential stakeholders and analyze their influences on biogas technology business, related risks and risk management. Also, the researcher will visualize stakeholders’ influences on the following grid.

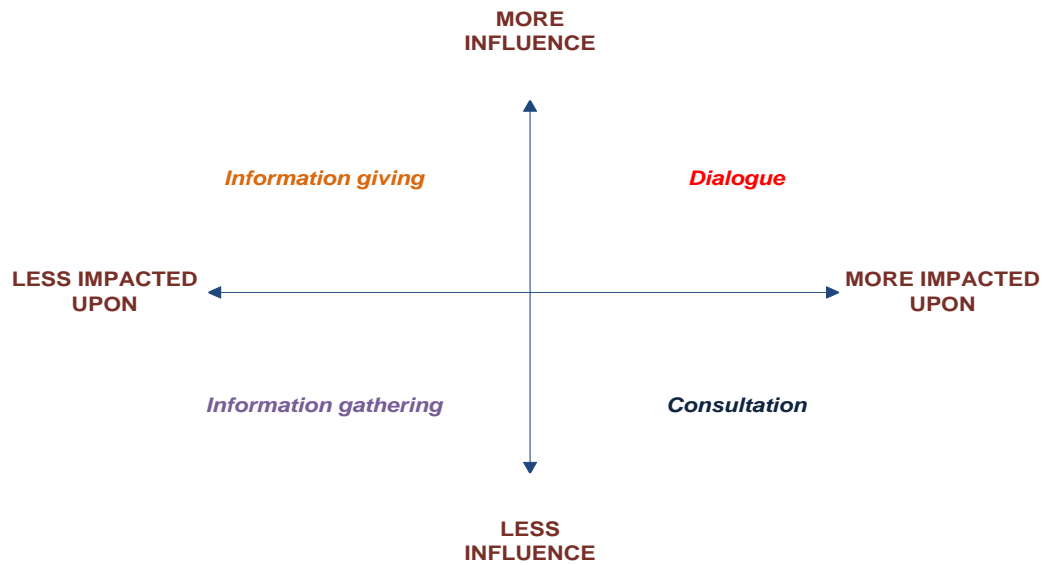


Figure 2-9 Stakeholder Influence Grid

(Source: Bronwen & Gawler, 2005, p.1)

2.2.4 Business model

After selecting the target segments, the researcher will examine which market entry strategy is appropriate for the target segment. In order to suggest market entry strategy, there is a need for understanding which business model will be appropriate and what entry mode is suitable.

Although the business model is widely used, there is no generally accepted definition of what a business model is. According to the research in 'The Business Model: Theoretical roots, recent development and future research', *'at a general level the business model has been referred to as a statement, a description, a representation, an architecture, a conceptual tool or model, a structural template, a method, a framework, a pattern, and as a set'* (Zott, Amit & Massa, 2010, p5-6). Considering the nature of biogas technology business, the business model must be one applicable for a technology firm. Chesbrough and Rosenbloom (2002) proposed a definition for a business mode innovation for technology firm as *'the heuristic logic that connects technical potential with the realization of economic value'* (Chesbrough & Rosenbloom, 2002, p. 529). They suggested a firm should

consider the many facets of its operations required to utilize the technology opportunity profitably:

The functions of a business model are to:

- Articulate the **value proposition**, that is, the value created for users by the offering based on the technology;
- Identify a **market segment**, that is, the users to whom the technology is useful and for what purpose; and specify the revenue generation mechanisms for the firm
- Define the **structure of the value chain** within the firm required to create and distribute the offering, and determining the complementary assets needed to support the firm's position in this value chain;
- Estimate the **cost structure and profit potential** of producing the offering, given the value proposition and value chain structure chosen;
- Describe the position of the firm within the **value network** linking suppliers and customers, including identification of complementors and competitors;
- Formulate the **competitive strategy** by which the innovating firm will gain and hold advantage over rivals (Chesbrough & Rosenbloom, 2002, p.7)

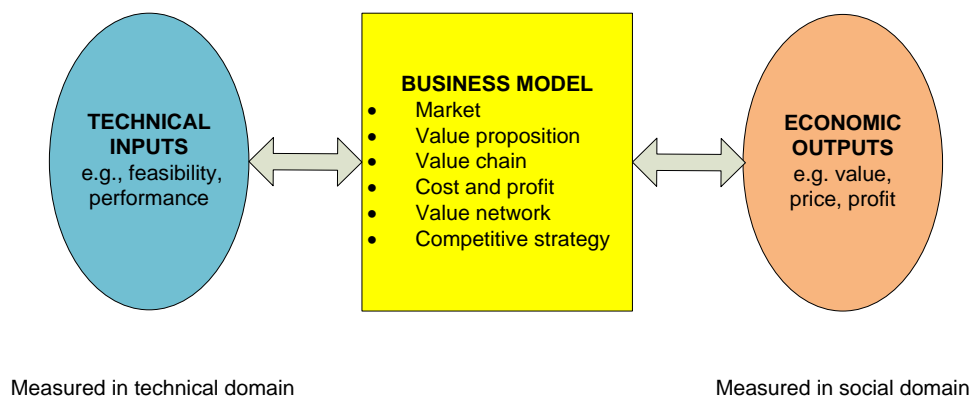


Figure 2-10 Business Model Mediates between Technical and Economic Domain

(Sources: Chesbrough & Rosenbloom, 2002, p.7)

The business model is affected by the entry mode which one company chose for entry into a foreign market. There is a broad definition on foreign market entry mode provided by Root (1997), 'an institutional arrangement that makes possible the entry of a company's products, technology, human skills, management, or other resources into a foreign country' (Root, 1997, p.5).

Foreign market entry modes fall into two major categories: equity and non-equity mode (see the below figure of choices of entry modes summarized by Krume in 2008). Entry modes differ from each other in the degree to which they involve the firm in a foreign market. For example, wholly own subsidiaries commit all sources needed to run a business in a foreign market. As a result, it may return on the highest profit but the risk is probably highest. On the other hand, in export mode, the level of committing to the target market is very low, therefore, profit may be not very high but the risk is low.

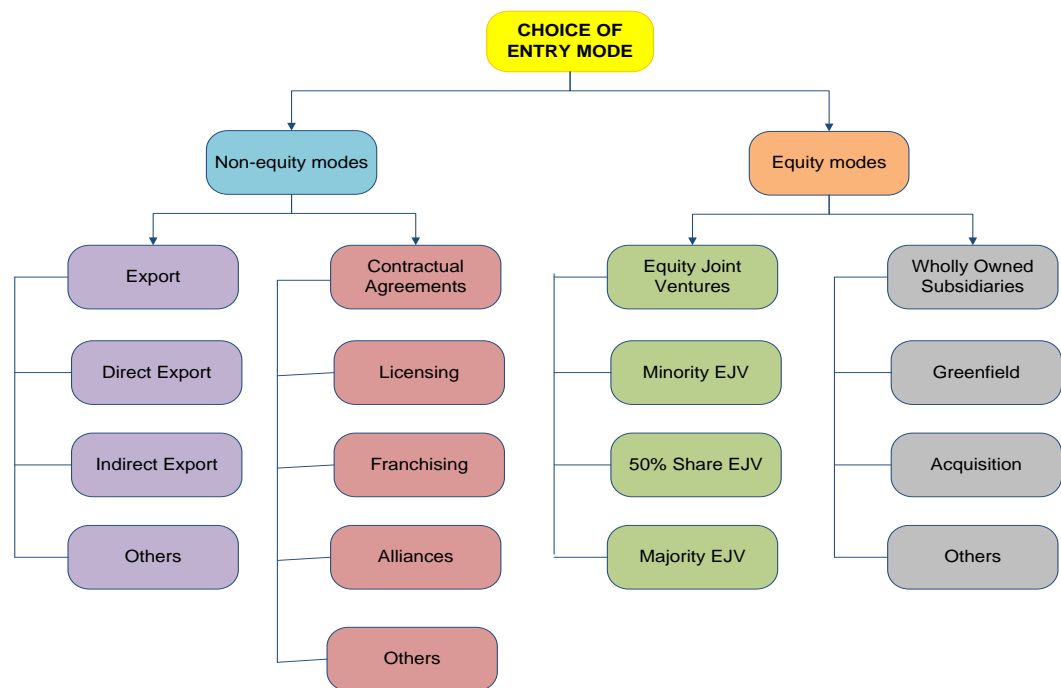


Figure 2-11 Choice of Entry Mode

(Source: Krume, 2008, p.19)

Decision on which kind of entry mode used will require a firm to decide how it can maximize profit subject to company resources, degree of risk, control requirements and non-profit objectives (Root, 1997).

3 RESEARCH APPROACH AND METHOD

This thesis's objective is to suggest the most profitable segment and an appropriate market entry strategy for foreign companies to supply biogas technology to the Vietnam beer sector. A set of research questions was designed to achieve the objectives. In order to answer the research questions, the researcher carries out empirical research in Vietnam. In this chapter, the researcher will introduce this study's research approach first, then methods for collecting, analyzing and interpreting data. There is also a discuss of a quality of the selected method.

3.1 Research approach

In order to carry out research, it is worth understanding what is the nature of research? According to Davies (2007) there are numerous definitions of research, of which the following three definitions can be used to embrace most projects.

- *Research is a process of gathering data in a strictly organized manner. It is roughly equivalent to a newspaper editor saying to a journalist, 'Go away and research it'. The end-product of the data-gathering process may vary along a continuum from simple description to reflection and interpretation. The emphasis is on structured investigation, exploration or discovery. In some contexts, theoretical constructs mean that the process is far from simple.*
- *Research is a process of testing a stated idea or assertion (the hypothesis) to see if the evidence supports it or not. This may involve putting in place experiment practices and comparing them with other controlled or current practices, but it can also employ simple data-gathering procedures.*
- *Research is a process of engaging in planned or unplanned interactions with or interventions in parts of the real world, and reporting on what happens and what they seem to mean. Field trials are one example of this approach; 'action research' is another (Davies, 2007, p.17).*

Maylor and Blackmon had a more concrete definition of research as '*A systematic process that includes defining, designing, doing and describing an investigation into a research problem*' (Maylor & Blackmon, 2005, p.7). Either way of definition, they have common feature that there is a research problem and a process to solve it.

This thesis is designed to study the Vietnam market to collect information about which ways to access breweries for providing biogas technology, what competition there is in the Vietnam biogas technology supply market and what the environment surrounding the market is. By analyzing all information, the researcher will end up with a suggestion of the most profitable segment and an appropriate market entry strategy for foreign companies to supply biogas technology to the Vietnam breweries.

To answer research questions, a researcher needs to determine which research approach-a strategy or a general logic he/she will employ. Considering the nature of different research approaches and the aim of this thesis- understanding breweries' buying behaviors- the researcher decided to use qualitative method to carry out research process. Qualitative data, according to Punch, K.F., are empirical information not in the form of numbers, most of the time this means words (Punch, 2005, p.55-57).

Another reason for choosing qualitative data was because of the way the researcher will collect data. A sample of stakeholders who are representatives of the potential market segment will be selected for interview but not a random sample of people as quantitative method uses to generalize the results.

Finally, this thesis is qualitative approach driven as it is will not test any existing market entry strategy for the Vietnam beer sector. At the end of this study, the researcher will suggest an appropriate market entry strategy through analyzing collected data. Hence, it will apply inductive method for research process.

Research process for this thesis is summarized in the following figure.

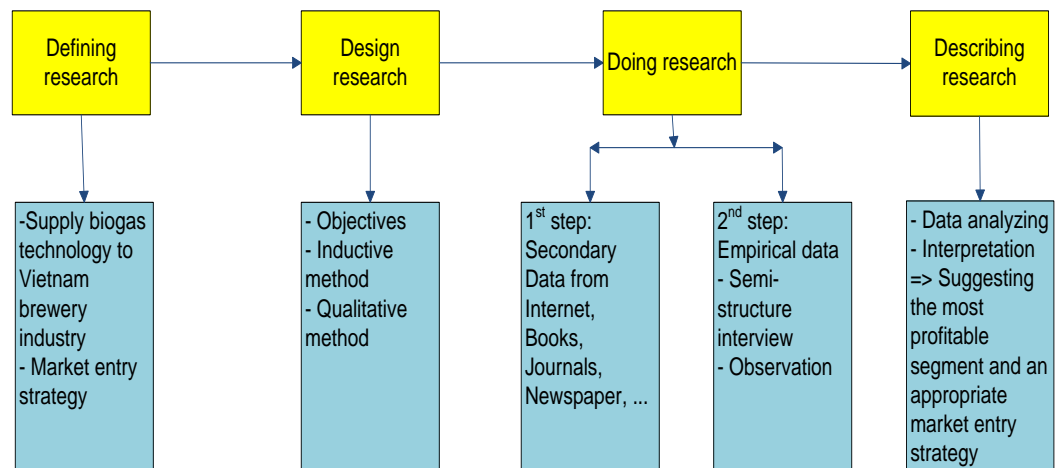


Figure 3-1 Research Process

3.2 Data collection and data quality

Data collection

The researcher will carry out two steps of research. The first step is done by studying secondary information from multi-sources: books, journals, internet and newspapers... to have background information for the following issues:

- What is biogas, its applications and trend in the world and in Vietnam
- Biogas technology for treating industrial (brewery in particular) wastewater treatment and its trend of development
- The Vietnam beer industry
- The macro environment in Vietnam concerning biogas energy

In the second step, the researcher collects data in the empirical field through multi-methods in qualitative paradigm. There are several methods for qualitative data collections mentioned by Spratt, et al (2004). As this thesis focuses on B2B market research for biogas technology, the researcher decided to apply personal interview and observation method for empirical research which will take place in Vietnam during 2011 summer. The reason is that biogas technology, which is used in WWTPs, is quite complex and costly. Hence, decision-making process will be more painstaking. Here, in-depth interview can provide the researcher good opportunity to understand respondents' behaviors.

Before going to the target market, the researcher prepared questions for key stakeholders' interview and interview plan. The type of interview is

semi-structured, which allows the researcher to prepare common topics and issues needed to cover, open ended questions for informal and unstructured discussion. The semi-structured interview is employed because it helps to control the interview time and because of time constrain on analyzing data (Maylor & Blackmon, 2005). The researcher plans to interview 10-15 representatives from the Vietnam breweries, who are possibly potential customers. Most of them are responsible for purchasing decisions or taking part in buying processes. Also, the researcher will interview two breweries who had already utilized biogas to understand how return on this investment is and what drawbacks of biogas utilization they may confront. Next, some officials from related ministries, such as MOIT, MONRE, will be interviewed for understanding policies concerning renewable energy and biogas production in Vietnam. Finally, the researcher interviews a biogas company in Finland to understand their criteria and concerns when entering new market like Vietnam in autumn 2011.

The questionnaires for interviews are attached in appendix 2 with the following main topics:

Questions for potential customers:

- What are their opinions about biogas utilization and what are their concerns?
- What are purchasing criteria if they consider utilizing biogas from wastewater treatment?
- How to access them when there is an investment in biogas?

Questions for companies who have already utilized biogas:

- What was the investment on biogas technology? How is the return on investment?
- Is there any drawback in utilizing biogas? If yes, how did they tackle these problems?

Questions for related authorities

- What are regulation and policies concerning renewable energy (biogas in particular)?
- What are incentives for renewable energy?
- What are the current situations of the breweries regarding utilizing biogas?

Question for a biogas company

- What are their criteria for entering new market?
- What are their concerns about new market?

One interview is estimated to take place from 30 to 60 minutes and is recorded if allowed. The questions and timetable is sent to respondents beforehand in order to have common understanding between both parties. The interview will be not only in form of face-to-face, but it may also be in form of phone or email messages in case the interviewee is not available.

During empirical research, some data may be jettisoned, in order to make sense of the data. This is a crucial requirement as semi-structured interview may raise a new ideas which the researcher may not pre-forecast or observation in the field may provide new information which the researcher cannot find while doing desk research. 'Wolcott, 1999 pointed out that one of the main problems in qualitative work is having too much data rather than not enough' (Cf. Woods, 2006).

Data quality

The quality of the findings in a study can be evaluated with the following criteria:

Reliability: is the finding going to be the same, if the research is repeated?

Validity: how well does the finding define the real situation without being misled or influenced by individual perspective or purpose?

Credibility: are the findings presented in a professional way and with clear evidence to support the findings?

Generalizability: how applicable are the findings in the research in a wider context? (Maylor & Blackmon, 2005)

The researcher understands that, with the chosen data collection method, the data may be more or less subjective. This is because the researcher is involved in the interview and because the observation is carried out by the researcher's personal lens.

Besides, the quality of collected data may also be affected by the practical skill of the researcher. In the interviewing process, the researcher may not be sensitive enough to dig out deeply into valuable points. Therefore, potential avenues are not explored. 'Adequacy and dependability of data, for example, will be grounded not

just in the variety of methods and sources, but in the practical skills of the researcher' (Richards, 2006).

The same problem may occur during analysis process. The researcher may not be skillful enough to utilize all the information. To minimize this probability, the researcher will rigorously apply the chosen research methodology and market analysis tool during research process.

3.3 Data analysis and interpretation method

The researcher has chosen qualitative approach with multi-methods of collecting data to carry out this research. Thus, the qualitative analysis procedure will be employed for analyzing data.

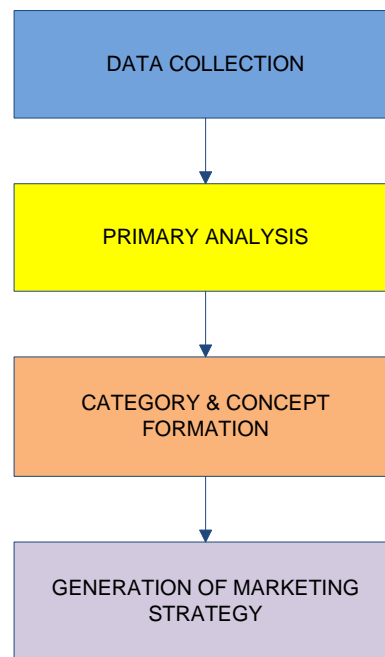


Figure 3-2 Qualitative Data Analysis Procedure

(Source: Woods, 2006)

Primary analysis

Primary analysis is carried out in parallel with data collection. In this stage, the researcher will use 'progressive focusing' method. This method means while carrying out research, if any major themes or patterns are emerging, the direction of future data collection will be driven. *'As interview transcripts are made, or field notes of observation compiled, or documents assembled, the researcher*

continuously examines the data, perhaps highlighting certain points in the text or writing comments in the margins. These might identify what seem to be important points, and note contradictions and inconsistencies, any common themes that seem to be emerging, references to related literature, comparisons and contrasts with other data and so on' (Woods, 2006).

Category and concept formation

In this stage, the researcher will put data into major categories under which the data can be subsumed. *'One usually has to have several shots at this before coming to the most appropriate arrangement, reading and re-reading notes and transcripts, and experimenting with a number of formulations. It may be helpful to summarize data in some way, tabulate them on a chart, or construct figures, or sketch diagrams. Such distillation helps one to encapsulate more of the material in a glance'* (Woods, 2006). For example, there will be a category of criteria regarding purchasing biogas technology. They will be put in form of figure (number) to analyze which criteria affect the buying decision most.

Generation of market entry strategy

After organizing data into category and concept, the researcher will use market analysis tools to examine. At the end, the researcher will suggest an appropriate market entry strategy for foreign companies to supply biogas technology to the Vietnam breweries.

4 MARKET ANALYSIS FOR SUPPLYING BIOGAS TECHNOLOGY TO VIETNAM BEER SECTOR

The researcher is going to analyze situations surrounding biogas business in Vietnam market, in terms of Vietnam macro environment, biogas technology market's environment. Then, market segmentation will be conducted based on the understanding of the Vietnam beer industry. Finally, segment selection and stakeholder analysis for selected segments will be presented.

4.1 Vietnam situational analysis

An overview of the Vietnam business environment will be presented in PESTLE analysis in the following sequence: Political, Economic, Sociological, Technological, and Environmental and Legal factors. Then, B2B biogas technology industry will be analyzed by 5 forces tools.

4.1.1 Vietnam macro environment analysis

Political

Vietnam is officially called the Socialist Republic of Vietnam, declaring independence on 2nd September 1945. It is run by a single-party, named the Communist Party. This party plays a central role on all aspects of the country from government, politics to society. Even though Vietnam remains a one-party state, a national priority focuses more on the economic development than on the ideological orthodoxy (State.gov, 2011).

One of the attractiveness's of Vietnam as a destination for foreign investors is its quite stable political system. The structure of the system has not changed much since its independence, however, it lacks the ability to take effective action (Ketels, et al, 2010). Vietnam politics is divided into 3 branches.

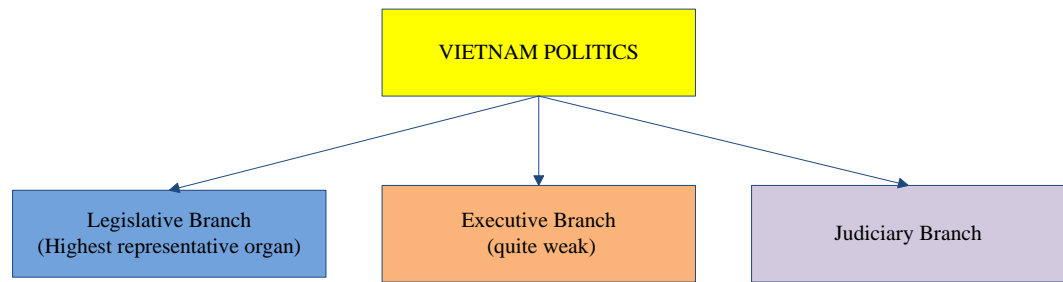


Figure 4-1 Vietnam Political System

(Source: Embassy of Vietnam, 2011)

It is worth bearing in mind that bureaucracy and corruption in Vietnam are still an issue even though corruption levels show a few signs of falling. Vietnam stood at the position of 116 out of 178 countries in the survey of ‘The 2010 Corruption Perceptions’ conducted by the Transparency International Organization. Vietnam still remains at the same score of 2.7 (0 is highly corrupt while 10 is completely transparent) as of 2009 (Transparency, 2009 - 2010).

Economic

Vietnam has been doing great efforts toward opening the economy to globalization since the revolution in 1986. It has been actively engaged in global and regional institutions. Remarkably, it gained membership to the World Trade Organization-WTO in January 2007 (UN Children’s Fund, 2011). Vietnam has become an attractive destination for many foreign investors. Let’s examine Vietnam’s economic performances in details.

Vietnam’s **real GDP growth rate** has showed an impressive and quite steady growth in recent decades. Going through the world financial crisis in 2008, the Vietnam economy remains growing at the rate of 6.2%, following by 5.3% in 2009. Recently, even though the world economy is facing turndown, the Vietnam economy growth rate is still expected to reach the rate at 6% according to EIU estimation released in August 2011 (Kinhtevadubao, 2011). This conveys the economy’s good prospect, which in turn will have positive influences on its industries in generally, and Beer - Alcohol - Beverage industry particularly.

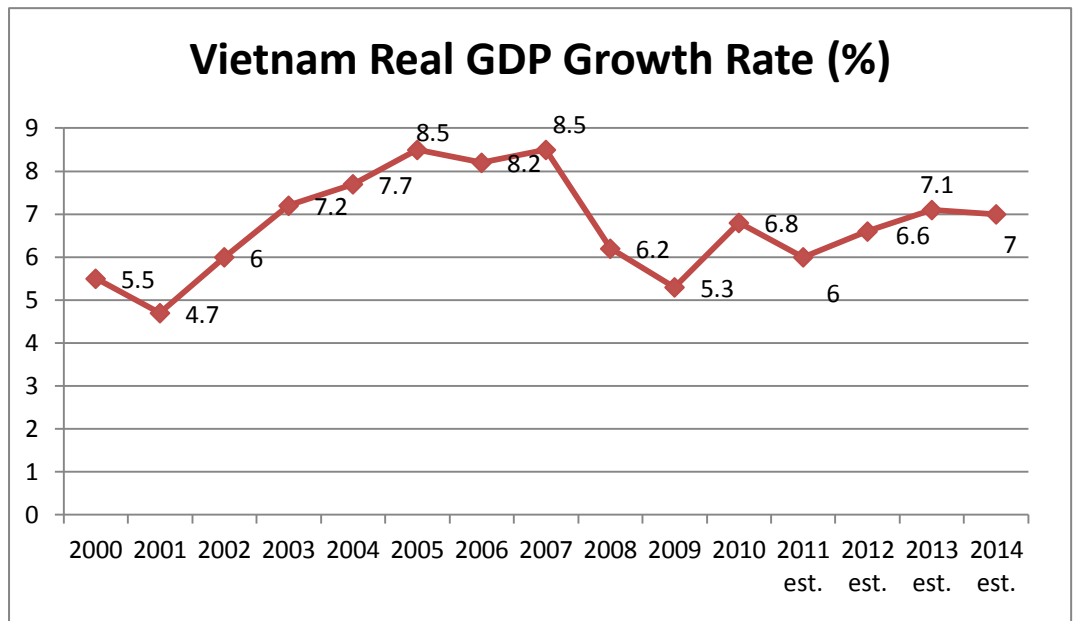


Figure 4-2 Vietnam Real GDP Growth Rate 2000-2011

(Source: Indexmundi, 2011; Kinhthedubao, 2011)

GDP per capita has grown steadily with a slow pace over the last two decades. Vietnam has achieved a middle-income country status in 2010. The rise in income implies that industries like the Beer - Alcohol - Beverage industry has probably bright prospect because Vietnamese have more money to spend on ‘luxuries’ than they used to be in the past when money for food was an issue.

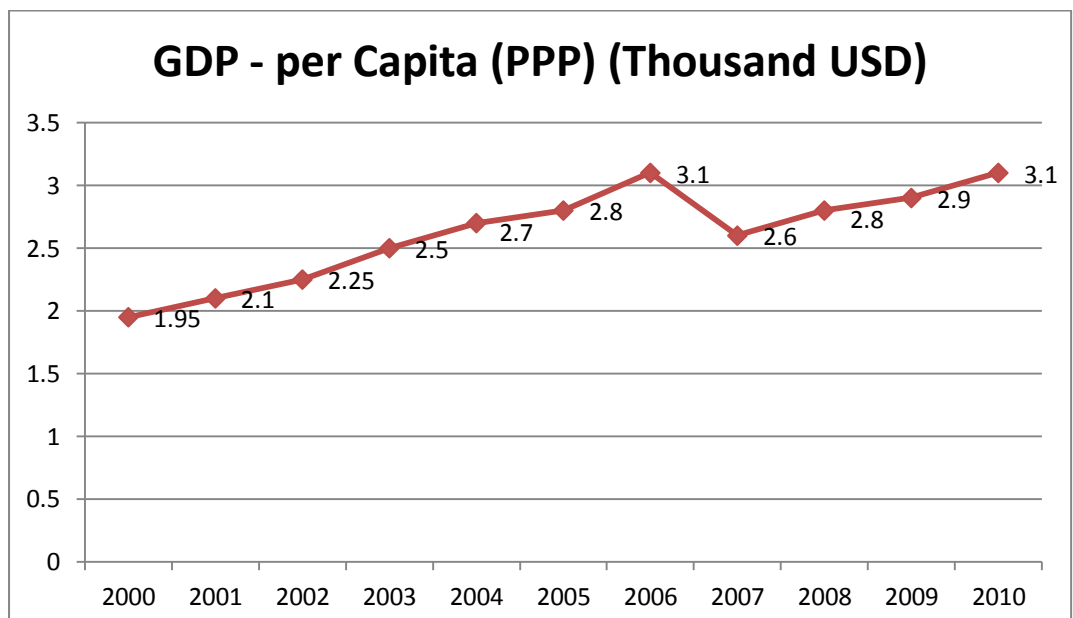


Figure 4-3 Vietnam GDP per Capita 2000-2010

(Source: Indexmundi, 2011a)

Vietnam **economic structure** remains as an export-oriented economy. Vietnam's exports are mainly low value added products, except for exports of natural resources and agricultural products. Vietnam's main agricultural products include rice, pepper, jute, rubber, sugarcane, coffee, tea, groundnut and tobacco. Remarkably, it has been the second largest exporter of rice worldwide for several years (Ausaid.gov, 2011; Indembassy, 2011).

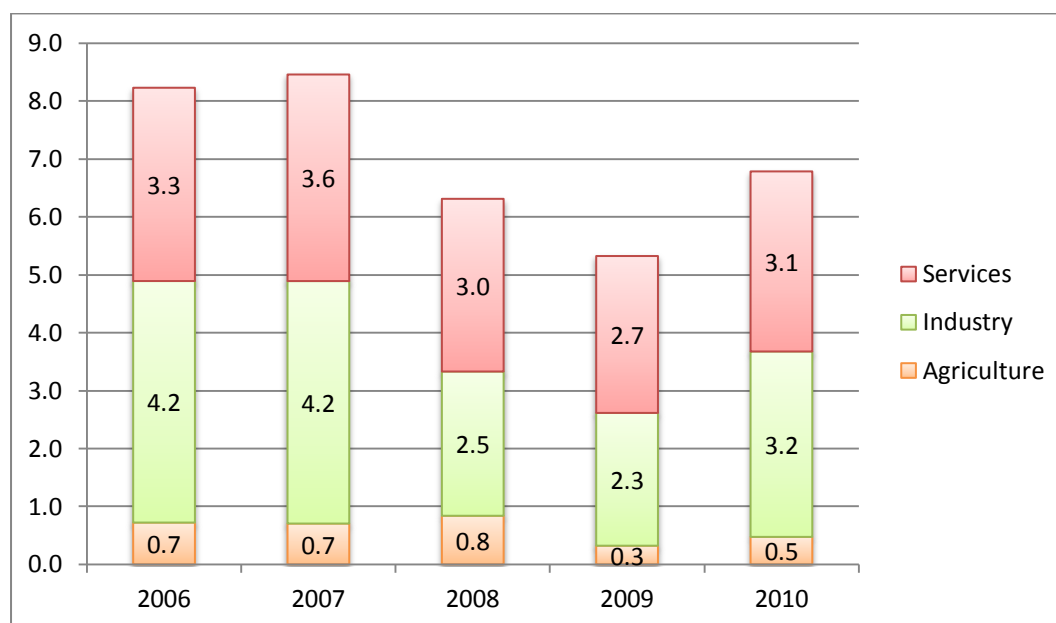


Figure 4-4 Percentage Contribution to GDP of Each Economic Sector

(Source: ADB, 2011, 215)

Macroeconomic monetary environment's stability is measured by four main issues: inflation, exchange rate management, trade deficit, budget deficit. *'Overall, the Vietnam macroeconomic policy is a considerable weakness. Fiscal policy is hampered by the high structural deficits in the government sector. While the support of foreign donors is welcomed, this is no substitute for solid government finances. The persistent pressure on the exchange rate, high inflation, and the financial market overheating before the onslaught of the global financial crisis are indications of the problematic state of monetary policy'* (Ketels, et al, 2010, p.14). This somehow explains why Vietnam credit rating had been lowered by Standard & Poor's Ratings Services on 19th August 2011 as follows: Local currency long-term rating to 'BB-' from 'BB'; Foreign currency sovereign credit rating at 'BB-/B', the short-term issuer credit rating at 'B' (Reuters, 2011a).

First, Vietnam has been witnessing a significant high **inflation** rate, one of the highest inflation rates in Asia (Ketels, et al, 2010, p.70). *'High inflation remains the*

biggest challenge to the economy in the next 12 months' said Hai Pham, an analyst at ANZ (Reuters,, 2011). This is a crucial problem since it affects a firm in many ways such as cost for operation and real profit.

To fight inflation, the Vietnam government has raised **interest rate** many times. The Economist Intelligence Unit- EIU estimated that the 2011 loan interest rate is 18.3% per year (Kinhtevadubao, 2011). However, the real interest rate is believed to be much higher. The state's monetary tighten policy makes smaller private sector companies continue to have difficulties in getting access to capital. In addition, equity markets suffer from high volatility and a lack of transparency (Ketels, et al, 2010, p.15). The high inflation rate and interest rate will probably affect potential breweries' willingness in investing in biogas technology in the sense that they may have to undergo painstaking process in evaluating the cost versus the return on investment.

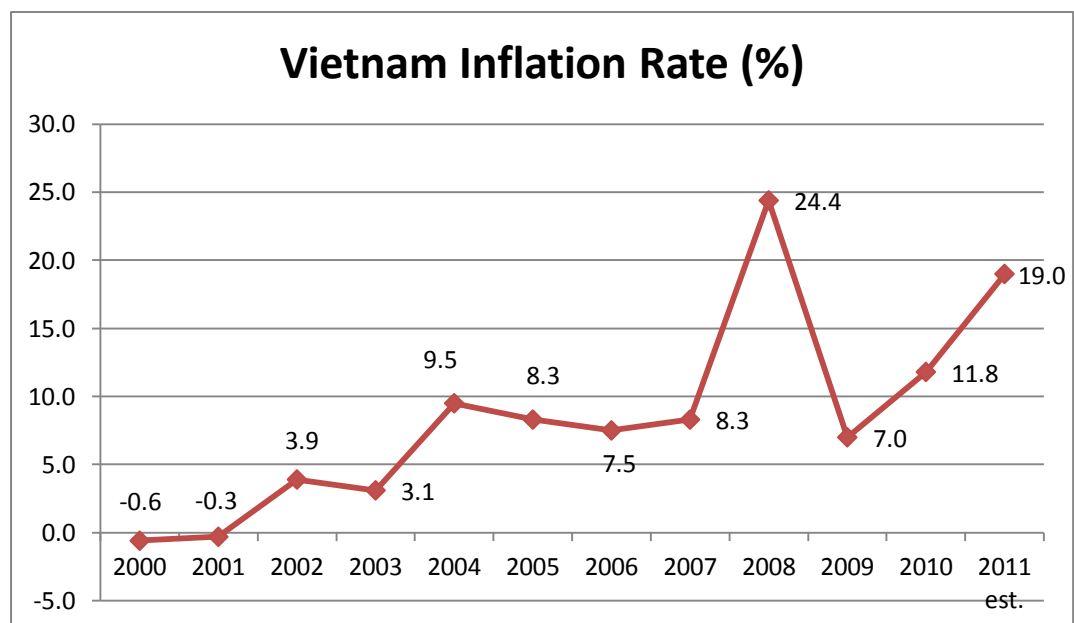


Figure 4-5 Vietnam Inflation Rate 2000-2010

(Source: Indexmundi, 2011b; Kinhtevadubao, 2011)

Second, the Vietnam government has been employed an **exchange rate** policy oriented towards stable nominal rates. As a result, Vietnam had to repeatedly devalue its currency many times due to increases in real exchange rates. *"The biggest risk to the economy at this stage is a crisis of confidence in policymaking that impacts foreign exchange rates and leads to a significant deterioration in the asset quality of the banking system,"* said Johanna Dee Chua, chief Asia-Pacific

economist at Citi (Reuters, 2011). As of 21st September 2011, the USD/VND exchange rate was 20,830 for bid/sell rate and 20.834 for ask/buy rate (Vietcombank, 2011). The weak VND will affect a foreign company at least in two ways: its products are relatively higher in price and its profit is relatively lower in term of the company's own currencies.

Third, Vietnam is facing an increasing **deficit in its trade balance**. As of 2010, Vietnam's current account balance was USD -12.22 billion, and it is estimated to continue in negative figures in the next 5 years by EIU (Kinhtevadubao, 2011). This fact puts pressure on foreign currencies reserves, which poses difficulties for companies who need foreign currencies to pay for their imports as well as foreign investors who want to withdraw their money out of Vietnam.

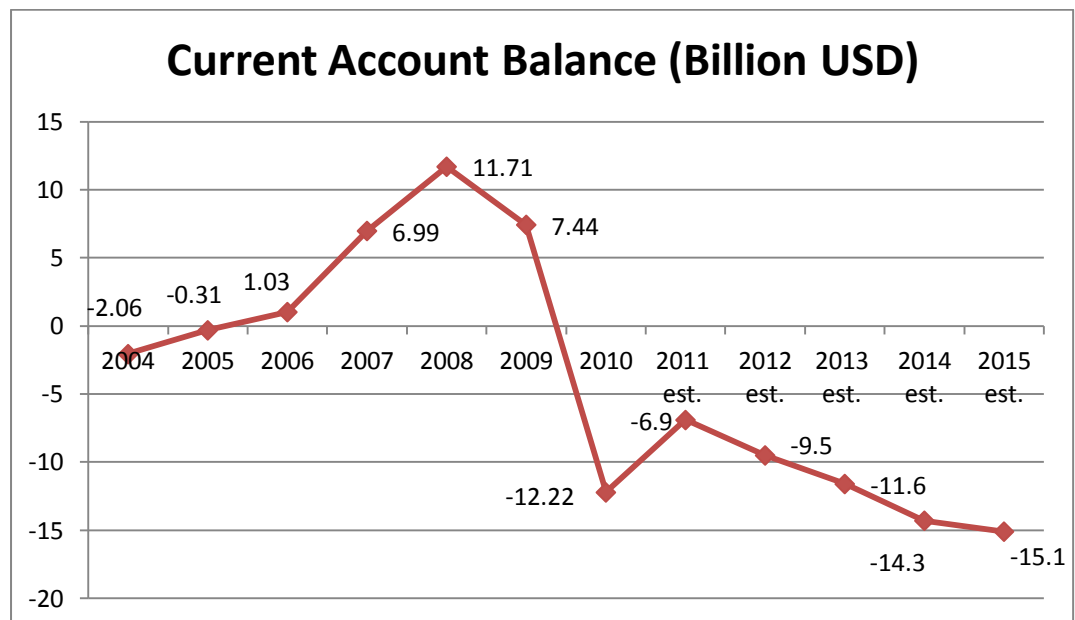


Figure 4-6 Vietnam Current Account Balance 2004-2010

(Source: Indexmundi, 2011c, Kinhtevadubao, 2011)

Fourth, Vietnam is also tackling high **budget deficit**, reaching 56.7% of GDP in 2010. *'The external deficit has to be covered through capital inflows which come from foreign investment, remittances, development aid, or through other sources. The increasing concerns about Vietnam's ability to finance its external deficit, fuelled by rising external debt and a significant drop in foreign reserves, create uncertainty about the country's future economic outlook'* (Ketels, et al, 2010, 105).

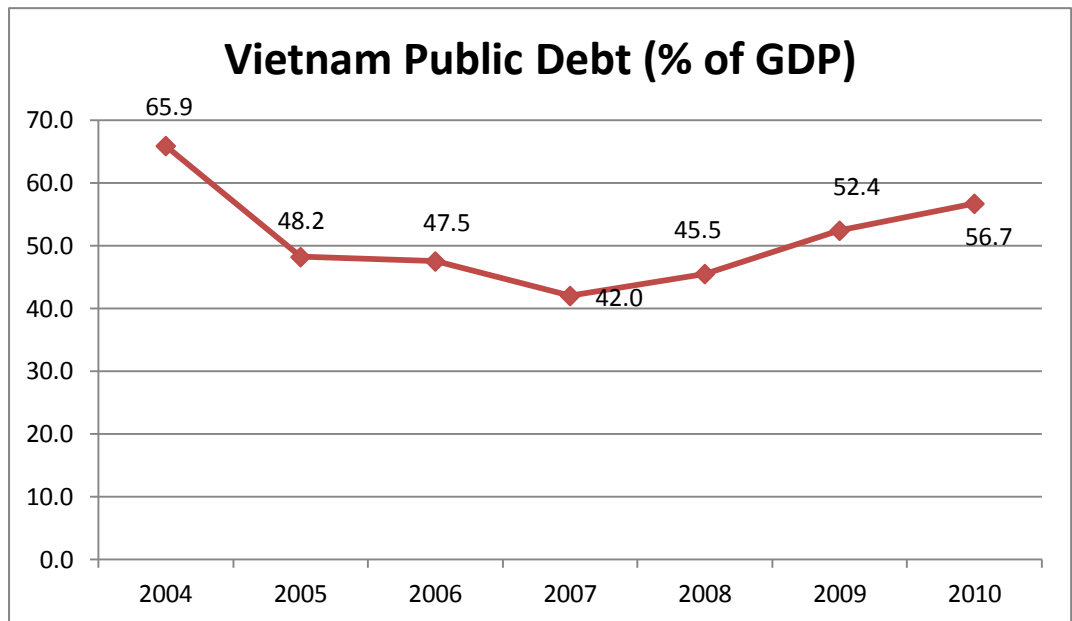


Figure 4-7 Vietnam Public Debt 2004-2010

(Source: Indexmundi, 2011d)

Socio-Cultural

Vietnam is the 13th most populous country in the world with population of 90,549,390 at July 2011 est. and the growth rate of 1.007%. This provides an abundant and cheap labor source for the economy with 46.2% of population in the working age in 2010 (CIA, 2011). In addition, basic education and health care are available across the country, providing an important basic prerequisite for economic growth. The large size of population is a great market for such products as beer drinks which is popular in tropical countries. Furthermore, young people tend to drink more beer than other groups. These promise the bright future for beer industry.

One risk in the Vietnam labor work force is that the productivity is very low. There is relatively high growth rate in overall labor productivity, however, the absolute level remains much lower compared to most countries in the region. Vietnamese labor's skill levels remain modest because the education system is not keeping pace with the rising demands of the Vietnamese economy (Ketels, et al, 2010, p.14).

Technological

One of the main problems Vietnam is facing is a poor infrastructure system. Despite the fact that millions USD has been poured into upgrading the infrastructure every year, it did not meet the need of the country's growth. Infrastructure bottlenecks are

locally concentrated in high-growth regions, especially the Ho Chi Minh City, Hanoi.

A plus point for Vietnam is that it has a good communication infrastructure. As of 2009, there were 17.427 million landline telephones, 98.224 million mobile cellular and 23.4 million people using internet. The report 'Google: Business Development Strategy in Vietnam' indicated 81% spending time on internet from 5-6 hours per day, whereas, the figure for TV is 57% with 2.7 hours, newspapers and magazines 36% with 1.5 hours, and radio 12% with 1.4 hours among 1,094 Vietnamese respondents. In addition, '80% of customers look for technical features on the internet before making buying decisions' Mr. Salvador Head of Business Development – South East Asia Google Inc. said (Vnexpress, 2011). This is valuable information for company who are considering channels for promotion.

Regarding Vietnam biogas technology status, small scale biogas technology in agriculture has been stable and complete in Vietnam, with about 2 million units of biogas digesters nationwide. Biogas is used for cooking and lighting with a high efficiency. Medium-scale biogas digesters for agriculture with the volume up to 300 m³ are mainly built with steel and concrete. The gas is utilized not only for cooking and lighting, but also for generating electricity. Large-scale biogas digesters for large scale farms are of covered anaerobic lagoon, using HDPE (high density polyethylene) sheet with the volume up to 100,000 m³. The biogas technology in urban landfills and in industrial wastewater treatment is not really developed (Tu, 2011).

Biogas digester types in Vietnam are floating gas holder unit, biogas with nylon bag, fixed dome biogas plant (RDAC type), Can Tho University type TG-BP, energy institute type LN.6 (Global methane, 2011).

Dr. Sc Bui Van Ga and his colleagues at the University of Da Nang have successfully manufactured GATEC accessories for diesel engines to use biogas instead of petrol/oil. These kind of small – sized power generators were supplied to several dozens of farms and agricultural production facilities in provinces (Tieckiemnangluong, 2010). However, the ability of private organizations in the biogas field is limited (finance, technology know-how, after sales services) (Tu, 2011).

Legal

The Vietnam government has endeavored to create a favorable environment for the development of a multi-sector market economy as well as a more open and stable investment environment by making efforts to improve its legal system. Especially, in order to prepare for joining WTO in 2007, many laws and regulation were enacted.

Vietnam has signed and acceded to various bilateral and multilateral arrangements on investment. Where the international agreements contain provisions inconsistent with the provisions of the legal instruments on FDI, the provisions of the international agreements shall be applied. Bilateral and multilateral arrangements are agreements for the promotion and protection of investment with 46 countries and territories, the Framework Agreement on the ASEAN Investment Area (AIA), the BTA with the US containing an investment charter, the Convention on the Establishment of the Multilateral Investment Guarantee Agency (MIGA), and other related international investment agreements (Lydall, 2008, p.20-21).

However, the cumbersomeness of the Vietnam's overall administrative environment is undermining its attractiveness to foreign investors despite improvement in recent years. Several major reform initiatives, such as Project 30, are being carried out to improve the administrative practices (Ketels, et al, 2010, p.15).

The main legislation governing **Foreign Direct Investment-FDI activities** are the Law on Investment (2005) and the Law on Enterprises (2005) in Vietnam. Recently, there is a controversy on dismissing the Law on Investment because after six years of implementation, this law shows many shortcomings (Thesaigontimes, 2011). It is still an ongoing issue in Vietnam.

The plus point for Vietnam legal system is that the government guarantees fair treatment for investors in **Law on Investment 2005**. Capital and other legal assets of investor will not be expropriated or confiscated by law or administrative measures. Businesses with foreign-invested capital will not be nationalized. Foreign investors are allowed to remit abroad investment capital and profits, loan principal and interest, and other legal proceeds and assets. Foreign investors can enjoy all form of enterprises under the **Law on Enterprises 2005**.

Law on investment also propose incentives provided for investments on many sectors including the manufacture of bio-technology and investments in regions with difficult or especially difficult social-economic condition, industrial zones, exporting zones, high-tech zones and economic zones.

The government of Vietnam respects intellectual and industrial property rights and the interests of foreign investor relating to technology transfers into Vietnam. This is fully represented on the **Law on Technology Transfer (2006)** and the **Law on Intellectual Property (2005)**. However, the implementation of these two laws in Vietnam is an issue. For example, although inventions and utility solutions are central to technology transfer transactions, there have been only few technology sales and purchases associated with patents. Among all protected titles, trademark protection in Vietnam has accounted for the highest proportion and also the fastest increase in number for the past 10 years (Ketels, et al, 2010, p.56).

Besides, Vietnam has a quite comprehensive **framework for CDM projects**. There is procedure for CDM projects registration in the appendix 3. The common practice regarding CDM project in Vietnam is that the investors will corporate with a CDM consultant company who knows the procedure well. The CDM consultant company has to do the documents, sell CERs with the best price, and supervise the project during register CERs time. In turn, the CDM consultant firm can have some percent of the total the revenue coming from selling CERs (normally from 3-5%).

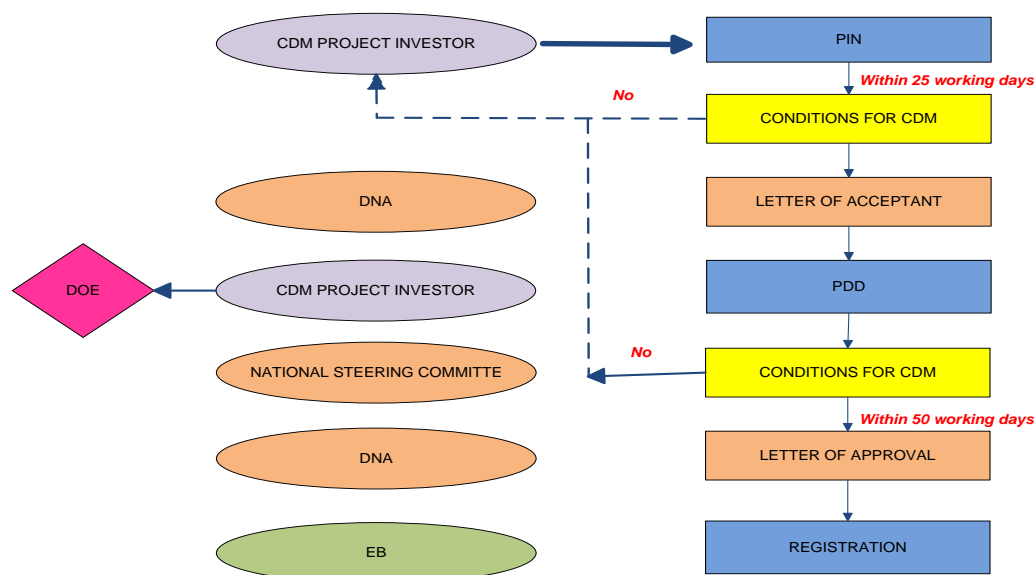


Figure 4-8 CDM Project Registration Process in Vietnam

(Source: Anh Tran Hai, 2009, p.40)

However, doing business in Vietnam is not as easy as what is regulated in papers. Vietnam is ranking at 78 out of 183 countries in terms of **ease of doing business** (see the below table for details). It has made a great progress in activities such as starting a business, dealing with construction permits, and getting credit. However, foreign investors still consider Vietnam as one of the countries where investors are not protected most at the rank of 173/183 (World Bank, 2011, p.47). The risk management plan for doing business in Vietnam is a crucial must here.

If there is dispute between parties in a contract, they can choose an arbitration to settle instead of a court. The location of dispute settlement can be inside or outside the territory of Vietnam, according to the Commercial Arbitration Act 2010 No. 54/2010/QH12.

Table 4-1 Vietnam's Ranking in Ease of Doing Business

Starting a business (rank)	100	Dealing with construction permits (rank)	62
Procedures (number)	9	Procedures (number)	13
Time (days)	44	Time (days)	194
Cost (% of income per capita)	12.1	Cost (% of income per capita)	128.4
Minimum capital (% on income per capita)	0.0		
		Getting credit (rank)	15
Registering property (rank)	43	Strength of legal rights index (0-10)	8
Procedures (number)	4	Depth of credit information index (0-6)	5
Time (days)	57	Public registry coverage (% of adults)	26.4
Cost (% of income per capita)	0.6	Private bureau coverage (% of adults)	0.0
Protecting investors (rank)	173	Paying taxes (rank)	124
Extent of disclosure index (0-10)	6	Procedures (number)	32
Extent of director liability index (0-10)	0	Time (days)	941
Ease of shareholder suits index (0-10)	2	Cost (% of income per capita)	33.1
Strength of investor protection index (0-10)	2.7		
		Enforcing contracts (rank)	31
Trading across borders (rank)	63	Procedures (number)	34
Documents to exports (number)	6	Time (days)	295
Time to export (day)	22	Cost (% of income per capita)	285
Cost to export (USD per container)	555		
Documents to import (number)	8	Closing a business (rank)	124
Time to import (day)	21	Time (days)	5
Cost to import (USD per container)	645	Cost (% of estate)	15
		Recovery rate (cents on the dollar)	18.6

(Source: World Bank, 2011, 204)

Environmental

Vietnam shares borders with China, Lao and Cambodia, with the total area of 331,210 square kilometer, 3,444 km coastline (excludes islands). It is divided into

59 provinces, with 5 municipalities (Can Tho, Haiphong, Da Nang, Hanoi, Ho Chi Minh). It has a tropical climate in south, and monsoonal in north with hot, rainy season (CIA, 2011). This weather is an ideal condition for biogas production which requires high temperature.

This thesis deals with biogas production from brewery wastewater, therefore, water quality is very important information. According to the Vietnam development report 2011: Natural Resources Management, water pollution and degradation in Vietnam is caused by rapid urbanization and industrialization with untreated domestic, hospital, and industrial wastewater, poor urban drainage, and expansion in tourism, and the use of rivers, lakes, and ponds as dumping grounds for most solid waste. Much of untreated wastewater is illegal (Joint department partner, 2010). In Hanoi, there are about 300,000 – 400,000 m³ untreated or preliminary-treated wastewater discharged every day. On the other hand, the industrial wastewater in Ho Chi Minh city discharged every day is 400,000 m³ (Dwrm, 2011). Considering the biogas technology business, this fact indeed is an opportunity. The government will strictly control water pollution, hence, companies have to invest in their WWTPs.

In order to tackle the problem, in 2003, the Prime Minister promulgated the Decision No. 64/2003/QD-TTg about ‘Scheme for stringently handling establishments which cause serious environmental pollution’ dated 22nd April 2003. The scheme is divided into two periods: from 2003 to 2007 and from 2008 to 2012. In the first period: 439 seriously polluting establishments were handled. In the second period 3,856 and other new establishments will be handled. The Decision also stipulated that these establishments can receive financial support from the Vietnam Environment Protection Fund-VEPF (Details about the breweries which were in this list in the appendix 4). However, the decision has not been fulfilled yet: only 338 out of 439 establishments have solved their pollution problems. There are additional 3,856 establishments which are causing serious environmental pollution. The main difficulty is the financial shortage. The MONRE proposed the Prime Minister to direct ministries, branches, and local authorities to stringently handle these 101/439 establishments before 31st December 2011 (Cpv.org, 2011). The new re-located companies have to invest in their

WWTP. Standing on a biogas company's point of view, this decision creates opportunities for supplying products.

In addition, global warming and climate change has forced the Vietnam government to pay more attention to the environment. World Bank estimated that Vietnam is one of top ten countries/territories worldwide are impacted in terms of population. In Vietnam, an estimated 10.8 percent of the nation's population would be displaced with even a 1 meter sea level rise – and disproportionately high impacts in the Mekong and Red River deltas (World Bank, 2007). Acknowledging the impact, Vietnamese Government was an early participant in and signature to the United Nations Framework Convention on Climate Change and the Kyoto Protocol and proposed many policies and regulations to prevent this. One of which is to reduce GHG emission. The government has many policies to support clean energy such as wind, solar, bio-energy, and hydropower.

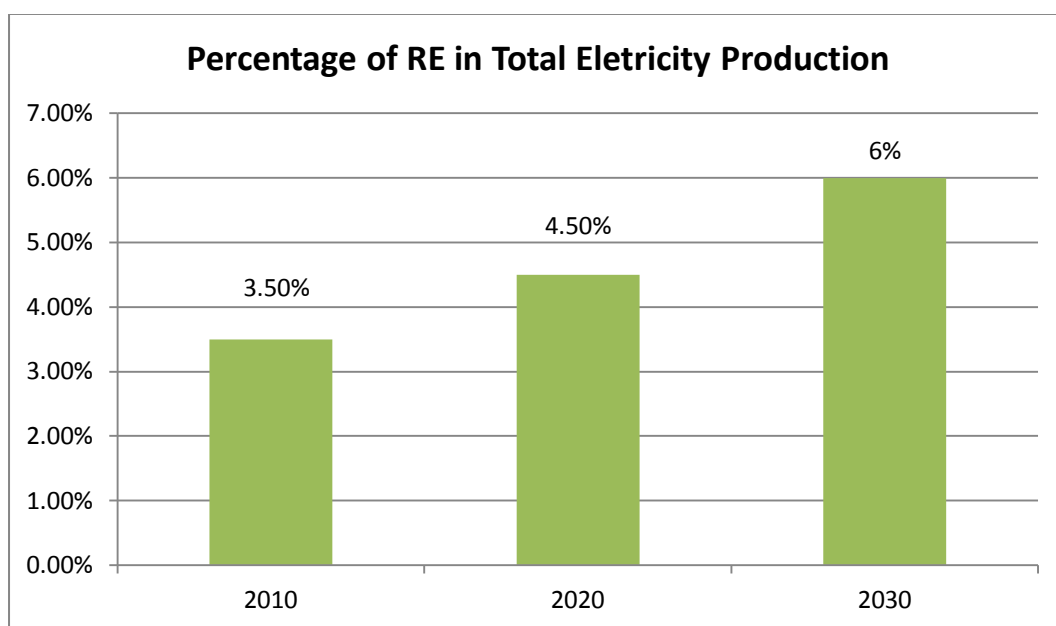


Figure 4-9 Plan for RE Development 2010-2030

(Source: National Master plan for power development for the 2010 – 2020 period with the vision to 2030 in the Decision No. 1208/QĐ-TTg dated 21st July 2011)

Table 4-2 Summary on PESTLE

	Market driver	Market inhibitors
Political	<ul style="list-style-type: none"> • National priority focuses more on economic development • Stable politic system 	<ul style="list-style-type: none"> • One-party state • High bureaucracy and corruption • Weak executive branch
Economic	<ul style="list-style-type: none"> • Opening market to the world • Quite good GDP growth rate • On-increasing GDP per capita, middle income country 	<ul style="list-style-type: none"> • Macroeconomic monetary environment is instable
Social	<ul style="list-style-type: none"> • Large population and young people • Abundant and cheap labor resources 	<ul style="list-style-type: none"> • Low productivity • Modest labor skill levels
Technological	<ul style="list-style-type: none"> • Good communication infrastructure • Common knowledge on biogas technology • Industrial scale biogas technology not highly develop • Biogas private organizations' abilities are limited (finance, technical know-how, after-sales services) 	<ul style="list-style-type: none"> • Poor infrastructure system • Well biogas technology development for small scale
Legal	<ul style="list-style-type: none"> • Reform initiatives to improve administrative • Government guarantees fair treatment for investors • Intensives for investment of manufacturing on bio-technology and on some regions • Legal framework for technology transfer and intellectual property, CDM projects • Free to choose arbitration location • Make progress in ease of doing business 	<ul style="list-style-type: none"> • Cumbersomeness of overall administrative environment • Low level of implementation on law of intellectual property • Complicated procedure for CDM projects • Less protection for foreign investors
Environmental	<ul style="list-style-type: none"> • Tropical country • Decision on moving scheme for stringently handling establishments which cause serious environmental pollution' • Global warming and climate change 	

4.1.2 Microenvironment analysis on Vietnam biogas technology market

This part will examine the biogas technology market in Vietnam from a foreign biogas company's point of view. It is critical to state beforehand that this biogas technology market concerns only B2B market. Biogas technologies for households or livestock farms are irrelevant in this analysis.

The **threat of entry is medium**. The Vietnam government is welcoming environmental-friendly technology, so it has proposed many policies and regulations to for these businesses. From a foreign company's point of view, there is no barrier to entry Vietnam biogas technology except for proprietary learning curve. Vietnam local biogas companies' capacities are low, therefore, it is an attractive market for foreign companies with technical know-how. However, if considering the Vietnam current macro environment, many foreign companies may be afraid to enter.

The **threat of substitutes is zero** once the company decides to invest in biogas utilization. The company has to invest in their WWTP already; biogas utilization will require them to invest more in gas treatment system. In case the company's WWTP does not do well enough, there will be additional investment in upgrading the plant in order to maximize the biogas collection. There is no substitute in this case.

The **power of buyers is high**. The customer either utilizes biogas or just releases it. The breweries don't need to utilize biogas if they don't think that the values earned are high enough. According to what the researcher obtained from interviewing potential customers, ROI of investing in using biogas is a crucial criterion because they have already owned their WWTP to meet the requirement of the government. Hence, price sensitivity is quite high. Besides, the accessibility to the Vietnamese government's incentives for renewable energy is also a push for a buyer's investment decision.

The **power of suppliers is low-medium** since the business consists of the whole package of physical equipment and service (Design, construction, installation, commissioning, training, transfer technology, and after-sales service). The service element is outweighs the physical element. Physically, biogas technology for a brewery WWTP contains two systems, wastewater treatment system and gas utilization system. Wastewater treatment system includes main parts such as tanks

(equalization tank, biogas digester tank, aeration tank, sedimentation tank, and sludge thickener tank), pumps, valves, pipes, chemical bacterium for anaerobic and aerobic treatment, and electronic control system. Gas utilization system contains gas pipes, valves, gas holder, gas refining machine, gas blower, gas-boiler or dual fuel burner, electronic control system, and electric generator for electricity production purposes. The inputs for this system are mainly steel and cement and standardized components such as valves, pumps, pipes. There are many competitive suppliers for those raw materials, Hence, the supplier power is low-medium

The **competitive rivalry is high**. The concentration ratio in Vietnam biogas technology market is low because there is no signal of market leaders in the Vietnam biogas technology market for B2B customers. This implies that the industry is characterized by many rivals, none of which has a significant market share. Hence, the competition in the biogas technology industry is high. The researcher had investigated what kind of business models biogas companies apply in Vietnam B2B market, details in the appendix 5. In short, it can be summarized as follows:

There are three main forms of entry mode employed by biogas companies in Vietnam. First, local companies (even trading companies or CDM consulting companies) do partnership or joint venture with foreign biogas companies to strengthen their competitive advantages in technology intelligence. Second, foreign companies, who have strength in biogas technology, directly contact the customer through BOOT, BOT or turnkeys contracts. Third, some wastewater treatment companies also provide the whole package of biogas utilization attaching to their WWTP by importing equipment for a biogas utilization system.

There is a trend of using BOOT (Build, Own, Operation, and Transfer) contracts in the biogas technology market. Both foreign companies and local companies prefer this strategy. In this model, the customer can treat their wastewater for free and enjoy a cheap energy source. After some years (7-15 years), they can own the biogas plant. The investors, on the other hand, have an advantage in selling energy and CERs in trading off for the investment in building plant.

Biogas companies often penetrate to companies in one industry first, spreading to other industries later. Some agriculture-related industries such as seafood

processing, tapioca processing, and ethanol production have already built several biogas plants. For example, Hoai Bac Trading Co. Ltd is implementing an umbrella biogas recovery and utilization project from a series of Seafood wastewater treatment units in An Giang and Dong Thap province under the CDM framework. There are vigorous competitions in these markets.

However, the beer industry has not been touched systematically. There are only three breweries in the beer industry utilizing biogas, namely South East Asia Brewery Ltd (2001), Thanh Hoa Brewery JSC (2005), Sabeco Hanoi (2009), with different biogas suppliers. Thus, there is a huge opportunity for foreign biogas companies.

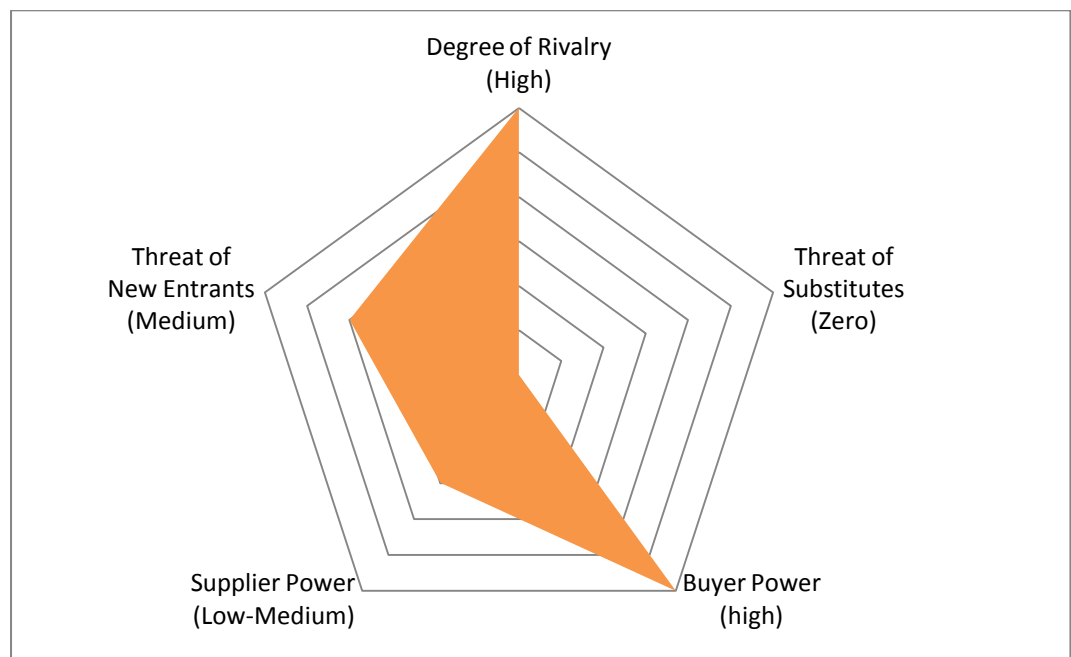


Figure 4-10 Summary of 5 Forces Analysis

4.2 Market segmentation and segment selection

In this section, the researcher will firstly study the Vietnam beer industry to gain an overview of how the potential customers are organized. Next, there will be segmentation process after empirical research. Finally, the argument on segment selection will be presented.

4.2.1 Vietnam beer industry overview

The Vietnam beer sector belongs to the Vietnam Beer - Alcohol - Beverage industry. In the past years, this industry has grown rapidly at 15.03% during 2001-2007, thanks to the government's renovation policies and opening market regulations, the high growth rate of the economy, the improved living standards and the people's growing demands, the number of tourists and foreign investors to Vietnam. As of 2007 the industrial production value of the Beer - Alcohol - Beverage industry was VND 26,745 trillion, accounting for 21.66% of the total industrial production value of the food and beverage industry, or 4.69% of the total industrial production value of Vietnam equivalent to 2.68% GDP. Of which beer sector contributed VND 18, 257 trillion, accounting for 66.05% of the total industrial production value of the Beer - Alcohol - Beverage industry (MOIT, 2008).

Market growth and investment

The state plans to develop the Vietnam Beer - Alcohol - Beverage industry into a vital economic sector, with the specific goals as follows:

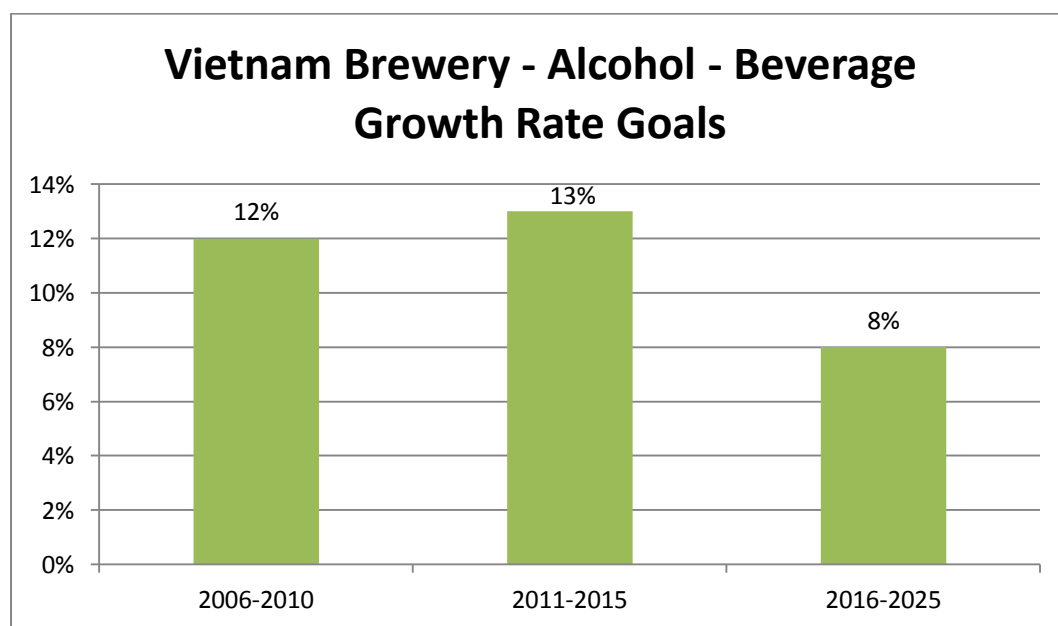


Figure 4-11 Goal for Beer - Alcohol - Beverage Industry Growth Rate

(Source: MOIT, 2008)

The Vietnam Beer - Alcohol - Beverage industry is under the MOIT's direct administration. The industry's development scheme is drafted and approved by this ministry. The latest development scheme was made on 21st May 2009, which approved the industry's development until 2015, vision to 2025.

Legally, investment projects for building plants with capacity of more than 50 million liters per year have to be approved by the MOIT. The ones with capacity of more than 200 million liters per year must be approved by the Prime Minister.

Vietnam beer sector will need VND 18.042 trillion in 2015 and VND 24.056 trillion in 2025. The state will support one part of the expenditures on scientific research activities, wastewater treatment plan, raw material production areas (land and land fee) (MOIT, 2009) (See appendix 6 for more information on investment on Vietnam beer investment)

The beer sector is witnessing a rapid increase in beer consumption. The amount of beer consumed has been boosting rapidly and steadily for decades.

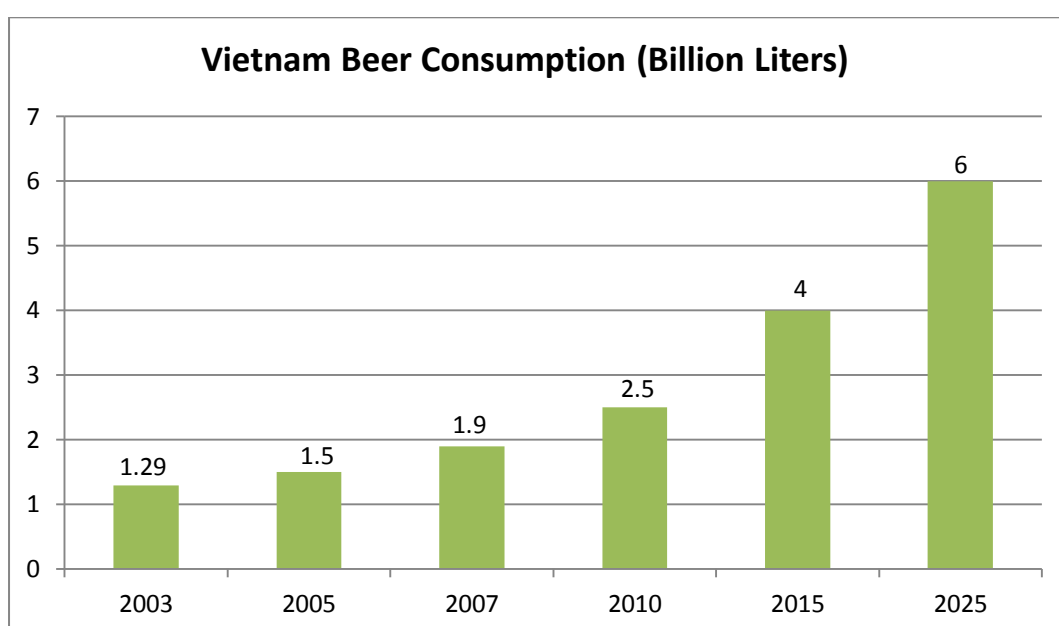


Figure 4-12 Vietnam Beer Consumption 2003-2025

(Source: Cafef.vn, 2011, MOIT, 2009)

In 2004, many small breweries in Vietnam provinces were merged by Sabeco and Habeco to become members, and then become subsidiaries of the two corporations. At that time, Sabeco and Habeco were still under the state's direct control.

In 2005, there was a transfer from direct administration of the state to the ownership administration model. Until now, the two corporations have already completed and effectively operated under the model of parent company and subsidiaries. The parent company has more than 50% shares in a subsidiary. With the member companies, the corporations just outsource producing products, under their technical production requirements for beer quality. They also have stocks in these member companies but less than 50%.

The privatization of subsidiaries changed the nature of the relationship between the parent company and subsidiaries from capital allocation to financial investment. The parent company controls the technology, investment, capital, brand and market of the subsidiaries (MOIT, 2008).

The parent company and subsidiaries sign a contract in which the subsidiaries will produce beers under the parent's brand then hand them over to the parent company. The parent company will do marketing, develop sales policy and sell all products. In 2008, the state began to privatize the two corporations. However, until now they have not completed the privatization and implement the IPO-Initial Public Offering- for many reasons. In the meeting with foreign professionals on 6th September 2011, the Prime Minister said in 2012, the privatization progress of the state owned enterprises will be speed up after a long time of delay (Cafef.vn, 2011).

Market structure

Vietnam beer market is still dominated by low-end segment and middle segment, accounting for 88% of the total beer market. Local beers are the market leaders in these two segments. The High-end segment has the representation of foreign beer brand, namely Heineken, Carlsberg and Tiger, apart from local brand- Sabeco (Vfr.vn, 2010).

Table 4-3 Market Structure of Vietnam Beer Market

	% in Volume	% in Value	Average price (VND/liter)	Market leaders
High-end segment	12	20	28,000	Heineken, Carlsberg, Tiger, Sabeco
Middle segment	45	50	15,000	Sabeco, Habeco
Low-end Segment	43	30	10,000	Habeco, provincial breweries

(Source: Vfr.vn, 2010)

Regarding regional patterns, the biggest consumption area is in the North, at more than 1 billion liters in 2009, equivalent to more than 50% of the whole country's consumption. The Southeast area (including Ho Chi Minh City, Binh Duong, Binh Phuoc, and Dong Nai) earns the second place, with annual beer consumption of 750 million liters (Vfr.vn, 2010).

Table 4-4 Top Ten Beer Brands in Vietnam 2010

Company	% Market	Number of Brands	Brand names
Sabeco	51.1%	4	Saigon Export 355ml, 333 can 330ml, Saigon Lager 450ml, Saigon Special 330ml
VBL	26.2%	5	Heineken can 330ml, Heineken bottle 330ml, Pierre Laure, Tiger bottle 330ml, Tiger can 330ml
Habeco	11.4%	1	Hanoi (450ml)

(Source: Biz.cafef, 2011)

Market share

According to internet sources, there are about 350 breweries in Vietnam. The capacity of those breweries is as follows:

Table 4-5 Number of Breweries in Vietnam according to Internet Figures

Capacity	Number of breweries
More than 20 million liters	20
More than 15 million liters	15
Less than 1 million liters	268
Total	350 (unmatched figure)

(Source: Vietnamnews, 2011)

On the other hand, according to the MOIT's latest report issued in 2008, the figure is totally different.

Table 4-6 Number of Breweries in Vietnam according to MOIT, 2008

Capacity	Number of breweries
More than 100 million liters	7
More than 50 million liter	14
More than 20 million liters	18
More than 10 million liters	9
Less than 10 million liters	103
Total	151

This report also pointed out that there was a decreasing trend in the number of small beer companies because of M&A phenomenon or dissolving. This information is proofed by the researcher's observation: the number of brewery companies is decreasing in the sense that the two state owned corporations-Sabeco and Habeco are merging and acquiring the small and going-to-death beer companies to become its subsidiaries. On the other hand, the number of medium and large breweries is growing because these two corporations have been opening

several big breweries. Some projects which were approved but then shut down such as Vilaken brewery project in Nghe An province (Tienphong, 2009).

The researcher could not find united figures which makes sense. Therefore, the researcher decided to calculate the number of breweries based on companies' websites, news etc, in addition to the trusted figure in the report of MOIT on the Vietnam Beer - Alcohol - Beverage development 2000-2007.

Table 4-7 Number of Vietnam Breweries (author synthesized from MOIT, 2008 and other sources)

Capacity	Number of breweries
More than 100 million liters	15
More than 20 million liters	36
Less than 20 million liters	112 (est.)
Total	163

According to the report to stakeholder of Sabeco, there are three big Vietnam beer producers-Sabeco, VBL and Habeco, accounting for 95% market share (Biz.cafef, 2011) (See the figure below). Breweries are located mainly in Ho Chi Minh (23%), Hanoi (13%+6% of Ha Tay province), Haiphong (8%) (MOIT, 2008)

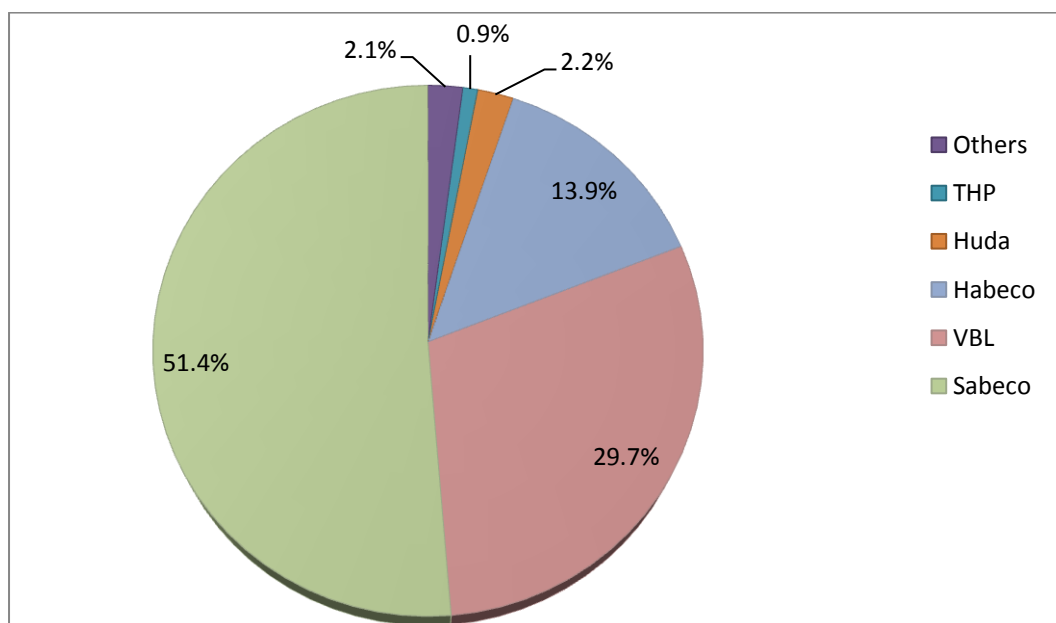


Figure 4-13 Market Share of Vietnam Beer Producer as of 12/2010

(Source: Biz.cafef, 2011; Sabeco report)

Besides local beers, the number of imported beers is increasing too. The beers are imported from Mexico, German, Holland, and Belgium under brands as Corona, Budweiser, Bit Burger, Leffe Brown, Hoegaarden White, MOA, Cooper, Bavaria, etc. Heineken beer, which is produced in Vietnam, is also imported because of the

high demand and the Vietnamese prefer – foreign- products’ phenomenon. According to Mr. Michel de Carvalho from VBL, Vietnamese consumed 200 million liters of Heineken in 2010, only after America and France. Mr. Michel de Carvalho forecasted that Vietnam will surpass France to become Heineken’s second largest consumption country in 2012, only after America. And, it may be become the leading consumption country in 2015 (Laodong, 2011). The following figure shows the three biggest beer producer’s brewery locations. For more information on each big beer producers, see the appendix 7).

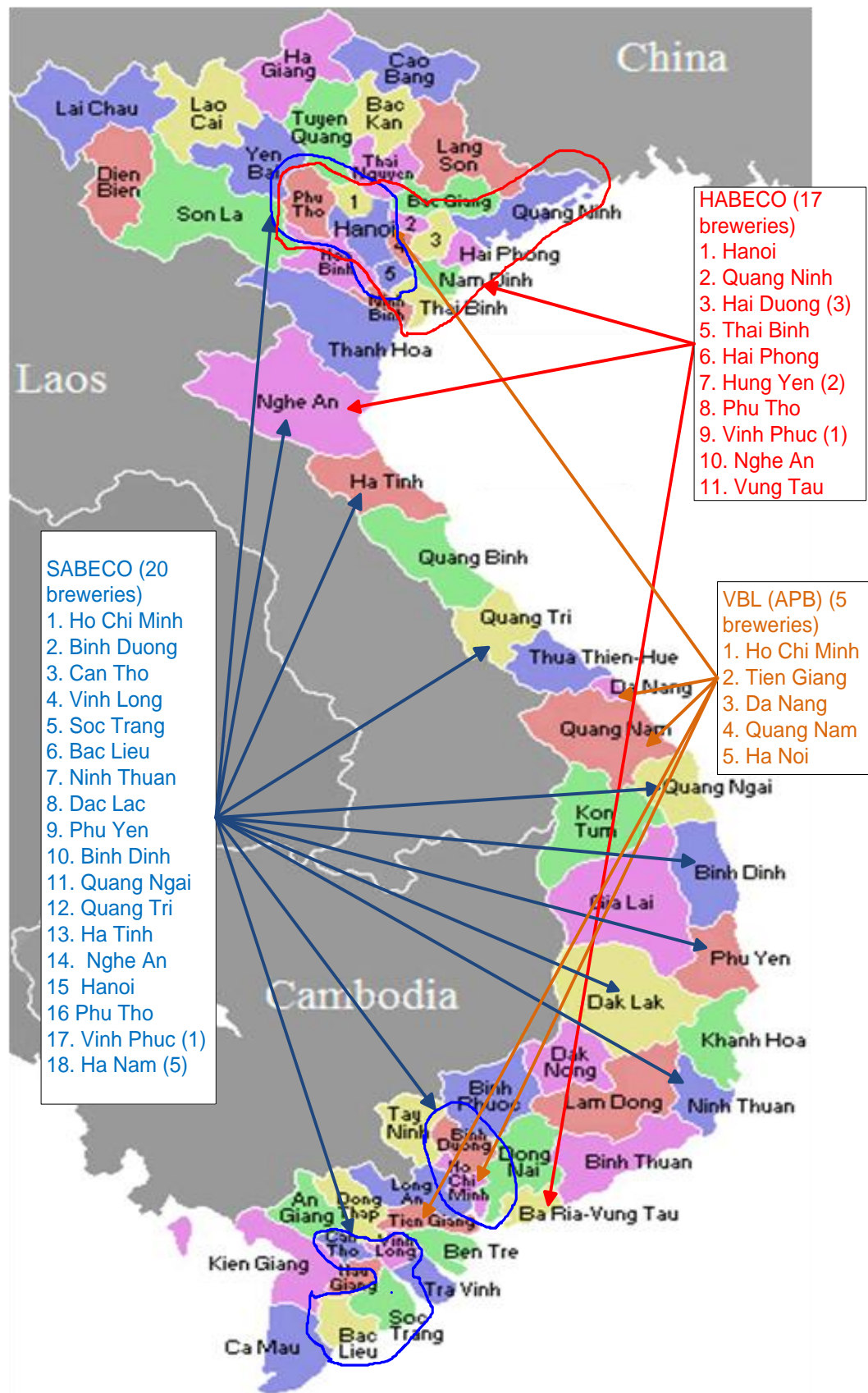


Figure 4-14 Factories' Locations of Three Biggest Beer Producers in Vietnam

Regarding technology of production line in Vietnam breweries

Table 4-8 Technology of Production Line in Vietnam Breweries

Brewery Capacity	Technology of Production Line
More than 100 million liters per year	A wholly imported production line from Germany, Italia, America, etc
50-100 million liters per year	Main equipment imported. The rests are produced in Vietnam
20-50 million liters per year	Production lines manufactured in Vietnam with some important components imported from the EU
10-20 million liters per year	Are partly upgraded with the equipment manufactured in Vietnam. However, the uniformity is not high. Management system is semi-automatic.
< 10 million liters per year	Obsolete technologies, mostly do not meet requirements of food safety

(Source: MOIT, 2008)

There are some local companies (hereby beer technology companies) who have strong capacities in brewery production line and equipment such as: POLYCO - Polytechnical Mechanical, Thermal, Electrical, and Refrigeration Engineering Co., Ltd, ERESSON – Eresson refrigeration JSC, IMECO – Mechanical & Industrial Construction JSC, CONG MINH Mechanical Manufacture, Commerce and Service JSC etc.

German Kroness AG Company is the main supplier for production lines in EPC contracts for medium and large breweries in Vietnam. WWTPs at these breweries are supplied by local companies like POLYCO, ERESSON, ASIATECH (Asia Development for Technology & Environment Company), etc. Most breweries are using UASB reactor for anaerobic treatment in their WWTPs.

4.2.2 Market segmentation after empirical study

Before the field research trip, the researcher divided the target market into 3 segments merely based on their demographic characteristics in terms of production capacity: large, medium and small size. The standard for size is the capacity per

year: large factory more than 100 million liters, medium factory 20-100 million liters, and small factory less than 20 million liters.

- **Segment 1:** 15 large breweries
- **Segment 2:** 36 medium breweries
- **Segment 3:** 112 est. small breweries

During the empirical study, the researcher interviewed four representatives from segment 1, seven from segment 2, and one from segment 3. Among these, two breweries had already utilized biogas. Besides, the researcher had a chance to hold a meeting with one representative from the Habeco Corporation who knew the corporation level of management well. Therefore, the researcher had more knowledge on the two state owned corporation (Habeco and Sabeco) management procedures and their buying behaviors.

The researcher also interviewed three officials from MOIT, MONRE to understand what regulations concerning renewable energy there are in Vietnam, what incentives are available for companies, and to gain information and report about Beer - Alcohol - Beverage industry.

After interviewing and observing the market, the researcher found that it would be better to re-segment the market as follows:

- **Segment 1:** 24 breweries belong to Sabeco and Habeco Corporations
- **Segment 2:** 29 breweries of other companies which have capacities of > 20 million liters per year
- **Segment 3:** Est. 110 breweries with capacities of <= 20 million liters per year

See information on breweries capacity, ownership, locations in the list of Vietnam breweries in the appendix 8.

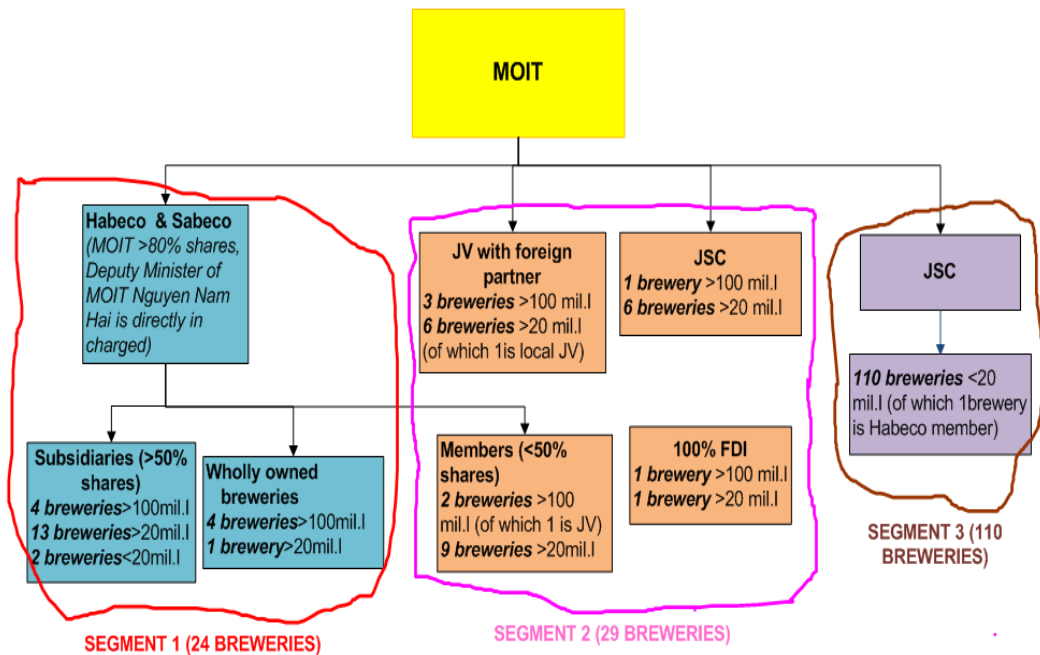


Figure 4-15 Vietnam Brewery Market Segments

The re-segmentation is needed because demographic criteria are not enough for describing the target market. The same characteristics of ownership, buying process, trend of growth drive the researcher to group all Sabeco and Habeco Corporations' wholly owned breweries and subsidiaries into one segment even though many of these subsidiaries were previously put in segment 2 and segment 3. The reasons for re-segmentation are as follow:

Ownership

Segment 1: From what the representative of Habeco Corporation said, their subsidiaries' investment decisions have to parallel the factory's plan, the corporation's plan, and the industry's master plan. Because the corporation holds more than 50% of the stocks, they appoint representatives to the Board of Managers of subsidiaries. The corporation makes decision on investment of subsidiaries. At the upper level, as the state still holds more than 80% of these two corporations' shares, MOIT is appointed to be directly responsible for these two corporations. Mr. Nguyen Nam Hai Deputy Minister of MOIT is appointed to directly responsible for the two corporations.

Segment 2: Other breweries with capacity of more than 20 million liters are foreign wholly owned, joint venture (foreign and local or local and local) or joint stock companies (of which 11 breweries are members of the two corporations),

Segment 3: Provincial breweries- They used to be state owned companies or private companies, but now they have been privatized. In many JSCs, the state still owns major shares in these breweries, which means the MOIT is also in charge of these breweries in general.

Buying process

All of the respondents to the researcher have a common process for their decision process. Depending on each company's size, the internal process will be different. However, on top of that, every company will carry a tendering for choosing supplier. They act as required in the Law on Tendering 2005. There are 6 forms of contractor selections for a tender: open tendering, limited tendering, direct appointment of contractor, direct procurement, competitive quotation in procurement of goods, self-implementation. See the appendix 3 for more details about these tendering types.

Potential customers' sources of supplier information are from the internet, conferences, recommendations, available technical documents or inviting capable organizations to discuss and clarify the content in case of brand new projects. For small projects, they often use a simple appointment method among those suppliers they know.

For companies in *Segment 1*, before carrying out tendering, they have to ask permission from their corporation. The tendering results have to be approved by the corporations.

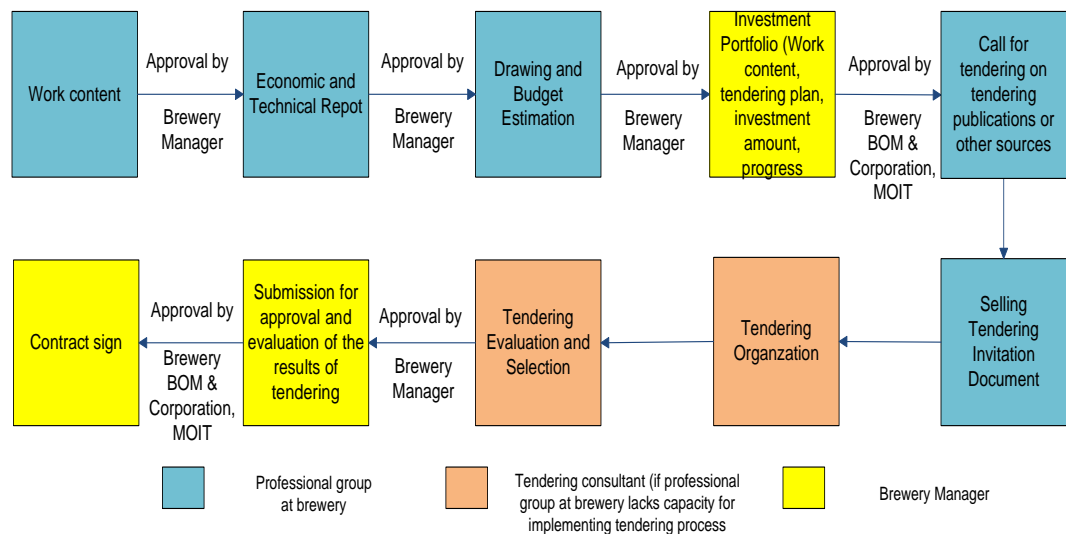


Figure 4-16 Buying Process in Segment 1

In *Segment 2*, decision making is done by a board of managers. Some breweries also need approval from its corporation.

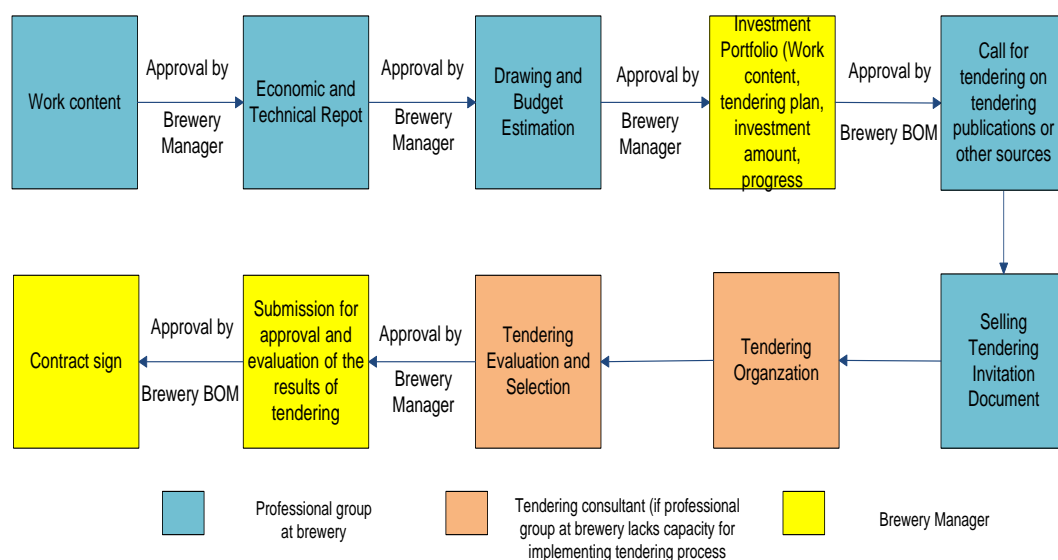


Figure 4-17 Buying Process in Segment 2

In *Segment 3*, breweries must ask for MOIT's approval.

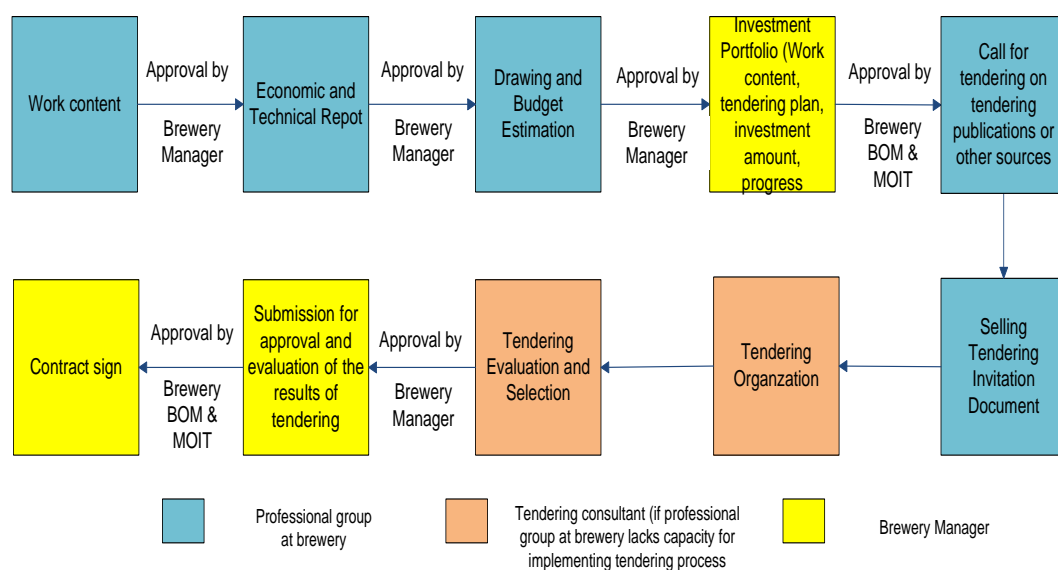


Figure 4-18 Buying Process in Segment 3

Trend of growth

Sabeco and Habeco Corporations in *segment 1* are expanding their capacity of production to meet the demand of national consumption and export. They have been aggressively opening and expanding their breweries in recently years. On the other side, in the *segment 3*, the number of small beer companies is decreasing because they cannot compete with the two big corporations due to old production

lines and low quality products. They are struggling to survive. Mostly their products are sold locally, in one province normally, to take advantages of local consumers' awareness. There is a trend of being merged and acquired by the two big corporations.

The *segment 2* also experiences a trend in expanding their capacities as the future of the beer industry is bright regardless of the gloomy economy.

Important findings

Buying criteria

It is interesting that regardless of differences in size, ownership, buying process and trend of growth, the ROI- return on investment- is the potential companies' biggest concern. They have WWTPs to meet the government's requirements already. Right now, they just freely release or flare the gas generated from wastewater treatment process. From interviews with 10 potential companies, 100% said that ROI is an important criterion. In this context, ROI includes capital investment and added value (biogas, CERs selling, fertilizer selling, and reduction of wastewater fee). For them, if there is a successful model in Vietnam, they would consider utilizing biogas. Besides, what they care most is short-term economic return. If one can prove that a biogas utilization system can bring quick ROI, then they will consider investment.

On the other hand, the companies which consider environmental-friendly production by utilizing biogas (Reduction of unpleasant smell and odor) important are those large breweries.

From technical aspect, many breweries are concerned about biogas fluctuation, the corrosive caused to other equipment due to impurities in biogas, and safety of using the system gas utilization system.

Some interviewees commented that the Western products in general have very good quality, but they somehow do not match with their needs in terms of price, technology, or applications. Asian products, for example Chinese products, will more satisfy their needs in terms of appropriate price and compatible technology. This information is critical for Western companies to adapt their product to meet the Vietnam customers' needs.

There is no fixed number for what percentage the energy cost accounts for in the product's price. However, one interviewee estimated that the energy cost is around VND 200 per liter.

Reasons for having not utilized biogas yet

Breweries have reasons for not being highly interested in biogas utilization even though investment for biogas technology has quick ROI on paper. First, capital needed for biogas utilization is huge while ROI has not been proved. Second, many breweries have old WWTPs, which means they have spend more money to upgrade on wastewater treatment process if they want to utilize this energy. Thus, they are more reluctant to biogas investment. Third, there is a concern about gas utilization system due to the corrosive process effects on other equipment.

The interviews of two representatives from breweries, which utilized biogas, illustrated that biogas utilization in their breweries is not really successful. One factory started using biogas from 2003. After some years, problems rising from equipment corrosive prevented them from continuing to use this energy. This company is now working on this problem to continue using biogas.

The other factory has just utilized biogas from 2010, but they don't use biogas continuously because they want to examine how the gas affects their equipment and their production is not at full capacity.

The third company who utilized biogas did not have a specific figure for biogas value alone. This company carried out a total package of energy saving production, biogas utilization, improvement in refrigeration efficiency together with ice thermal storage, and VRC system (Vapour Recompression Compressor). Many interviewed companies commented that this is the only case which succeeded with biogas utilization.

Unexpected discovery

From the interviews, the researcher also accidentally discovered that the Decision 64/2003/QD-TTg has not been fulfilled yet. Many breweries are now planning to move their plant outside cities. At least, 4 breweries out of the interviewed breweries are moving or planning to move their facilities. This creates opportunities for biogas companies to contact potential customers from the beginning of their projects. On the other hand, there are 5 breweries in the progress of raising capacity. 8 breweries are going to raise capacity in the near future. There is one big brewery

who wants to collect them. However, they are still considering appropriate products for gas utilization system.

4.2.3 Segment selection

Table 4-9 Segment Attractiveness Evaluation

	Segment 1	Segment 2	Segment 3
FUTURE ATTRACTIVENESS			
Size and growth	24 breweries, high growth (new breweries and capacity raising of existing ones, plant moving)	29 breweries, medium growth (capacity raising of existing ones, plant moving)	110 breweries, Reducing (plant moving)
Profitability	High	High	Low
Relative risk	High	Medium	Low
Competition	High (2 corporations are main decision makers)	Medium (enough potential customers)	Low (too many potential customers)
Government/ environmental considerations	Supportive	Supportive	Supportive
Customer demands/ technology	High because biogas yield in big breweries is high	High because biogas yield in big breweries is high	Low (biogas yield in small breweries is not high)
Present relationships	N/A	N/A	N/A
RESOURCE DEMANDS			
Technology	Fit each factory's WWTP, modern to fit their modern production lines	Fit each factory's WWTP, modern to fit their modern production lines	Fit each factory's WWTP, medium requirement because plants are often local origin
Relationships	Need closed contact with two corporations and MOIT, contact with breweries.	Mostly direct contact with breweries and their corporations	Mostly direct contact with breweries and department of MOIT at provinces
Human resources -purchasing, sales, services, production	Medium	Medium	Large to contact 110 breweries
Image	Good	Good	Average
Capital investment	Huge for series of plants	Medium for each plant (or for series of plant of one corporation)	Low for each small plant.
Product development	Fit each factory's WWTP	Fit each factory's WWTP	Fit each factory's WWTP

The researcher set segment attractiveness weight criteria based on the most important criteria in the table below. The aim is to take in to account the weight of each attractiveness factor influencing on the biogas business.

Table 4-10 Attractiveness Weight Criteria

Attractiveness factors	Attractiveness weight	Parameter		
Size	10%	10-7 (Large)	6-4 (Medium)	3-0 (Small)
Growth	25%	10-7 (High)	6-4 (Medium)	3-0 (Low)
Profitability	25%	10-7 (High)	6-4 (Medium)	3-0 (Low)
Risk	10%	10-7 (Low)	6-4 (Medium)	3-0 (High)
Competition	10%	10-7 (Low)	6-4 (Medium)	3-0 (High)
Relationship requirement	20%	10-7 (Low)	6-4 (Medium)	3-0 (High)

Note: 'Growth' criterion includes new plants, plant expansions and plant relocations; 'Relationship requirement' illustrates the ability to access potential customers.

Now the researcher grades each segment based on the characteristics by the scale of the defined measurement.

Table 4-11 Attractiveness Point for Each Segment

Attractiveness factors	Attractiveness weight	Parameter					
		Segment 1		Segment 2		Segment 3	
		Point	Adjusted	Point	Adjusted	Point	Adjusted
Size	10%	2.18	0.22	2.60	0.26	10.00	1.00
Growth	25%	10.00	2.50	6.00	1.50	2.00	0.50
Profitability	25%	8.00	2.00	8.00	2.00	3.00	0.75
Risk	10%	3.00	0.30	6.00	0.60	9.00	0.90
Competition	10%	2.00	0.20	6.00	0.60	10.00	1.00
Accessibility	20%	1.00	0.20	8.00	1.60	3.00	0.60
TOTAL		5.42		6.56		4.75	

The figure illustrates that both segment 1 and segment 2 are potential-profitable segments. Depending on the above analysis, one foreign biogas technology can consider its own firm strategy in making a final decision on segment selection.

If a biogas company does not want to have too much contact with the state, then the segment 2 seems more suitable. The contact with breweries in segment 2 will be more transparent and their decision making processes are simpler than those in segment 1.

On the other hand, segment 1 promises the most potential for a foreign company who has ability to access the two corporations and MOIT. When one biogas technology can deal with the two corporations and MOIT, it will be easier to make contact with breweries in segment 2 and segment 3 via the two corporations' member network.

4.3 Stakeholder analysis for the chosen segment

In this section, the researcher will firstly describe key stakeholders of the selected segments. Then there will be an analysis of their influence on the biogas business. Finally, based on the deeper understanding of stakeholders, the researcher will map them in to a grid of influence to illustrate an overview of the whole relationships in biogas business.

4.3.1 Describing key stakeholders

The key actors specifically involved in supplying biogas technology for breweries are categorized into two main groups, direct stakeholders and indirect stakeholders.

Direct stakeholders

Breweries

There are several benefits for a brewery to utilize biogas from WWTP. In terms of money, they may enjoy a renewable energy resource, CERs revenue under CDM framework, fertilizer revenue and environmental fee reduction. Regarding intangible benefit, a factory can obtain a will from highlighting their responsibility to the environment by utilizing biogas which means a reduction in CO₂ emission. Currently, there is a growing awareness on global warming and corporation responsible business in Vietnam. Unfortunately, the changes in consumption of environmental friendly products have not showed a significant signal. In the future, this may be a criterion for customers to choose product.

Regardless of huge benefits from biogas utilization, potential customers' main concerns are ROI, influences on other equipment, compatible technology and applications.

Fortunately, there are incentives for investing in WWTP from the Vietnam Environmental Protection Fund to encourage breweries. Besides, there are also incentives for using renewable energy from the government's supports.

Two corporations - Sabeco and Habeco

Breweries in the segment 1 are belonged to the two corporations- Sabeco and Habeco. The two corporations will enjoy direct benefits from their breweries or indirect benefits from their subsidiaries if they invest in biogas utilization, both in terms of money and reputation. They have representatives for their shares in the board of management in their subsidiaries. All investment of subsidiaries must be approved by the corporations. Therefore, subsidiaries' revenues and expenses on biogas system will be presented in the two corporations' consolidated financial statements.

They are also concerned about ROI because they have huge shares in their subsidiaries. If one biogas company can prove that the investment in biogas utilization is profitable, then it can probably do an umbrella series of projects for the two corporations' subsidiaries.

Ministry of Industry and Trade - MOIT

MOIT is the agency of the Vietnam government, performing the state management of industry and commerce field. The energy sector and Beer - Alcohol - Beverage sector are under the administration of this ministry. The Deputy Minister of Industry and Trade – Nguyen Nam Hai, on behalf of MOIT, is in charge of Habeco and Sabeco. There are some functions of this ministry directly concerning the Beer - Alcohol - Beverage industry as follows:

- *To submit strategy and planning for overall development; strategy and planning for branch and sector development; strategy and planning for regional and territorial development; development programs, national target programs, technical-economic programs; and other important legal documents under its administration to the Prime Minister for approval and implementation.*
- *To approve the strategy, planning and branch and sector's development programs under its administration and regions and territories as permitted and authorized by the government and the Prime Minister.*

- *To promulgate decisions, directives and circulars; to direct, guide, inspect and implement legal documents under its administration; propagate and educate on legislation on industry and commerce.*
- *To build standards, publish procedures, regulations, economic and technical norms for branches and sectors under its administration; to manage, guide and inspect businesses, which are under conditional control, under its administration according to the list regulated by the government and the Prime Minister.*
- *To be in charge of evaluation or approval, inspection, monitoring the implementation of investment projects belonged to industrial and commercial sectors under its administration ((extracted from Decree 189/2007/NĐ-CP dated 27th December 2007 of government: Regulation on functions, obligations, rights and organizational structure of MOIT)*

From micro-management's point of view, MOIT is the representative of more than 80% shares of the state in the two corporations. Hence, they have an important voice in every decision of the two corporations. One official from MOIT confirmed that there are a few breweries utilizing biogas. He thinks the reason is that there is no official proof of the ROI of biogas utilization to encourage breweries.

Foreign Biogas Technology Company- supplier

The researcher had an opportunity to interview one biogas company in Finland. From their point of view, what they are concerned most about when entering new market are normally legal matters and local authorities.

The benefits foreign biogas companies can obtain is revenue for providing the whole package of equipment and installations, new market for their products, knowledge on Vietnam market, or revenue from selling CERs in some entry modes such as BOT project.

Indirect stakeholders

(a) Competitors

Biogas Technology Company – Biogas Tech Co.

Other biogas technology companies are direct competitors. They also own technology know-how. There will be a fierce battle in price, product and service quality, and relationship closeness if they all target Vietnam breweries.

Wastewater Treatment Company- WWT Co.

A wastewater treatment company may become a competitor when it integrates biogas utilization system for customers. They have advantage of going ahead in the sense that they installed WWTP for some potential customers. Here, the relationship will be closer than a biogas company. However, their weakness is that they do not own the technology know-how of biogas utilization system. This weakness can be overcome when wastewater treatment company do partner with a biogas company.

Beer Technology Company- Beer Tech Co.

Beer technology companies can be both supporter and competitor. They have connection with potential customers by providing production line and other services for breweries. From the observation in the market, most WWTPs in Vietnam breweries market are supplied by these beer technology companies.

On the one hand, a biogas company can take advantage of a beer technology company's network to assess potential customer by doing partnership or joint venture with them. At this option, there will be a reduction in revenue generated and risk of intellectual property-IP stolen, but there will be available service for customer any time.

On the other hand, a beer technology company may import biogas technology to supply for potential customers. Here, their price may be lower and after service may be better than a foreign company in terms of geography and time. However, their weakness does not fully own technology know-how.

CDM Consultant Company- CDM Cons Co.

CDM Consultant Company may become a competitor in case it cooperates with other biogas company. Here, they have advantage of knowing the CDM procedure and biogas technology know-how.

(b) Authorities dealing with Policy and Regulation – Authority group

Vietnam Government- Vietnam Gov.

Biogas investment can reduce GHG emission, which somewhat helps the Vietnam government to keep its commitment to the Kyoto Protocol. The Vietnam government really welcomes environmentally-friendly projects. It has built a comprehensive legal framework for renewable energy. Besides, the government

has also built a comprehensive legal systems and regulations for doing business in Vietnam to meet the requirement of WTO.

Ministry of Natural Resource and Environment – MONRE

MONRE is the agency of the government, performing the state management in fields of land, water resources, public service management under its administration etc. Some functions of this ministry concerning environment (somewhat concerning biogas technology) are:

- *To guide, inspect and organize the implementation of policies and laws on environmental protection, including: prevention and control of pollution and environmental degradation; nature conservation and biodiversity; reform and improvement of environmental quality.*
- *To guide and supervise the implementation of national technical regulations on the quality of environment and wastes; to guide and supervise the implementation of environmental criteria in the planning, development plans of ministries, sectors and localities.*
- *Develop and promulgate under its jurisdiction or propose competent authorities to issue directives and environmental criteria; establishment of national environmental reports, thematic reports on environmental regulations organizational assessment, forecasting and load status of the environmental components by region and parts of the country and guide the ministries, branches and People's Committees of provinces and cities directly under the Central Government in the making of environmental status, report on environmental impact;*
- *To guide and supervise the evaluation and approval of reports on strategic environmental assessment, reports on environmental impact assessment, registration of environmental commitments nationwide; To organize assessment of report on strategic environmental assessment and organize evaluation and approval of reports on environmental impact assessment under its administration;*
- *To direct and coordinate the investigation, determination of the environmental polluted area in inter-provinces, inter-state; To guide the determination of damages and the implementation of handling pollution and degradation and improving environmental quality;*

- *To guide the formulation, amending and supplementation of the list of establishments causing serious environmental pollution; To control and inspect the responsibility to handle and overcome the consequences in accordance with the law ;*
- *Lead the formulation and implementation of master plan for national environmental monitoring system; To guide and inspect environment monitoring activities, inspect environmental monitoring equipment; To direct construction and unified management of environmental monitoring data;*
- *To promulgate the list of biological products used in the prevention, minimization and treatment of wastes, the list of banned biological products which cause environmental pollution from importing; To guide the inspection, assessment and evaluation of waste treatment equipment and plants before being put into operation; To guide and inspect environmental assessment task in accordance with law;*
- *To guide and organize the registration and recognition on environmentally-friendly establishments and products; To issue the environmental permit according to related laws; To regulate itinerary and coefficient for the application of the national technical standards for wastes by sector, region, sector consistent with the load capacity of the environment;*
- *To be in charge of or coordinate with relevant agencies to build and issue under its authority or propose the competent authorities for promulgating mechanisms and policies, taxes, charges, fees and other revenue sources and the incentives related to environmental protection; To host, integrate, balance funds for the annual environment expenditure of the ministries, branches and localities or coordinate with the Ministry of Finance to propose to the competent authorities for consideration and decision; To organize and manage the Environmental Protection Fund in Vietnam which is a national focal point of the Global Environment Fund in Vietnam (extracted from Decree 25/2008/NĐ-CP dated 4th March 2008 of government on Regulation on functions, obligations, rights and organizational structure of MORNE)*

Department of Water Resources Management-DWRM belongs to MONRE. This department is in charge of wastewater amount, discharge gate, and wastewater treatment technology at breweries. One official from this department confirmed that the current wastewater technology at breweries in Vietnam is UASB. There are some other treatment processes if the wastewater is highly polluted for example aerobic treatment and sedimentation.

Ministry of Planning and Investment MPI

MPI is the agency of the state, performing state management of planning, investment and statistics, including: general assistance in the national socio-economic strategy and development plan; develop strategy, mechanism and management policy for general economy and some specific areas such as: domestic investment, foreign investment in Vietnam and Vietnam's foreign investment, economic zones; manage official development assistance sources and non government aid foreign procurement; tendering; establish and develop business sectors and the collective, cooperative sector; statistics; state management over public services under its administration.

1. Domestic investment, foreign investment in Vietnam and Vietnam's abroad investment:

- *To assist the government in managing the domestic investment activities and foreign direct investment in Vietnam, Vietnam's abroad investment; To organize investment promotion activities; To guide investment procedures*
- *To implement registration or inspect and issue certificates for foreign investment; To carry out inspection and issue certificates for investment projects under BOT, BTO, BT modes.*
- *To lead and coordinate with related ministries and agencies in guiding, monitoring, inspecting and verifying investment activities; To propose solutions for problems arising from the formation, development and implementation of investment projects; To evaluate the economic- social result and efficiency of domestic investment and foreign investment; To inspect, supervise and evaluate the overall public investment activities; To report the implementation of targeted programs and projects approved by the Prime Minister; To organize meetings between the Prime Minister and domestic and foreign investors.*

2. Tendering

- To evaluate tendering plans and results of contractor selection of projects under the jurisdiction of the Prime Minister in accordance with the law on tendering; To coordinate with ministries and agencies in monitoring the implementation of tendering for projects approved by the Prime Minister.*
- To guide, inspect, examine, supervise and review the implementation of legal regulations on tendering; to organize the information network on tendering under the current decentralization.*

3. Establishment and development of enterprises

- To lead and coordinate with related ministries and agencies to develop strategy, programs, reform, innovation, development plans for state owned enterprises; To propose management and support policies for state owned enterprises and development plans for small and medium size enterprises of various economic sectors.*
- To coordinate with ministries, branches and People's Committees of provinces and cities directly under the central government to set up, organize and re-organize the state owned enterprises; To summarize the implementation of organizing, innovating and developing state owned enterprises and the development of enterprises from other economic sectors nationwide;*
- To assist the government in unifying the state management of business registration; to guide business registration procedures; To inspect, monitor and review the implementation of business registration and after-business-registration of enterprises nationwide (extracted from Decree 116/2008/NĐ-CP dated 14th November 2008 of government on Regulation on functions, obligations, rights and organizational structure of MPI).*

Ministry of Finance MOF

MOF is an agency of the government, performing the state management of finance (including: state budget, taxes, fees and other revenues of the state budget, state reserves, state properties, state financial funds, financial investment, corporate finance, finance of the collective and economic cooperative group); custom; accounting; independent auditor; prices; securities; insurance; financial services

and other services under its administration; To represent the owner of state capital at enterprises according to law. On corporate finance and management of state capital at enterprises

- *To develop and submit policies for managing corporate finance and monitoring finances of all types of enterprises from all economic sectors to the government or the Prime Minister according to the management authority; To propose mechanism and financial policies for ownership transformation and reorganization of state enterprises, transformation of public units into public enterprises and privatization of public units; To propose financial mechanisms for developing cooperative and collective economy*
- *To guide, inspect the implementation of the state policies on corporate finance*
- *To lead or participate in the evaluation of capital investment or financial support of the state in enterprises; To monitor and supervise the implementation of state investment for business after obtaining approval and settlement policies issued by related authorities during rearrangement of state enterprises in accordance with law.*
- *To summarize, analyze, evaluate, formulate and submit plans for harmonizing capital and fund for the state corporation and the corporation of the state economy to the Prime Minister for approval.*
- *To be a centre for synthesizing the implementation of rights and obligations of the representative of the state capital ownership at enterprises as prescribed by law as assigned by the government; to implement the rights and obligations of the state capital ownership at enterprises under the administration of MOF, state capital investment and trading corporation and other financial funds according to the law and assigned by the government (extracted from Decree 118/2008/NĐ-CP dated 27th November 2008 of government on Regulation on functions, obligations, rights and organizational structure of MOF).*

Energy Efficiency and Conservation Office- VNEEP

MOIT is also responsible for renewable energy development of Vietnam. In the interview with an official from MOIT, the researcher noticed that regulations and

laws for renewable energy have a comprehensive legal framework, but in reality it is difficult to access incentives. Overall, the Vietnam government really welcomes renewable energy projects.

Provincial People's committee- Local Authority

At the province or city level, the People's committee will represent the state in implementing laws and regulations. Local authorities usually encourage environmental friendly projects, especially CDM projects. They can promote local business activity, generate income activities and improve local and global environmental condition.

(c) CDM group

DNA Vietnam- Vietnam National Steering Committee for UNFCCC and Kyoto Protocol

The Department of International Cooperation MONRE was designated as a DNA – Designated National Authority- in Vietnam in March 2003. DNA Vietnam is responsible for the endorsement of PIN, granting Letter of Approval, coordinating CDM relating activities within Vietnam and the region, etc.

Projects of utilizing biogas from brewery wastewater are subjected to CDM project as they help to reduce the amount of CO₂ released into the environment, as well as use clean energy instead of conventional energy.

Other ministries/ organizations

There are many ministries involved in CDM projects registration DNA Vietnam is comprised of representatives from relevant ministries such as MONRE, MOF, MOIT, MOST, MOFA, MOLISA, MPI, MARD, MIC, VUSTA, other. These personnel are responsible for steering, managing and coordinating activities related to Vietnam's implementation of the KP.

CDM Consultant Company- CDM Cons. Co.

CDM consultant companies in Vietnam are very active. They can be local consultants or international consultants. There is a common practice of using consultant in the CDM market. They prepare documents in accordance with requirements for CDM projects for investors. In most cases, consultants are either buyers or authorized by investors for looking for buyers. In many projects, consultant fees are paid in form of a certain percentage of the revenue from selling CERs.

Carbon Credit buyer - CDM buyer

CDM buyers in Vietnam are diversified, mostly from Japan, Europe, Korea, and Singapore. Among those, Japanese buyers are the most active. In several projects, buyers are not end-buyers but intermediary buyers. The information of buyers is not directly accessible by sellers.

Carbon Credit broker - CDM broker

CDM brokers in Vietnam are mostly financial organizations. In many case, consultants play the role of brokers. Brokers are not only to facilitate to find a buyer but also to arrange financing for preparing CDM documentation. In a number of projects, brokers bear all cost of developing CDM projects such as PDD- Project Design Document- preparation fee, validation fee, registration fee, etc. As a result, they have right to be the first buyer.

Vietnam Environmental Protection Fund- VEPF

VEPF is under the administration of MONRE and under the financial management of MOF. VEPF operates for non-profit purposes. VEPF is also responsible for CDM activities in the following areas

- Registration of CERs and implement CDM projects after getting CERs from the CDM Executive Board.
- Supervision and management of CERs granted by the CDM Executive Board to CDM projects in Vietnam;
- Collection of fees from selling CERs
- Price subsidies for CDM project's products (Vepf, 2011)

The official at Hanoi VEPF confirmed that incentives for projects which aim to improve the environment are available. Investment on WWTP is on the list. This is a financial source for breweries to support their investments in biogas technology.

(c) Supporting Organizations

Vietnam Biogas Association- Vietnam Biogas Assn.

Vietnam Biogas Association was officially founded on 9th April 2011. Vietnam biogas association is a social-professional organization, aiming to create a network for its members in the field of biogas. It is also a bridge between individuals and organizations with the state agencies in the completion of institutional system and policy. The main purpose of this Association is to develop the Vietnam biogas

sector to a well-organized structure toward commercialization, providing scientific and technological services and equipment; guaranteeing the Vietnamese life quality; To ensure international standard when participating in the export of biogas. Vietnam Biogas Association can be an important stakeholder in promotion of biogas in Vietnam in the sense that foreign biogas technology can open a seminar on biogas for beer companies to raise awareness on this issue. However, because it was newly established, the number of members is not much.

Vietnam Beer - Alcohol - Beverage Association- VBA

VBA is a voluntary non-governmental organization for enterprises in Beer - Alcohol - Beverage sector in Vietnam. Its purpose is to create a network for enterprises to cooperate, support each other in the terms of technology, trading, service, economic information and market, etc in the field of Beer - Alcohol - Beverage. It also represents and protects members' legitimate rights. Besides, it represents the members proposing suggestions to the state about guidelines, policies and motivation measures and assists the development of the Vietnam Beer - Alcohol - Beverage industry.

They organize conferences and scientific seminars; publish journals, science and technology materials to exchange experiences, encourage members to cooperate to co-exist and develop. They carry out promotion activities nationwide and worldwide in accordance with the law.

This association is a place for Beer - Alcohol - Beverage companies to meet and exchange experience. A biogas company may use this association as a bridge to reach potential customers and learn more about them as well as promote itself. There are some ways to do this such as holding seminars, advertising on the association's magazine.

MOIT publications

MOIT is also in charge of some publications: Vietnam Economic News, Industry and Trade Newspaper, Industrial Magazine, Trade Magazine. They are tools for a biogas company to promoting its company to potential customers. The company can public its product information, research and advertising.

Institutions (Research Organization)

There are some institutions in Vietnam doing research on biogas technology for small-scale farmers: Da Nang Polytechnic University, Can Tho University, Ho Chi

Minh National University, Hanoi University of Science and Technology, etc. Besides, there are also some universities which focus on improving industrial wastewater treatment and utilize biogas such as Van Lang University. These studies proved biogas feasibility for industrial wastewater in Vietnam. It will help potential customers have more knowledge on biogas utilization from wastewater treatment.

Community

The community can enjoy a big benefit if breweries invest in biogas utilization system. The surrounding environment will be less polluted by methane which otherwise is released freely or burned. Therefore, community will support any company who cares about the environment in the sense that they appreciate the better environment. Vietnam consumers have not had a strong activity to support environmental-friendly companies yet, even though MORNE has the responsibility of ‘To guide and organize the registration and recognition of environmentally-friendly establishments and products’.

(d) Creditor group

Vietnam Environmental Protection Fund-VEPF

Potential customers can seek funding from VEPF for investment in biogas technology for WWTP. VEPF’s function is to mobilize capital from the state budget, funding sources, contributions, entrusted fund from organizations and individuals at home and abroad, aiming at providing financial supports for environmental protection activities nationwide. They have 5 programmes of funding: soft loan, interest rate support, funding and co-funding, deposits for environmental restoration in mineral exploitation, and debt guarantees (See details in appendix 9).

International Funding Organization- Funding Org.

A biogas company may seek for funding for going into a new market from many International Funding Organizations. For example, Finnfund is a Finnish development finance company that provides long-terms risk capital for private projects, which involve Finnish interest, in developing countries. (Finnfund, 2011). Such organizations are a good source of low interest capital for a biogas company.

4.3.2 Analyzing stakeholder's influence on biogas business

From the above understanding of key stakeholders, the researcher takes a further step in analyzing their influence on the biogas business. The researcher would like to emphasize that this stakeholder analysis is made from a foreign biogas's point of view. The main direction is to answer the following questions:

- What are stakeholder's stakes in the biogas business?
- At which level can they influence the business?
- What does the business expect the stakeholder to provide
- What are stakeholder's attitudes and/or risks?
- What should be a biogas company's stakeholder management strategy for each type?

Table 4-12 Stakeholder Analysis

Stakeholder	Stake in the business	Potential impact on business	What does the business expect the stakeholder to provide?	Perceived attitudes and/or risks	Stakeholder management strategy
DIRECT STAKEHOLDERS					
Brewery	Enjoy partial energy self-sufficiency, CERs revenue, fertilizer revenue, & environmental fee reduction Good reputation in environmental-friendly production, meet national standard in terms of wastewater & air	High	Invest in biogas utilization, wastewater, space for biogas utilization system	Main concerns are ROI, influences on other equipment, compatible technology and applications. Biogas efficiency is not high because of WWTP	ROI proof: benchmark project or pilot project in Vietnam Upgrade WWTP
Sabeco & Habeco	Direct benefits from their breweries or indirect benefits from their subsidiaries if they invest in biogas utilization, both in terms of money and reputation	High	Decision on investment, network connection between the two corporations, and with the MOIT, and members in other segments	Main concern is ROI because this business directly affects their financial situation. Choose other suppliers	ROI proof: benchmark project or pilot project in Vietnam Strong relationship
MOIT (directly control Sabeco & Habeco)	Represents for 80% share in BOM of the two corporations	High	To approve the overall strategy, planning and development programme (policy) To be in charge of evaluation or approval, inspection, monitoring the implementation of investment projects.	Biogas utilization is an environmental-friendly project, MOIT will support it if the two corporation have proved its efficiency	Strong relationship Raise awareness of huge benefits from biogas utilization.

			Have major influence on the two corporations' every decision through its representatives in the board of managers. Provide connection to other breweries		
Foreign Biogas Technology Company-supplier	To receive revenue providing the whole package of equipment and installations, and other services; New market for their products, knowledge of Vietnam market, Or revenue from selling CERs in some entry modes such as BOT project.	High	Physical equipment and service, technology know-how ROI proof	Choose wrong entry strategy for wrong segment Don't have strong relationship with the two corporations and MOIT	If not having strong relationship, choosing segment 2
INDIRECT STAKEHOLDERS					
(a) Competitor Group					
Other foreign biogas technology company	To receive revenue providing the whole package of equipment and installations, and other services; New market for their products, knowledge on Vietnam market,	High	That they also own technology know-how	Direct competition. A fierce battle in price, product and service quality, and relationship closeness.	Keep close watch on Develop competitive strategy

	Or revenue from selling CERs in some entry modes such as BOT project.				
WWT company	To receive revenue providing the whole package of equipment and installations, other services	Medium	Not to have technology know-how but they can import equipment Knowledge on Vietnam market	If they have installed WWTP, they have a closer relationship	Keep close watch on Develop competitive strategy. Compete on technology know-how
Beer technology company	The same stake in the business	High	Not to have technology know-how but they can import equipment Knowledge on Vietnam beer producers Close relationship with potential customers	Many breweries use WWTP from these companies as the whole package in EPC project. Have strong relationship with breweries and the two corporations	Cooperate with them to have access to potential customer=>risk of IP breach (clearly state condition on risk management of IP breach with partner in the contract)
CDM consultant company	The same stake in the business CDM consultant fee	Medium - low	Not to have technology know-how but they can cooperate with other biogas technology company CDM consultant	Have advantage of knowing the CDM procedure and biogas technology know-how.	Keep close watch on Develop competitive strategy, focus on relationship closeness with potential customer
(b) Authorities Dealing with Policy and Regulation					
Vietnam Government	Better environment for the country because of GHG reduction	Medium	Provide comprehensive legal framework for RE Policy and regulations for	Support environmental-friendly projects	Pay attention to policy changes

			doing business in Vietnam		
MONRE	Environmental protection Recognition on environmental-friendly establishments and products	High	<p>Perform the state management in field of water resources, land, environmental protection</p> <p>To guide the formulation, amending and supplementation of the list of establishments causing serious environmental pollution</p> <p>To organize and manage VEPP</p> <p>To guide and supervise the implementation of national technical regulations on the quality of environment and wastes</p>	Supportive	Pay close attention to
MPI	Implement policy on investment, tendering	High	<p>To perform state management of planning, investment and statistics</p> <p>To implement registration or inspect and issue certificates for foreign investment; To carry out inspection and issue certificates for investment projects under BOT, BTO, BT modes.</p> <p>To be in charge of the implementation of legal regulations on tendering,</p>	Supportive	Follow the legal requirements

			establishment and development of enterprises		
MOF	Implement policy on finance	Medium-High	Allocate the state financial funds, financial investment for corporations Dealing with tax issues	Supportive	Follow the legal requirements
RE department of MOIT	Policy on RE	Medium-Low	Guide and implement	Supportive	Pay attention to
Provincial People's committee	They can promote local business activity, generate income activities and improve local and global environmental condition.	Medium - Low	Represent the state in implementing laws and regulations at province level	Local authorities usually encourage environmental friendly projects, especially CDM projects.	Pay attention to
(c) CDM Stakeholders					
DNA Vietnam – Vietnam National Steering Committee for UNFCCC & KP	Implement government policies on CDM procedure	Medium	Is responsible for the endorsement of PIN, granting Letter of Approval, coordinating CDM relating activities within Vietnam and the region, etc.	Supportive	Neutral
Other ministries/ organizations	Doing their functions	Low	Representative in DNA, Be responsible for steering, managing and coordinating	Supportive	Neutral

			activities related to Vietnam's implementation of the KP.		
CDM consultant company	Consultant fee, mostly in form of a certain percentage	Low	Prepare documents in accordance with requirements for CDM projects	Supportive	Employ in case of BOT contract
CDM buyer	CERs	Medium	Buy CERs	Supportive, but if the amount of CERs is small, they will not be interested in buying	If each project's CERs is small, then do a series of projects and calculate all CERs together
CDM broker	Fee for service	Low	To facilitate to find a buyer but also to arrange financing for preparing CDM documentation	Supportive	Neutral
VEPF	Collect fee for CDM procedure	Low	Service for CDM procedure Registration of CERs and implement CDM projects after getting CERs from the CDM Executive Board. Supervision and management of CERs granted by the CDM Executive Board to CDM projects in Vietnam;	Supportive	Neutral
(d) Supporting Organizations					
Vietnam Biogas	Information on biogas technology	Low	A place for potential customers to learn more about biogas	Supportive	Keep in touch, holding conferences

Association			energy		
VBA	Information on biogas technology	Medium	A place for potential customers to share information in their industry	Supportive	Keep in touch, holding conferences, advertising on their publications
MOIT publications	Information on biogas technology, fee from these article, advertising	Medium	A connection to potential customers and related stakeholders	Supportive	Manage public information
Institution (Research Organization)	Information on biogas technology	Low	Information on biogas technology in Vietnam, doing feasibility study on biogas production	Supportive	Keep in touch
Community	Cleaner environment	Low	N/A	Supportive	Neutral
(e) Creditor Group					
VEPF	Implementing is goals of supporting environmental projects	Medium-High	Giving financial funds for environmental project like biogas utilization	Worried about paying back ability of borrowers in terms of time and capacity	Neutral
International Funding Organizations	Provide credit for a foreign company	Medium-Low	Giving financial funds for biogas company	Worried about paying back ability of borrowers in terms of time and capacity	Access

4.3.3 Stakeholder influence grid

After analyzing stakeholder's influence, the researcher maps them into a grid to have an overall view on their integrated influence. Criteria for mapping key stakeholders are: what influence a stakeholder has and how it impacts upon the biogas business. Those stakeholders, who have different influence aspects, there will be more places for them in the grid. VEPF, for example, belongs to both CDM group and creditor group, therefore, it has two places in the grid.

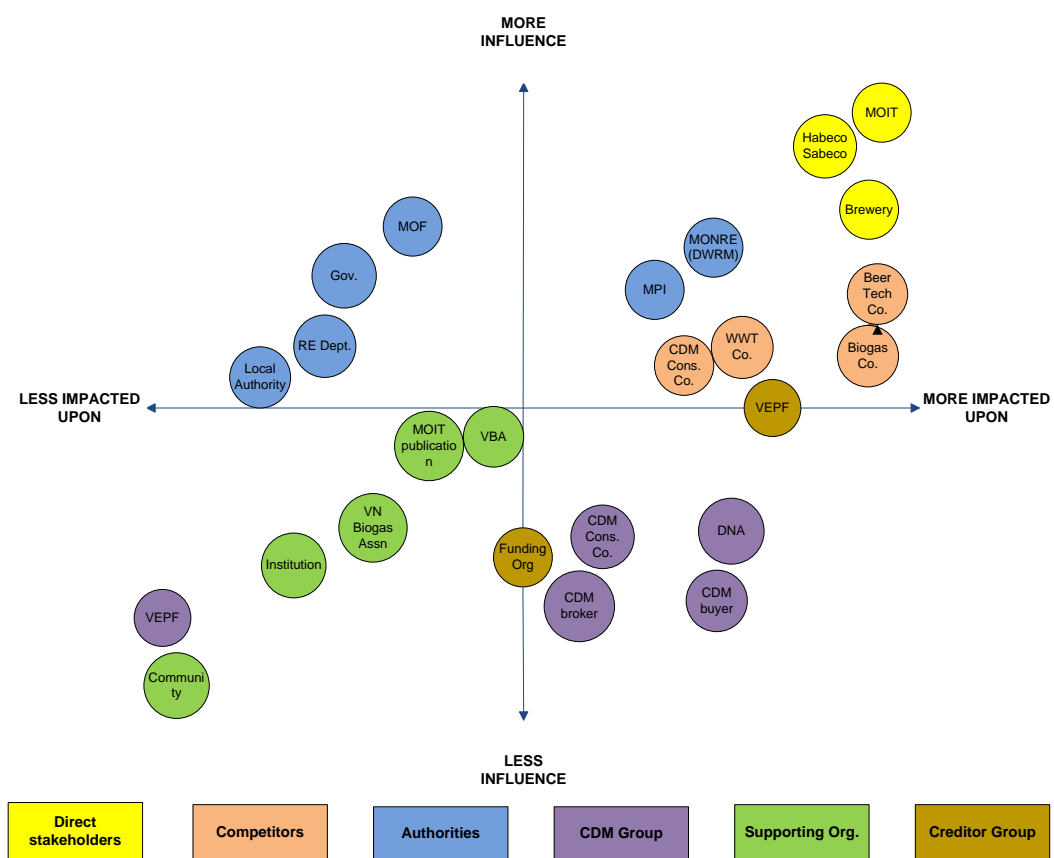


Figure 4-19 Stakeholder Influence Grid

5 RECOMMENDATION FOR BUSINESS MODEL AND APPROPRIATE APPROACH TO TARGET CUSTOMERS

Going through the whole process of market analysis, the researcher had an in-depth knowledge on how the biogas technology market in Vietnam is organized, how the potential customers are organized and what their decision-making processes are, what regulations and laws regulate biogas business, what key stakeholders are and how they may influence the business. The researcher would suggest that the most potential segments are the segment 1 and 2.

5.1 Promotion strategy

Regarding the first step to access potential customers, the researcher would recommend posting articles on the VBA publications and MOIT publications. These articles are an efficient way to raise potential customers' awareness and related stakeholders about biogas utilization in breweries.

Advertising on Google is also recommended as Vietnam customers tend to google the technical aspects of products and available suppliers. Making the company's website accessible and in Vietnamese is a plus point for Vietnam market.

The researcher would also suggest a biogas company to hold seminars, conferences on biogas technology for breweries through the help of Vietnam Biogas Association, VBA, or the two corporations. A conference for MOIT- the main stakeholder of the two corporations is suggested.

It would be a great idea to bring an identical example of a successful brewery who utilized biogas. Furthermore, if the biogas company can give a ROI in details will be more persuasive. The more important thing is that for those large breweries, the biogas company should both emphasize ROI and environmental-friendly production while small breweries just need emphasize ROI. The reason is that large breweries care more about environmental-friendly production image than those medium and small ones.

5.2 Product strategy

A biogas company also should consider price, technology, and applications for Vietnam market, not according to the standards of its own country. In other words, design the product in the concept of Vietnam market: reasonable price, parallel technology and applications. Besides, safety and biogas fluctuation control are also requirements in designing the system.

5.3 Business model recommendations

Considering the instability of the world's economy as well as Vietnam's economy, and the cumbersomeness of the Vietnam administration procedure, the researcher would recommend non-equity entry modes for a foreign biogas company. Turnkey projects and BOT contracts are the two appropriate forms, from the researcher's point of view.

5.3.1 Business model for Turnkey projects

For a company who does not want to take too much risk, the appropriate entry mode should be separate-independent turnkey projects.

Value proposition: Provide physical biogas utilization system that enables customers to utilize biogas for other purpose and reduce CO₂ emission.

Market segment (target customers): Newly established breweries in segment 1 and segment 2.

Value chain

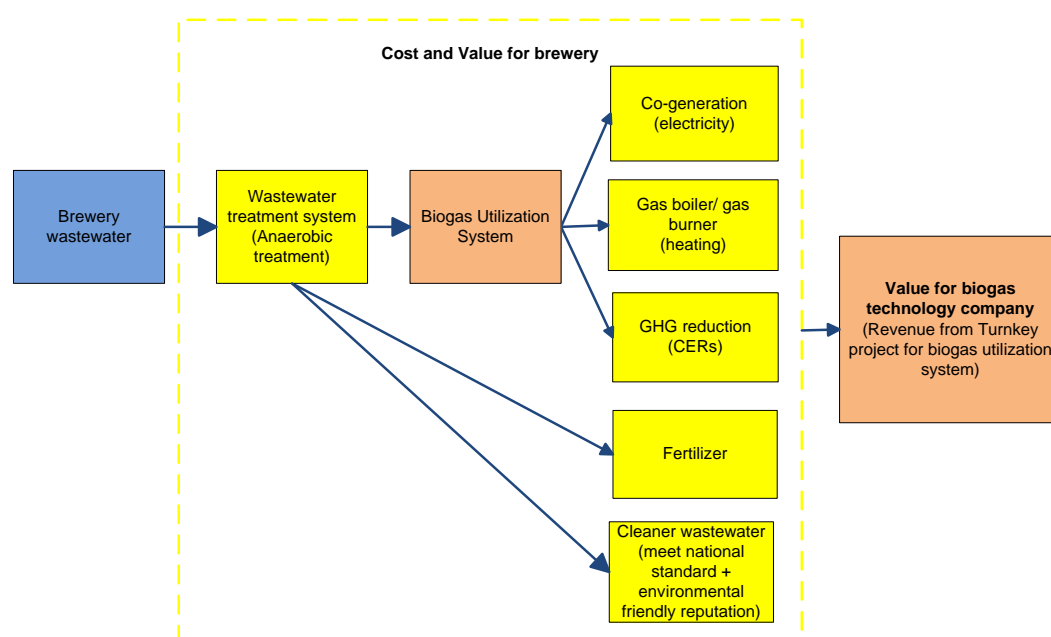


Figure 5-1 Value Chain for Turnkey Entry Strategy

Cost structure and profit potential

Cost for R&D, product design, production, marketing and installation, technology transfer. Train client's staff in operations, procedures and maintenance.

Potential profit comes from added value for physical equipment and service. Future profit may come from maintenance or repair service.

Value network: N/A

Competitive strategy:

- Technology know-how on handling the potential customers' concern of corrosive on other equipment and safety
- Low costs on operation and maintenance
- Easy to operate and repair
- Reliable brand

5.3.2 Business model for BOT contracts

Those breweries, which have less modern facilities, often have sub-standard WWTPs. Therefore, the amount of biogas generated from anaerobic treatment is not high. In these cases, a biogas company should use BOT method to approach

potential customers. The biogas company can either upgrade current WWTP of these breweries or build a new one.

The researcher would recommend a biogas company to cooperate with a local beer technology company in this business model. The biogas can take advantage of the local partner's network with potential customers, reduction in price of WWTP, and better after-sales service.

Value proposition: Upgrade WWTP and attached biogas utilization system or build a new biogas plant. Operate in 10-15 years and provide cheap energy sources for customers. Transfer property (biogas plant) for customer after 10-15 year.

Market segment (Target customers)

- Separate-independent BOT contracts: for older breweries or going-to-be-built breweries in segment 2. Most of them have capacities of less than 100 million liters per year.
- Series of BOT contracts for older breweries in segment 1 because they have the same owner. This way of doing will save time and effort in accessing the customers and doing marketing activities.

Value chain

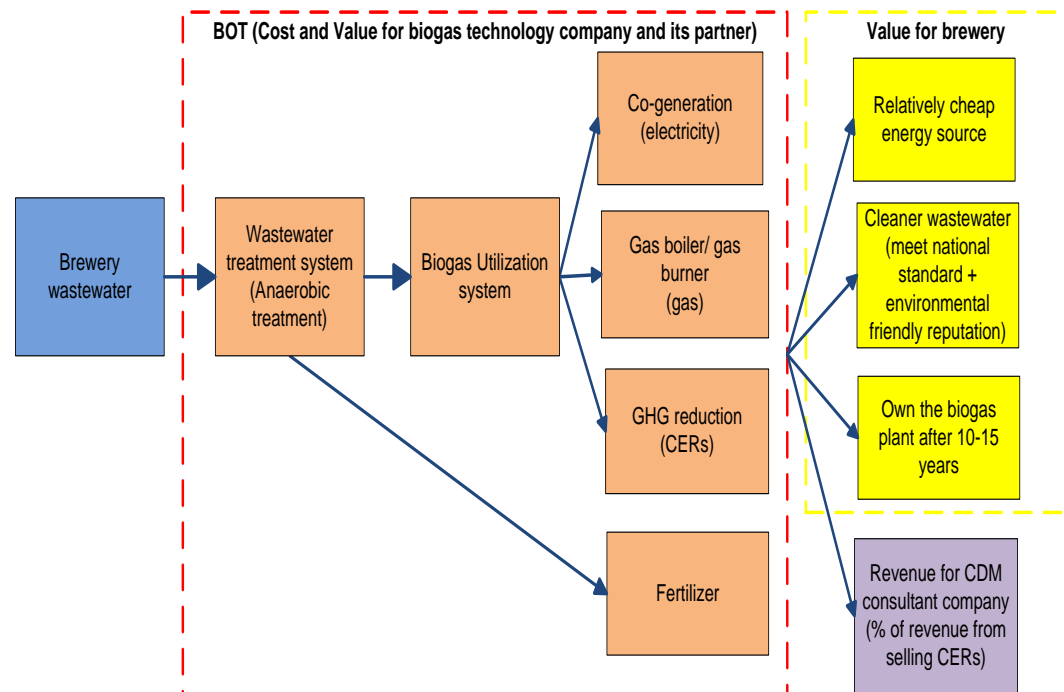


Figure 5-2 Value Chain for BOT Entry Strategy

Cost structure and profit potential: The cost comes from core activities: R&D, design, production, marketing, build, operation, maintenance.

Revenue flows:

- Energy selling to the breweries with an appropriate price over 10-15 years.
- CERs revenues
- Fertilizer revenue

The cost is shared between partners based on their proposition in the contract.

Value network

- A local beer technology will be responsible for upgrading or building WWTP.
- A brewery becomes a customer of energy trade. The factory will provide a certain wastewater amount and area for building plant. The biogas company will sell energy generated from biogas plant to the factory at an appropriate price. The benefits of the brewery are cheap energy resource, free wastewater treatment service, free plant after 10-15 years.
- The CDM consultant company: In order to register for CDM projects, the biogas company should seek service from a CDM Consultant Company. The consultant will be responsible for all documents for CDM project registration, finding a CDM buyer and inspecting the CDM project regarding CO₂ reduction for the whole CDM period. In return, the CDM Consultant Company will enjoy a certain amount of revenue coming from selling CERs.

Competitive strategy:

- Strong financial situation of a biogas company and strong relationship of its partner with potential customers.
- Technology know-how on handling the potential customers' concern of corrosive on other equipment and safety
- Low costs on operation and maintenance.
- Easy to operate and repair
- Reliable brand

5.4 Risk management

Risk management for each group of stakeholders was described in the stakeholder analysis. In short, for direct stakeholders, a biogas company should expend great efforts on MOIT, corporations and breweries. In the competitor group, other foreign biogas companies and Vietnam local beer technology companies are strong stakeholders. From the policy aspect, the biogas company should keep close eyes on MONRE, MPI and MOF.

Here, the researcher would like to emphasize IP protection. It is a good idea to clearly state which legal resources will be applied, what rights and obligations the customer or partner have regarding IP, how conflicts and disputes are settled and by what legal entity. A company should choose arbitration outside Vietnam because it minimizes the ability of dealing with complication in the Vietnamese legal system.

There is a risk that KP will expire in 2012, if governments are not interested in keeping it. Legally, KP is ended when governments agree. The EU, who is the main buyer of CDM credits, will back a Kyoto extension, if other major emitters commit to stronger emissions reductions. Russia, Japan, Canada and others will not sign up to a second commitment period unless it includes all major emitters. China, India and others refuse to take on binding targets after 2012 unless all developed nations, including the United States, not only sign up to a new pact but make much deeper emission cuts than already pledged (Reuters, 2011b). The consequence is that the major financing sources for biogas companies to take part in BOT contracts will vanish. Hence, the recommendation of BOT model will not be appropriate; a motivation for potential customers to invest in biogas technology through turnkey projects will decrease too.

6 CONCLUSION

This thesis is set out to analyze the Vietnam market to seek for business opportunity in terms of biogas technology for foreign companies. The Vietnam beer industry was chosen because it has large market size, high growth rate and more demand for partial energy self-sufficiency source in the future. From the initial information on the target market, the researcher designed research questions and research approach to achieve the objectives. The main objectives of this paper were to suggest the most profitable market segment and an appropriate approach entry strategy to enter Vietnam market. In order to answer research questions, the researcher employed qualitative method to carry out this research.

Data was collected through 2 stages: desk-research and empirical research. The researcher conducted 17 interviews with the identified market segments, including potential customers, corporation staff, biogas-experienced breweries, government officials and Finnish biogas company. Potential customers helped the researcher understand their buying behaviors, expectations and concerns in terms of biogas technology. At the upper level, corporation staff gave valuable information on how the corporation governs its breweries and subsidiaries. Biogas-experienced breweries helped the researcher understand more about the reasons why Vietnam breweries are still reluctant with biogas utilization. Government officials provided useful information on the regulation, law, and incentives. A Finnish company also gave their criteria and concerns on entering a new market, which drove the researcher to focus more on law and regulation.

All the collected data was analyzed and assessed before presenting the findings. Market analysis tools were applied to analyze Vietnam macro environment, biogas technology market in Vietnam, market segments and segment selection, key stakeholders' influence on the business, entry mode, and business model for the foreign biogas company.

Key findings

- The more reliable number of breweries in Vietnam is 163, based on the researcher's synthesized conclusion. It turns out that even though biogas is not a new phenomenon, only three breweries in Vietnam utilized this

valuable resource. Two out of these three breweries have temporary stoppages in using biogas because of technical problems.

- Local biogas technology companies' capacities are low, in terms of financial, technology know-how, after-sales services.
- **Market growth and investment:** The beer sector belongs to the Beer - Alcohol - Beverage industry which had an average growth rate of 15.03% during 2000-2007. This industry is forecasted to grow at 12% during 2006-2010; 13% during 2011-2015, and 8% during 2016-2025.

Vietnam beer sector will receive VND 18.042 trillion in 2015 and VND 24.056 trillion in 2025 for investment.

Legally, investment projects for building plants with capacity of more than 50 million liters per year have to be approved by the MOIT. The ones with capacity of more than 200 million liters per year must be approved by the Prime Minister.

The amount of beer consumed has been boosting rapidly and steadily for decades. Vietnam produced 2.5 billion liters beer in 2010. The amount is estimated to reach 4 billion liters in 2015, and 6 billion liters in 2025.

- **Market structure:** Low-end segment and middle segment dominate the whole Vietnam beer market, comprising 88% of the total market volume. Local beers are the market leader in these segments. The biggest consumption area is in the North of Vietnam, making up more than 50% of the whole country's consumption.
- **Market share:** Vietnam beer is mainly produced by the three giant producers (95% output), namely Sabeco, Habeco and VBL, of which, Sabeco and Habeco are state owned corporations. They operate on the principle of parent company and subsidiaries. The parent company controls the technology, investment, capital, brand and market of the subsidiaries.
- **Level of production line technology:** Breweries with capacity of more than 50 million liters per year have modern facilities, mostly coming from foreign countries. Breweries with capacity of 20-50 million liters per year are installed with local equipment, with some important components imported from the EU. Production lines of those with capacity of less than 20 million liters per year are heterogeneous or obsolete.

- **Main constructors:** German Kroness AG Company is the main supplier for production lines in EPC contracts for medium and large breweries in Vietnam. WWTPs at these breweries are supplied by local companies like POLYCO, ERESSON, and ASIATECH etc. Most breweries are using UASB reactors for anaerobic treatment in their WWTPs.
- **Buying criteria:** ROI is the most critical purchasing criterion. 100% of the interviewed companies agreed with this. And, they will be encouraged more by a short period of ROI. Also, larger breweries are more appreciative of the environmental-friendly production image than others.
 From technical aspect, many breweries are concerned about biogas fluctuation, the corrosive caused to other equipment due to impurities in biogas, and safety of using the gas utilization system.
 Western products somehow do not match with local need in terms of price, technology and applications as those of Asian products.
 There is no fixed number for what percentage the energy cost accounts for in the product's price. However, one interviewee estimated that the energy cost is around VND 200 per liter.
- **Reason for not utilizing biogas yet:** There are three main reasons why breweries are not highly interested in utilizing biogas yet. First, investment for utilizing biogas is high while ROI is not secure. Second, many breweries have a sub-standard WWTP, which means they will spend more money to upgrade on wastewater treatment process if they want to utilize this energy. Thus, they are more reluctant to invest in biogas technology. Finally, unsuccessful biogas utilization in 2 breweries is one of the inherent factors discouraging other breweries thinking of biogas utilization.
- **Unexpected discovery:** Right now, many breweries are moving or planning to move their facilities out of city/province centers according to the Decision 64/2003/QD-TTg. 4 breweries out of the interviewed breweries are moving or planning to move their facilities; 5 breweries are in the progress of raising capacity. 8 breweries are going to raise capacity in the near future. One big brewery is in need of a biogas utilization system.

After evaluating each segment's attractiveness index, selecting the most profitable segments, and identifying each stakeholder's influence level and risk management,

the researcher made some recommendations for foreign biogas companies. If they use these recommendations, the chance to succeed in entering the Vietnam market will rise.

The segment 1 and segment 2 are recommended as the most profitable for a biogas company. The segment 1 includes 24 breweries belonging to the two state owned corporations- Habeco and Sabeco. Segment 2 is comprised of the remaining 29 medium and large breweries, in forms of JV and JSC.

The appropriate market entry modes are non-equity modes, namely turnkey project and BOT contract. The ways to approach potential customers are advertising on VBA and MOIT publications, holding seminars, conferences through the help of Vietnam Biogas Association or VBA, Sabeco, Habeco or MOIT. Making the company's website accessible and in Vietnamese, and advertising on Google will increase chances for the biogas company.

There should also be a case study on a successful brewery with an analysis of ROI on biogas technology. More specifically, the emphasis on ROI and environmental-friendly production will have more influence on large breweries while small breweries just need emphasis on ROI.

The researcher also formulated business modes for 2 entry mode choices. This gives a clearer view on how a biogas company earns revenue and what value potential customers enjoy. Separate-dependent turnkey project is suggested for new breweries in segment 1 and 2. Separate-independent BOT contract is suitable for the older breweries in segment 2 and a series of BOT contracts is the most appropriate option for older breweries in segment 1 to take advantage of the same owner.

Stakeholder risk management must carefully state the most important stakeholders in each group. In addition, risk management on IP protection should be well prepared in advance.

There is a risk that the Kyoto Protocol will expire in 2012. Then, the major financing sources of selling CERs for biogas companies to take part in BOT contracts will vanish. Hence, the recommendation of BOT model will be up in the air, a motivation for potential customers to invest in biogas technology through turnkey projects will decrease too.

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8.1 Appendix 1: Biogas Technology for Treating Industrial Wastewater

In order to produce biogas, a substrate must be treated in an anaerobic digestion (AD) process. Based on the reached temperature during the process, AD is divided into three ranges, Cryophilic (under 25⁰C), Mesophilic (25-40⁰C) and Thermophilic (45-65⁰C) (Henze et al, 1997, p.124). The higher the temperature is, the higher the reaction rate is. In this context, it means that the rate of substrate removal per amount of biowaste is higher under the thermopholic range (EIA biogas, 2001, p.4). The AD process consists of two sub-processes, a microbiological process and a technological process.

Microbiological process of AD

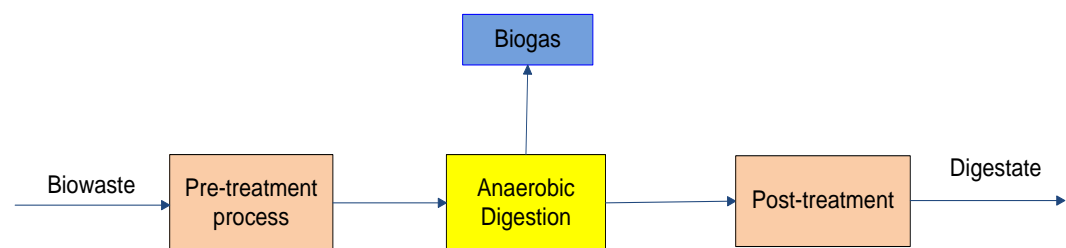
Basically, there are four steps in the microbiological process of AD: Hydrolysis, Acidogenesis, Acetogenesis and Methanogenesis. They are consequent steps, in which the product of the previous step is the initial material for the following step. In each step, a certain group of bacteria will be used for decomposing the organic matter. Biogas and digestate (fertilizers) are harvested as by-products of the AD process (EIA biogas, 2001, p.4).

Anaerobic Process Steps (Juncà, 2010, p.15)

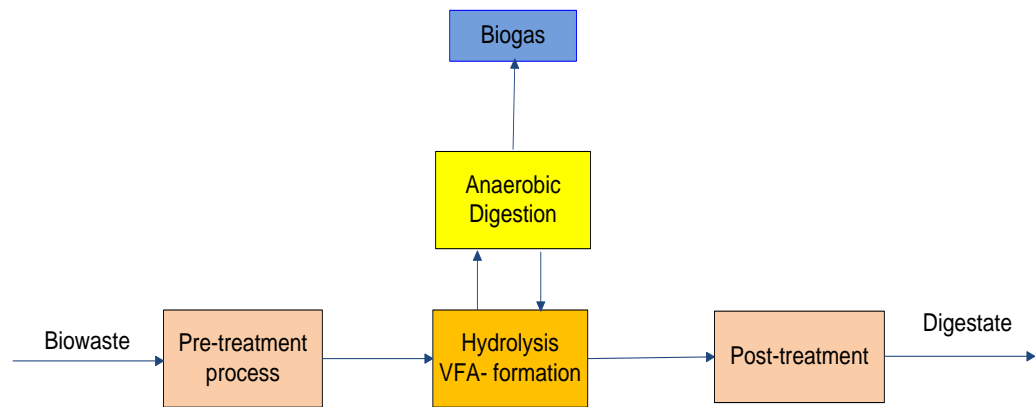
Step	Type	Bacteria group	Substrate(s)	Product(s)
Hydrolysis	Enzymatic	Extra-cellular	Particles, large dissolved molecules, carbohydrates, proteins and lipids	Amino acids, fatty acids, monosaccharides (sugars), alcohols
Acidogenesis	Biological	Acid-forming bacteria	Carbohydrates, amino acids, long chain fatty acids	Butyric acid, propionic acid, acetic acid (VFAs), H ₂
Acetogenesis	Biological	Acetogenic bacteria	High molecular and volatile fatty acids	Acetate
Methanogenesis	Biological	Acetoclastic bacteria Methane bacteria	VFA (such as acetate) H ₂ , CO ₂	Methane, CO ₂ , Methane

Technological process of AD

There are several ways to classify the basic technological process of AD. In respect to the dry matter content of the feedstock, the technological process can be divided into two types, wet (max. 10-15% dry matter) and dry (max 20-40% dry matter). Regarding steps of the production, it can be single-step or multi-step, continuous or batch or the combination of these (Wellinger, 1999)



Single-step Process (Wellinger, 1999)



Multi-step Process (Wellinger, 1999)

The efficiency of anaerobic treatment is affected mainly by the type of a reactor used. With the development of secondary generation reactors, so-called high-rate digesters, the efficiency rate has improved significantly, drawing the upward trend of the worldwide interest in anaerobic treatment, especially in agro-food sector. This system allows an extreme uncoupling of the solids retention time from the hydraulic retention time (Van Lier, 2008, p.15-25). However, the treatment effectiveness of these reactors depends on factors such as wastewater composition, the temperature and pH level (Medhat & Usama, 2004, p.817-818).

Anaerobic Treatment as Compared to Aerobic Treatment (Parawira, 2004, p.7)

	Aerobic digestion	Anaerobic digestion
Start-up	Short start-up period	Long start-up period
Process	Integrated and phosphorus removal possible Production of high excess sludge quantities Large reactor volume necessary High nutrient requirements	No significant or phosphorus removal, nutrients removal done via post treatment Production of very little excess sludge (5-20%) Small reactor volume can be used Low nutrient requirements
Carbon balance	50-60% incorporated into CO ₂ ; 40-50% incorporated into biomass; 40% lost as process heat	95% converted to biogas, 5% incorporated into microbial biomass
Energy balance	60% of available energy is used in new biomass; 40% lost as process heat	90% retained as CH ₄ , 3-5% is lost as heat, and 5-7% is used in new biomass formation
Residuals	Excess sludge production No need for post-treatment	Biogas, nitrogen mineralized into ammonia Post-treatment required for removal of remaining organic matter and malodorous compounds
Costs	Low investment costs High operation cost for aeration, additional nutrient and sludge removal, and maintenance	Often moderate investment costs Low operating costs due to low power consumption and additional nutrients hardly required

8.2 Appendix 2: Interview question
Interview questionnaire for potential customer

Company Name:

Interviewee:

Place:

Title:

Date/Time:

1.	What is your position in the company?
2.	<p>How long have you worked in this company? _____ (months/years)</p> <p>How long have you worked in this industry? _____ (months/years)</p> <p>Size of business:</p> <p>Number of personnel:</p> <p>- Small (Number of Employees 10-200 or Capital Investment < VND 20 billion)</p> <p>- Medium (Number of Employees 200-300 or Capital Investment VND 20 billion – 100 billion)</p> <p>- Large (Number of Employees >300 or Capital Investment > VND 100 billion)</p>
3.	<p>How would you describe your role in the decision making in buying new equipment in your company?</p> <p><input type="checkbox"/> I make the decision myself - Is there a threshold of purchase that can be done by individual?</p> <p><input type="checkbox"/> I am part of the decision making process – Who are in the team?</p> <p><input type="checkbox"/> I know the process well and sometimes participate in it - what kind of decisions have been participating in lately?</p> <p><input type="checkbox"/> I am not part of the process but I am familiar with the process / is it a clear process?</p>
4.	<p>What is the capacity of your company in terms of output per month/year?</p> <p>_____</p>
5.	<p>Wastewater volume per day: _____ m³</p> <p>Wastewater treatment plant capacity: _____ m³</p>
6.	<p>What energy sources is your company using at the moment?</p> <p><input type="checkbox"/> Electricity</p> <p><input type="checkbox"/> Petro/ Diesel</p> <p><input type="checkbox"/> Coal</p> <p><input type="checkbox"/> Other, please specify _____</p> <p>Can you rank the energy sources from the most important to the least? If possible, please specify how many percentage each energy source make up.</p> <p>How much is your company's energy bill per month?</p> <p>VND _____ (Confirm is the figure exact from a bill or the persons estimate? _____)</p> <p>How often is your company affected by shortage of energy for production?</p> <p>_____</p> <p>What is your company's backup source for energy in case of blackout?</p> <p>_____</p>

7.	Have you ever been offered the biogas digesters to integrate with wastewater treatment system?				
	Yes, by what company / what happened / why was it a good deal, bad deal?				
	In case your company decides to invest in biogas digesters, please state the following criteria's importance to your company	Most important	Important	Less important	Least important
	Investment cost	1	2	3	4
	Maintenance requirements (fee, technical support)	1	2	3	4
	Meeting the government standard of wastewater treatment	1	2	3	4
	Added values (biogas, fertilizer, CERs, reduction of wastewater fee)	1	2	3	4
	Environmental friendly production (Reduction of unpleasant smell and odor)	1	2	3	4
	Be self-sufficient in energy	1	2	3	4
	OPEN DISCUSSION ISSUES: To understand how your company makes decision on investing new equipment, can you explain the purchase process in more details?				
- How does your company get information of suppliers? - Through what process your company decides the selected supplier? (Tender, offers, acquaintances...) - How is a new investment approved in your company?					

8.3 Appendix 3: Law on CDM project

1. Procedure for CDM projects and related law and regulations (Anh Tran Hai, 2009)

No.	Legal documents No	Issued by Authorities	Content of legal documents
1.	Directive No. 35/2005/CT-TTg, dated 17/10/2005	Prime minister	Guide implementation of Kyoto Protocol to the UNFCCC. The directive stipulate obligations for each organization: MONRE, Ministry of Culture and Information, Ministry of Justice, MOF, MPI, Ministries, ministerial level and governmental agencies, centrally affiliated provincial and municipal people's committees, Chairmen of People's Committee of centrally-affiliated provinces and cities.
2.	Circular No. 10/2006/TT-BTNMT, 12/12/2006	Ministry of Natural Resources and Environment	A guide to implementation of CDM projects under the KP.
3.	Decision No. 47/2007/QD-TTg, 04/2007	Prime minister	Vietnam master plan for implementation of KP, period of 2007-2010
4.	Decision No. 1016/QD-BTNMT, 07/2007	Ministry of Natural Resources and Environment	A national steering committee was set up in July 2007. This committee is responsible for overseeing implementation of KP and UNFCCC
5.	Decision No. 1133/QD-BTNMT, 07/2007	Ministry of Natural Resources and Environment	To set up National Standing Office, the representative of the Steering Committee. The National Standing Office is responsible for drafting regulations, policies, implementation manners, etc. and is the key contact organization among relevant entities. National Standing Office of National Steering committee for UNFCCC & KP 83 Nguyen Chi Thanh, Dong Da, Hanoi Tel: 84-4-7759384/5 Email: vnccoffice@fpt.vn
6.	Decision No. 130/2007/QD-TTg, 02/08/2007	Prime Minister	Provide mechanism and financial policies toward CDM projects in Vietnam.
7.	Inter-circular No. 58/2008/TTLT-BTC-BTN&MT 4 July 2008 issued by MONRE and MOF	Ministry of Natural Resources and Environment and Ministry of Finance	To guide implementation of Decision No. 130/2007/QD-TTg: Financial policy on CDM projects

Decision No. 130/2007/QĐ-TTg

The Decision provides the definition of CDM investors: domestic investors, foreign investors and JV investors. Rights and obligations of CDM investors are provided.

The CDM investor's rights include:

1. Favourable tax incentives applicable for most priority projects, according to Law of Investment
2. Probably eligible for subsidy per unit of productions (applicable for electricity generation only)
3. Eligible for financial support to prepare CDM project documentation
4. Prioritize to use products from CDM's projects in comparison with similar products from other non-CDM projects.

The CDM investor's obligations are:

1. Register with Vietnam Tax Department (in order to get tax incentives)
2. Register with Vietnam Environmental Fund on amount of granted CERs
3. Pay CDM fee, according to applicable legal regulation on fees in Vietnam.
4. Under supervision of relevant entities
5. Provide reports to relevant governmental entities.

Conditions for development of CDM projects:

1. Projects should be in-line with national sector strategies, national sartorial master plan, and contribute to sustainable development;
2. Implementation on voluntary basic
3. Having Environmental Impact Assessment Report;
4. Actually reduce GHG with improved conditionality and proper monitoring plan;
5. CDM projects are not allowed to use ODA or government budget to develop CDM and to transfer CERs to foreign investors. The last condition creates a tough barrier for ODA projects.

Inter-circular No. 58/2008/TTLT-BTC-BTN&MT

Stipulate details on management, utilization of CER revenues, payment of CER revenue fees, and utilization of CER revenues from CDM projects using ODA and subsidy mechanisms to products of CDM projects.

CER revenues from CDM projects using ODA will be government properties. The investors of CDM project using ODA have to transfer all receivable CER revenues

to the Vietnam Environmental Protection Fund, after deduction of CDM development expenses, if any.

CER fees that investors have to pay to Vietnam Environment Protection Fund are calculated as a percentage of the CER revenues, according to the CER purchase Agreement. The percentage used to calculate the fees depends on the technology used in the project:

No.	Sectors	Percentage
1	Energy conversation and energy efficiency	1.2%
2	Renewable energy	1.2%
3	Forest and afforestation	1.2%
4	Fuel conversion	1.5%
5	Landfill and gas recovery	1.5%
6	Reduction of CH ₄ emission from agricultural and animal husbandry activities; utilization of biogas	1.5%
7	Recovery and utilization of accompany natural gas from crude oil field	2%
8	Others sectors that help to reduce GHGs	2%

Fee on CER revenues is paid in VND, according to the exchange rate applicable at the date of transaction. In case where the CDM project investors are both domestic and foreigners, the domestic investor is responsible for paying the fee on the CER revenues. A format of declaration of payable fees on CER revenues is annexed to the Inter-circular.

The collected fee on CER revenues, deposited in Vietnam Environment Protection Fund, will be used for the following activities:

- Operation of National Steering Committee
- Monitoring and Supervision of CDM projects
- CDM awareness raising; CDM information dissemination;
- Financial support to develop PDD (this should not exceed 30% of the total PDD development cost);

Subsidies for electricity generated from CDM renewable energy projects are stipulated in the Inter-circular. Eligible renewable energy projects are wind energy, tide energy, geothermal energy, solar energy, electricity generation from landfill and gas recovery. The level of subsidy is calculated based on the following formula:

Subsidy per unit of production = Actual production cost per unit of production + Planned profit per unit of production - Actual selling price per unit of production.
The subsidized duration does not exceed the depreciation period of main equipment in power generation plants.

CDM project development procedure

Step 1: Prepare PIN

CDM project investors develop PIN and submit 16 copies, in Vietnamese and 16 copies in English to MONRE. Then MONRE will consider the legal eligibility of the project and send the PIN to all members of the National Steering Committee for comments. Based on comments from these members, the Minister of MONRE will issue a Letter of Acceptance. This should be completed within 25 working days from the date of receiving proper PIN;

Step 2: Prepare PDD

After receiving Letter of Acceptance, the CDM project investor will develop the PDD. In the case where the investor does not need the Letter of Acceptance, the investor can skip step 1 and start with step 2;

After completing the PDD, 16 copies in Vietnamese and 16 copies in English will be submitted to MONRE. Then MONRE will consider the legal eligibility of the project and send PDD to all members of the National Steering Committee for comments. Base on comments from these members, the Minister of MONRE will issue a Letter of Approval. This task will be completed within 50 working days from the date of receiving proper PDD.

Upon receiving the Letter of Approval, the project investor can start the process to register project with EB.

2. LAW ON TENDERING No. 61/2005/QH 11 DATED 25TH DECEMBER 2001
(Allens Arthur Robinson - Vietnam Laws Online Database on www.vietnamlaws.com)

Article 14 Preferential treatment in international tendering

Entities entitled to preferential treatment in international tendering shall comprise:

1. Tenderers are enterprises established and operating in Vietnam pursuant to the *Law on Enterprises* and the *Law on Investment*.
2. Partnership tenderers are who one of the partners being an entity prescribed in clause 1 of this article undertakes work valued at over fifty (50) % of a tender package for consultancy services or for construction and installation, or of an EPC tender package.
3. Tenderers participating in tendering for tender packages for procurement of goods where the ratio of the domestic manufacturing costs of such goods is thirty (30) % or more.

The Government shall provide detailed regulations on preferential treatment in international tendering.

Article 18 Open tendering

1. The form of open tendering must be held for the selection of a contractor to implement a tender package belonging to the projects stipulated in article 1 of this Law, except in the circumstances stipulated in articles 19 to 24 inclusive of this Law.
2. In open tendering, the number of participating tenders shall be unrestricted. Prior to issuing the tender invitation documents, the party calling for tenders must publish a notice inviting tenders in accordance with article 5 of this Law so that tenderers will have information about participation. The party calling for tenders must supply tender invitation documents to any tenderer who wishes to participate in the tendering. The tender invitation documents must not include any term or condition aimed at restricting the participation of tenderers or favoring one or more tenderers thereby causing unfair competition.

Article 19 Limited tendering

1. Limited tendering shall apply in the following cases:
 - (a) Where a foreign donor providing the financing source for the tender package so requests;

(b) Where the tender package has highly technical requirements or technical peculiarities; or in the case of tender packages of a research or experimental nature for which only a limited number of tenderers are capable of satisfying the requirements of the tender package.

2. When limited tendering is held, a minimum of five tenderers considered to have the capability and experience to participate in the tendering must be invited; if in fact there are less than five tenderers, the investor must make a submission to the authorized person for his consideration and decision on permission to continue to hold limited tendering or to apply another form of selection of contractor.

Article 20 Direct appointment of contractor

1. Direct appointment of a contractor shall apply in the following cases:

(a) In the case of an event of force majeure due to a natural disaster, war or a breakdown which should be immediately dealt with. The investor or the body responsible for managing the building works or assets affected shall be permitted to immediately appoint a contractor to carry out the work. Within a time-limit not to exceed fifteen (15) days as from the date of making a direct appointment, the investor or the body responsible for management of the building works or assets affected must, together with the appointed contractor, carry out the stipulated procedures for appointment of a contractor;

(b) Tender packages in which the foreign donor stipulates that there shall be direct appointment of a contractor;

(c) Tender packages belonging to national confidential projects; and urgent projects in the national interest or for the safety and security of energy as decided by the Prime Minister of the Government when deemed necessary;

(d) Tender packages for the procurement of any type of materials and equipment in order to restore, maintain or expand the capacity of equipment and technological production lines which were previously purchased from the one supplier, and in order to ensure compatibility of facilities and technology it is not possible to purchase such materials and equipment from other supply tenderers;

(đ) Tender packages for consultancy services with a tender package price of less than five hundred million dong, tender packages for the procurement of goods

or for construction and installation with a tender package price of less than one billion dong belonging to projects for investment and development; tender packages for the procurement of goods with a tender package price of less than one hundred million dong belonging to a project or estimated budget for recurrent procurement; however tendering shall still be held when deemed necessary.

2. When conducting direct appointment of a contractor, the selection must be of a contractor who is determined as having sufficient capability and experience to satisfy the requirements of the tender package and there must be compliance with the procedures stipulated by the Government for carrying out direct appointment of a contractor.

3. Prior to directly appointing a contractor in the cases stipulated in sub-clauses (b), (c), (d) and (đ) of clause 1 of this article, the estimated budget of the tender package must be approved in accordance with regulations

Article 21 Direct procurement

1. Direct procurement shall apply when a contract was signed for a tender package with similar contents within the previous six (6) months.

2. When conducting direct procurement, it shall be permitted to invite the tenderer who was selected via tendering to implement the earlier tender package with similar contents.

3. The unit price of the items of a tender package for which the form of direct procurement is applied shall not exceed the unit price of the corresponding items of the previous tender package for which a contract was signed.

4. Direct procurement may apply in order to implement a similar tender package belonging to the same or another project.

Article 22 Competitive quotation in procurement of goods

1. The form of competitive quotation shall apply in cases which satisfy all the following conditions:

(a) The tender package price is less than two billion dong

(b) The items to be purchased are commonly used goods which are readily available on the market, which have standardized technical features and which are similar to each other in quality.

2. When conducting competitive quotation, a request to provide a quotation must be sent to tenderers. Tenderers may send their quotation directly to the party

calling for tenders, by fax or via the post office. Each tender package must have a minimum of three quotations from three different tenderers.

Article 23 Self-implementation

1. The form of self-implementation shall apply where the investor is also a contractor with sufficient capability and experience to implement the tender package belonging to the project which such investor manages and uses.
2. The estimated budget for the tender package must be approved in accordance with regulations in order to apply the form of self-implementation. The entity supervising the implementation of the tender package must be organizationally and financially independent of the investor.

Article 24 Selection of contractor in special cases

In the case of a tender package with particular requirements for which the forms of selection of contractor stipulated in article 18-25 inclusive of this Law cannot be applied, the investor shall prepare a plan for selection of contractor or which ensures competitiveness and economic effectiveness and submit same to the Prime Minister of the Government for his consideration and decision.

Article 25 Conditions for issuance of tender invitation documents

Tender invitation documents shall be issued when the following conditions have been satisfied:

1. The tendering plan has been approved.
2. The tender invitation documents have been approved.
3. The notice inviting tenders or the list of tenderers invited to participate in tendering has been published pursuant to the provisions in article 5 of this Law

Article 26 Methods of tendering

1. The single envelope method of tendering shall apply to the forms of open tendering and limited tendering for tender packages for the procurement of goods and for construction and installation, and to EPC tender packages. A tenderer shall submit his tender in one envelope including his technical and financial proposals in accordance with the requirements set out in the tender invitation documents. There shall only be one opening of tenders
2. The dual envelope method of tendering shall apply to both open tendering and limited tendering for the provision of consultancy services. A tenderer shall submit his technical proposals and financial proposals in two separate

envelopes in accordance with the requirements set out in the tender invitation documents. There shall be two openings of tenders: first the technical proposals shall be opened for assessment, and then the financial proposals of all tenderers whose technical proposals have been assessed as satisfying the requirements shall be opened in order to make an overall assessment. In the case of tender packages with high technical requirements, the financial proposals of the tenderer who is awarded the highest technical score shall be opened for consideration and negotiation.

3. Two-phase tendering shall apply to the forms of open tendering and limited tendering for tender packages for the procurement of goods and for construction and installation, and for EPC tender packages with technical, new technological, complex and diversified requirements. The sequence of two-phase tendering shall be as follows:

(a) In the first phase, tenderers shall submit their technical and financial proposals without a tender price, in accordance with the phase one tender invitation documents; the phase two tender invitation documents shall be settled on the basis of discussions held with each tenderer who participated in phase one.

(b) In the second phase, in accordance with the phase two tender invitation documents, the tenderers who participated in the first phase shall be invited to submit stage two tenders comprising technical proposals, financial proposals with a tender price, and a method for securing their tender.

Article 33 Organization of tendering

1. Issuance of tender invitation documents:

The tender invitation documents shall be issued to all tenderers participating in open tendering, to all tenderers on the list of tenderers to be invited to participate in limited tendering, or to all tenderers who have passed the pre-qualification stage.

If there needs to be an amendment to the tender invitation documents after they have been issued, a notice must be sent to all tenderers who received the tender invitation documents at least ten (10) days prior to the deadline for tender closing.

2. Receipt and retention of tenders:

The party calling for tenders shall accept all tenders which are submitted in accordance with the requirements set out in the tender invitation documents,

and shall retain the tenders in accordance with the regime for retention of confidential documents.

3. Tender opening:

All tenders which have been submitted in accordance with the requirements set out in the tender invitation documents shall be opened publicly immediately after the deadline for tender closing. The main information set out in the tenders of each tenderer must be announced at the tender opening session and must be recorded in the minutes of the tender opening and signed by the representative of the party calling for tenders, the representatives of the tenderers and the representatives of any relevant bodies present.

8.4 Appendix 4: List of establishment handled by decision No.64/2003/QD-TTg

The Decision No. 64/2003/QD-TTg about ‘Scheme for stringently handling establishments which cause serious environmental pollution’ dated 22nd April 2003

TT	Establishment	Address	Administrative Agency	Time	Guiding Agency	Form of stringently handling
1	Thai Binh Beer	Thai Binh Town, Thai Binh province	The people’s committee of Thai Binh province	2003 - 2006	The people’s committee of Thai Binh province	Improve wastewater treatment system
2	Viger Beer factory	Viet Tri – Phu Tho province	MARD	2003 - 2006	MARD	Treat wastewater
4	Hai Phong Beer company- factory 1	No.16 – Lach Tray – Hai Phong city	Hai Phong department of Industry and Trade	2003 - 2006	Hai Phong department of Industry and Trade	Built WWTP
5	Habeco factory – Hoang Hoa Tham	No.70A – Hoang Hoa Tham – Hanoi	MOIT	2003 - 2006	MOIT	Built WWTP
6	Ha Tay brewery	Ha Dong town – Ha Tay province (now belong to Hanoi)	Ha Tay department of Industry and Trade	2003 - 2006	Ha Tay department of Industry and Trade	Treat wastewater, waste
7	Phu Ly brewery	Phu Ly town – Ha Nam province	The people’s committee of Ha Nam province	2003 - 2006	The people’s committee of Ha Nam province	Treat wastewater
8	Thanh Hoa brewery	Thanh Hoa city – Thanh Hoa province	The people’s committee of Thanh Hoa province	2003 - 2006	The people’s committee of Thanh Hoa province	Construct waste treatment system
9	Sabeco – Nguyen Chi Thanh	187 Nguyen Chi Thanh – Ward 5 – Ho Chi Minh city	MOIT	2003 - 2006	MOIT	Construct waste treatment system

8.5 Appendix 5: List of competitors and their business models (author synthesized from internet sources)

No .	Company name	Projects in Vietnam	Mode	How they do it
1.	Rhodia Energy GHG (French Rhodia Group)	Nuoc Trong Rhodia Biogas plant at Nuoc Trong tapioca JSC Tan Hoi, Tan Chau, Tay Ninh province (completed 21 Jan 2011)	BOOT	Rhodia built a plant, sell biogas for Nuoc Trong Tapioca JSC. This is a pilot plant in the Vietnam market, Rhodia will expand its business. Direct cooperation with the business customer. BOOT
2.	Solutions Using Renewable Energy Vietnam Joint Stock Company (SURE VNJSC) Philippines	SURE invested USD 10 million in biogas electricity power system to generate electricity from WWTP at Vietnam San Miguel Pure foods Co. Started 2010	BOOT	Sell electricity to San Miguel in 10 years, and then transfer the ownership to the company. Sell CERs. BOOT
3.	Asia Biogas Company Ltd (Thailand)	Biogas plants at tapioca Tay Ninh town and Tan Bien, Tay Ninh province Phu Tho Ethanol production plant of Biofuels and oil and gas Petrochemical Corporation (under the VietnamOil Corporation - PV Oil)	BOOT Turns key	1. BOOT (build and own biogas plant then sell biogas or electricity for the customer in 7-15 years, then transfer plant to customer) 2. Turnkey projects
4.	RCEE - NIRAS JSC (Vietnam – Denmark)	Many CDM projects	JV	RCEE is a CDM consultant, do joint venture with NIRAS Gruppen A/S which through its subsidiaries, operates as a consulting engineering company in Denmark and internationally. It offers consulting and engineering services in the areas of agriculture, civil works, energy, renewable energy, buildings, maritime engineering, transportation,

				waste management, communication and information, informatics, and environment.
5.	Hoai Bac Trading Co.ltd	An Umbrella biogas recovery and utilization project from a series of Seafood wastewater treatment units in An Giang and Dong Thap province under the CDM framework	BOOT	Hoai Bac Co. built WWTPs for seafood companies, then sell biogas for them, in addition to revenue from CERs
6.	Swiss Carbotech Company	SAGRIFOOD company, and many animal farms	BOOT	Carbotech invested in biogas collection system, liquidize the gas to use in the company and part for selling.
7.	Professors at Vietnam university	Tapioca Bidofood company at Tan Uyen, Binh Duong province: wastewater system by lagoon	Turns key	Large Turnkey projects
8.	Investment and Development of Electronics and Telecommunications Technology Corporation (ELCOM Corp) partnership with Sichuan Yalian Technology Co, Ltd (technology)	Quang Ngai Oil service Company ltd	Partnership	EPC contract: 'Design, construct, supply, install equipment, commissioning, operation, training and transfer technology to WWTP and the recovery of methanol for Quang Ngai Dung Quat Bio-ethanol production plant
9.	Vietnam – Toshiba Clean Development Service Co. ltd	Built WWTP in Starch production plant in Vietnam collect biogas, give plants as fuel. In future will expand to others industries such as breweries and food processing.	JV	Joint venture with Nguyen Vu Co. ltd (Toshiba 51%, Nguyen Vu 49%)
10.	Polyco - Polytechnical	Sabeco Hanoi	Turns	Supply refrigeration equipment and WWTP to

	Mechanical, Thermal, Electrical, and Refrigeration Engineering Co., Ltd		key	breweries. The biogas utilization system in Sabeco Hanoi is a secondhand gas boiler made in Japan.
11.	Mayekawa MFG Co. Ltd (Japan) Mayekawa Vietnam one member Ltd	Thanh Hoa Brewery JSC	Turns key	CDM framework, directly corporate with the Japanese NEDO (New Energy and Industrial Technology Development Organization of Japan serves for acquisition of CERs by the Government of Japan
12.	N/A	South East Asia Brewery Ltd	BOT	SEAB is now caring an upgrade project for their WWTP. One biogas technology company offer t hem a BOT contract for biogas utilization system but SEAB has to upgrade their WWTP

8.6 Appendix6: Decision No. 2435/QD-BCT, 2009

LIST OF INVESTMENT SCHEME OF BEER – ALCOHOL - BEVERAGE

In VND Trillion

	2008-2010	2011-2015	2016-2025
Red River Delta	4.493	5.745	
Include: - Beer	3.659	4.402	
- Alcohol	324	345	
- Beverage	773	999	
The North Mountainous Region	135	1.996	
Include: - Beer	86	1.740	
- Alcohol	6	123	
- Beverage	44	133	
Central Coast Region	2.809	6.185	
Include: - Beer	2.620	5.575	
- Alcohol	14	125	
- Beverage	174	485	
Tay Nguyen Region	254	887	
Include: - Beer	225	725	
- Alcohol	-	108	
- Beverage	29	54	
South East Region	2.001	5.664	
Include: - Beer	1.835	4.480	
- Alcohol	4	384	
- Beverage	162	800	
Mekong River Delta	2.874	2.270	
Include: - Beer	1.948	1.120	
- Alcohol	0	209	
- Beverage	926	942	
Total of The industry	12.565	22.747	
Include: - Beer	10.373	18.042	24.056
- Alcohol	347	1.293	
- Beverage	2.108	3.412	11.942

SCHEME FOR PRODUCT ACCORDING TO REGION PARTTERN

In million liters

Region	Production capacity		
	2010	2015	2025
Red River Delta			
Include: - Beer	927	1326	1961
- Alcohol	25	56	112
- Beverage	523	1088	2594
The North Mountainous Region			
Include: - Beer	79	191	320
- Alcohol	7	17	45
- Beverage	37	100	842
Central Coast Region			
Include: - Beer	600	1098	1450
- Alcohol	11	24	75
- Beverage	278	555	2222
Tay Nguyen Region			
Include: - Beer	37	80	110
- Alcohol	2	10	33
- Beverage	19	48	289
South East Region			
Include: - Beer	637	992	1712
- Alcohol	26	55	115
- Beverage	624	1129	3025
Mekong River Delta			
Include: - Beer	220	313	447
- Alcohol	9	26	60
- Beverage	510	1080	2028
Total of The industry			
Include: - Beer	2500	4000	6000
- Alcohol	80	188	440
- Beverage	2000	4000	11000

LIST OF PROVINCES AND CITIES ACCORDING TO REGION

- 1. The North Mountainous Region (14 provinces):** Bắc Cạn, Bắc Giang, Cao Bằng, Điện Biên, Hà Giang, Hòa Bình, Lai Châu, Lạng Sơn, Lào Cai, Phú Thọ, Sơn La, Thái Nguyên, Tuyên Quang, Yên Bái.
- 2. Red River Delta (11 provinces and cities):** Bắc Ninh, Hà Nội, Hải Dương, Hải Phòng, Hà Nam, Hưng Yên, Nam Định, Ninh Bình, Quảng Ninh, Thái Bình, Vĩnh Phúc.
- 3. Middle Coastal Region (14 provinces and cities):** Bình Định, Bình Thuận, Đà Nẵng, Hà Tĩnh, Khánh Hòa, Ninh Thuận, Nghệ An, Phú Yên, Quảng Bình, Quảng Nam, Quảng Ngãi, Quảng Trị, Thanh Hóa, Thừa Thiên – Huế.
- 4. Tay Nguyen Region (5 provinces):** Đắk Lắk, Đắk Nông, Gia Lai, Kon Tum, Lâm Đồng.
- 5. South East Region (6 provinces and cities):** Bà Rịa – Vũng Tàu, Bình Dương, Bình Phước, Đồng Nai, TP. Hồ Chí Minh, Tây Ninh.
- 6. Mekong Delta Region (13 province and cities):** An Giang, Bạc Liêu, Bến Tre, Cần Thơ, Đồng Tháp, Kiên Giang, Long An, Cà Mau, Sóc Trăng, Tiền Giang, Trà Vinh, Vĩnh Long, Hậu Giang

8.7 Appendix 7: Three biggest beer producers

1. Sabeco- Saigon Beer Alcohol Beverage Corporation



Sabeco is the leading producer in Vietnam with 51.4% market share. Sabeco produced 1 billion liters in 2010, becoming the 21st largest beer producers in the world and the 3rd largest in South East Asia. They plan to reach the number of 1.3 billion liters in 2011 and 2 billion liters in 2015. The MOIT is the biggest stakeholder of Sabeco with 89% shares, while others only with 11% (Sabeco financial report 2010).

The main products of Sabeco are: Saigon Export, 333, Saigon Lager, Saigon Special. Main markets are cities and provinces in the South, Middle in Vietnam and Tay Nguyen.

Sabeco has 7 breweries with the capacity from 100 million liters per year, 13 breweries with more than 20 million liters per years. In addition, it outsources others breweries to produce beer under its brands, such as Asean Brewery JSC, Vietna Ha Beer JSC, Huong Sen Brewery Co., Viger Beer Alcohol Co., etc (see appendix 6 for more information on each brewery's location, capacity and ownership). Sabeco subsidiaries and affiliates locate in Ho Chi Minh city, Vinh Phuc, Ha Nam, Nghe An, Ha Tinh, Quang Tri, Dac Lac, Quang Ngai, Binh Dinh, Phu Yen, Binh Duong, Can Tho, Vinh Long, Soc Trang, Bac Lieu, Ninh Thuan, Hanoi, Phu Tho, etc (Source: MOIT report 2007 and Sabeco website).

Sabeco's unified revenue in 2010 was VND 19,913 billion, equivalent to USD 1 billion. Profit before tax was VND 3.485 trillion. Profit after tax was VND 2.429 trillion. (Biz.cafef, 2011)

2. VBL- Vietnam Brewery Limited Corporation

VBL is a joint venture between APBL- Asia Pacific Brewery Limited of Singapore (60%) and Satra-Saigon Trade Corporation (40%). VBL is the second largest beer producer in Vietnam with 29.7% market share. The total production was 445 million liters in 2010. It is raising the capacity to 743 million liters per year. VBL aims to become the leading beer producer in Vietnam in 2015.



The main products of VBL are: Heineken, Tiger, Foster's, *Foster's Lager*, *Biere Larue*, *BGI*, *Flag* and *Song Han*. Main markets are in the North of Vietnam. (Biz.cafef, 2011)

VBL has 3 breweries: Ho Chi Minh VBL 280 million liters per year (now in progress of expanding to 420 million liters per year), Da Nang VBL 85 million liters per year (now in progress of expanding to 150 million liters per year), and Quang Nam VBL 27 million liters per year (now in progress of expanding to 120 million liters per year). And VBL's owner - APB has one whole subsidiary- APB Hanoi with the capacity of 50 million liters per year. (see appendix 6 for more information on each brewery's location, capacity and ownership).

According to APBL's annual report in 2010, Dong Duong market (Vietnam, Laos, and Cambodia) contributed 48% to its before-tax and interest profit, equivalent to 241.7 million Singapore dollars (VND 3.9 trillion). The growth was 48% compared with that of 2009.

3. Habeco-Hanoi Beer Alcohol and Beverage Corporation



The third largest beer producer is Habeco, with 13.9% of the total market share. Habeco sold 403.8 million liters beer in 2010, increasing 32.5% compared with that of 2009. Habeco has two big stakeholders, MOIT with 81.79%, Carlsberg 16.07%, others 2.14% (Habeco report, 2011).

The main products of Habeco are Hanoi, Hanoi draught beer, Hanoi Lager, and Truc Bach Special. Main markets are in the North of Vietnam, especially Hanoi and provinces surrounding.

Habeco has 3 breweries with the capacity from 100 million liters per year, 11 factories more than 20 million liters per year, 3 breweries under 20 million liters per year. Habeco has subsidiaries and affiliates mainly in the North of Vietnam, Hanoi, Quang Ninh, Hai Duong, Thai Binh, Haiphong, Hung Yen, Phu Tho, Vinh Phuc, Nghe An, and Vung Tau, etc (Source: MOIT, 2008 and Habeco website) (see appendix 6 for more information on each brewery's location, capacity and ownership).

Habeco's unified revenue in 2010 was VND 5.439 trillion. Profit before tax was VND 895 billion. Profit after tax was VND 734 billion. (Biz.cafef, 2011).

8.8 Appendix 8: List of Breweries in Vietnam (Author synthesized from MOIT, 2008 and other sources)

No.	Name	Location	Capacity (million liter per year)	Ownership
Large breweries				
1.	Sabeco Saigon -Cu Chi factory	Tay Bac IZ, Cu Chi, Ho Chi Minh city	264 (in progress) (500 in future)	Sabeco 100%
2.	Sabeco Quang Ngai	Quang Phu IZ, Quang Ngai province	100	Sabeco 62.89%
3.	Sabeco Song Lam	Vinh city, Nghe An province	100 (200 possible)	Sabeco 62.89%
4.	Sabeco Vinh Long	Vinh Long city, Vinh Long province	100 (200 in progress)	Sabeco 51%
5.	Sabeco Nguyen Chi Thanh factory	Nguyen Chi Thanh, 5 district, Hochiminh city	100	Sabeco 100%
6.	Sabeco Binh Duong (Sabeco Binh Tay)	Tan Dong Hiep B IZ, Di An, Binh Duong province	120	Sabeco 20.42%
7.	Sabeco Bac Lieu	Tra Kha IZ, Bac Lieu city, Bac Lieu province	100 (in progress)	Sabeco 10,20%
8.	Hochiminh VBL (Hooc Mon Brewery)	Hooc Mon, Hochiminh city	280 (420 in progress)	APB 60% & SATRA 40%
9.	Habeco Me Linh	Me Linh district, Vinh Phuc province	200	Habeco 100 %
10.	Habeco Hoang Hoa Tham	Hoang Hoa Tham, Hanoi	100	Habeco 100%
11.	Thanh Hoa Brewery JSC	Quang Trung street, Thanh Hoa city, Thanh Hoa province	100	Habeco 55%

12.	Hue Brewery Ltd (Huda) Phu Bai factory	Phu Bai IZ, Huong Thuy town, Thua Thien – Hue province	160	Hue Brewery Co. 50%, Carlberg 50%
13.	Viet Ha Beer JSC II (HALIDA)	Yen Phong IZ, Bac Ninh province	120	Viet Ha Corporation 100%
14.	Kronenbourg Vietnam Ltd	Duc Hoa IZ, Viet Hoa, Long An	150	Sapporo Holdings Limited 65% (Japan) and Vinataba 35%
15.	SABmiller Vietnam JV completed 2007	My Phuoc II IZ, Ben Cat, Binh Duong	100	SABMiller Corporation 50% & Vinamilk 50% (now SABMiller owns 100%)
Medium breweries				
1.	Sabeco Hanoi	Tu Liem Small & Medium IZ, Hanoi	90	Sabeco 51.85%
2.	Sabeco Mien Tay (Sabeco Can Tho & Sabeco Soc Trang merge)	Tra Noc , Can Tho city	50	Sabeco 51%
3.	Sabeco Phu Yen	Tuy Hoa city, Phu Yen province	23 (50 in progress)	Sabeco 51%
4.	Sabeco Ha Tinh	Thach Ha district, Vinh city, Ha Tinh province	50 (in progress)	Sabeco 54.47%
5.	Sabeco Phu Ly (Ha Nam)	Thanh Liem district, Ha Nam	50 (100 future)	Sabeco 51.03%
6.	Sabeco Ninh Thuan	Phan Rang city, Ninh Thuan province	50	Sabeco 100%
7.	Sabeco Daklak	Buon Me Thuat city, Daklak province	70	Sabeco 25%
8.	Sabeco Quy Nhon	Phu Tai IZ, Quy Nhon city, Binh Dinh province	50 (100 future)	Sabeco 20%
9.	Sabeco Hoang Quynh (Sabeco Binh Tay)	1 District, Hochiminh city	50	Sabeco 20.42%

10.	Sabaco Tay Do	Tra Noc IZ, Can Tho city	40	Sabeco 23.48%
11.	Sabeco Phu Tho	Trung Ha IZ, Tam Nong, Phu Tho province	50	Sabeco 29.97%
12.	Sabeco Me Linh (Sabeco Dong Xuan)	Quang Minh IZ, Me Linh, Hanoi	40	Sabeco 56.16%
13.	Tien Giang - VBL	My Tho IZ, Tien Giang	65	APB 60% & SATRA 40%
14.	Da Nang – VBL	Hoa Khanh IZ, Lien Chieu District, Da Nang city	85 (150 in progress)	APB 60% & SATRA 40%
15.	Quang Nam – VBL	Dien Nam – Dien Ngoc IZ, Dien Ban district, Quang Nam	27 (120 in progress)	APB 60% & SATRA 40%
16.	Asia Pacific Brewery Ltd (APB Hanoi)	Van Tao, Thuong Tin, Hanoi	50	APB 100%
17.	Habeco ID Hung Yen	Pho Noi A IZ, Hung Yen province	50	Habeco 51.12%
18.	Hanoi-Hai Phong Brewery JSC	Lach Tray, Ngo Quyen, Hai Phong city	25 (50 in future)	Habeco 65%
19.	Hanoi-Hai Duong Brewery JSC (Hadubeco)	Binh Han ward, Hai Duong city, Hai Duong province	50 (100 in future)	Habeco 55%
20.	Hanoi- Nghe An Brewery JSC	Nam Cam IZ, Nghe An	50 (100 in future)	Habeco 51%
21.	Hanoi - Thai Binh Brewery JSC (new factory)	Song Tra IZ, Tan Binh, Thai Binh province	50(100 in future)	Habeco 51%
22.	Hanoi – Quang Binh Brewery JSC	Bac Ly ward, Dong Hoi city, Quang Binh province	25	Habeco 51%
23.	Hanoi – Hong Ha Brewery JSC	Cat Tien ward, Viet Tri city, Phu Tho province	25(50 in future)	Habeco 28%

24.	Hanoi - Thai Binh Brewery JSC	Ly Thuong Kiet, Thai Binh	50	Habeco 51%
25.	Hanoi – Vung Tau Brewery JSC	My Xuan A IZ, Tan Thanh town, Ba Ria - Vung Tau province	50(100)	Habeco 45%, Carlsberg 51%, Vietnam Procelain Glass JSC 4%
26.	Habeco – Hai Phong JSC	Le Duan street, Quan Tru ward, Hai Phong city	25(50)	Habeco 25%
27.	Hanoi – Kim Bai Brewery JSC	Kim Bai, Thanh Oai, Ha Noi	30	Habeco 28%
28.	Hue Brewery Ltd (Huda) Phu Thuong factory	Phu Thuong IZ, Hue city, Thua Thien – Hue province	70	Carlsberg Corporation 50%, Hue Brewery Ltd 50%
29.	Huda-Dong Ha Brewery JV	Gio Quang, Gio Linh town, Quang Tri province	30	Hue Brewery Ltd & Dong Ha JV
30.	Viet Ha Beer JSC	Tien Son IZ, Bac Ninh province	70	Viet Ha Corporation 100%
31.	South East Asia Brewery Ltd	Hai Ba Trung district, Ha Noi	65	Carlsberg 60%, Viet Ha Brewery JSC 40%
32.	Ben Thanh Brewery Beverage factory	Thuan An, Binh Duong province	50 (2005 figure)	JSC (Tan Hiep Phat group)
33.	Nada Beer JSC	Hoa Xa IZ, Nam Dinh province	30	JSC
34.	Ha Long Brewery and Soft Drink JSC Dong Mai Brewery and Soft Drink JSC (Subsidiary)	130 Le Loi, Yet Kieu, Ha Long, Quang Ninh province Dong Mai, Hung Yen, Quang Ninh province	60	JSC (Carlsberg Corporation 30%)
35.	A Chau Brewery JSC	Tien Son IZ, Bac Ninh province	30	JSC

36.	Dai Viet Brewery	SENPRODIMEX Vietnam, Tran Thai Tong, Thai Binh city, Thai Binh province	60	Huong Sen group JSC
Small breweries (112)				
1.	Habada Brewery JSC	80 Ly Thai To, Tran Phu ward, Bac Giang city, Bac Giang province	12 – 20	JSC
2.	Hanoi-Nam Dinh Brewery JSC (HANABECO)	Thai Binh street, Nam Dinh city, Nam Dinh province	15-20	Habeco 51%
3.	Hanoi – Quang Tri Brewery JSC	Nguyen Trai street, ward 1, Dong Ha two, Quang Tri province	15 (25)	Habeco 71%
4.	Hanoi – Hong Ha Brewery JSC (other factory)	Cat Tien ward, Viet Tri city, Phu Tho provincen	4.5	Habeco 28%
5.	Viger Beer Alcohol JSC (Vibeco)	Ben Got ward, Viet Tri city, Phu Tho province	5	Outsourced by Sabeco and produce its own products
6.	Huong Sen brewery Co.	Nguyen Duc Canh, Thai Binh city, Thai Binh province	10	Huong Sen group JSC. Outsourced by Sabeco and produce its own products
			

8.9 Appendix 9: Incentive for environmental project from VEPF

This following information is about forms of funding (soft loan, interest support and guarantee for debt) VEPF, extracting from www.vepf.vn

VEPF Funding

Soft Loan	<ul style="list-style-type: none">• Loan principles: Project investors must (1) use the loan only for the purpose that stated in the credit contract; and (2) refund in time.• Project investors must meet but are not limited to these conditions: (1) be eligible for taking loans from VEPF; (2) have legitimate capability; (3) the project already completed in terms of investment and construction procedure as regulated by law; (4) the project plan has been appraised and approved by VEPF; (5) be able to refund by the deadline pledged in the credit contract; (6) have a certain percentage of corresponding capital to the loan and (7) have righteous method of loan guarantee.• Loan level: Loan level in VEPF is introduced by Ministry of Finance and finalized by Director of VEPF in each circumstance.• Loan duration: Duration of the loan depends on the capital capacity of VEPF, conditions of the project and re-fundability of project owner but not exceed ten years. Exceptions are defined by the Management Council.• Interest rate: Interest rate for each case is determined by Director of VEPF according to law regulations but not exceed the ceiling rate defined by Ministry of Finance for soft loan.• Loan assurance: Loan assurance is compulsory and on basis of a secured asset under the form of mortgage, pledge or guarantee by a third party. Other loan assurance regulations are due to existing law. The case of loaning without assurance is determined by General Director of VEPF, after consulting Leaders of the Operation Body.
Interest rate support	<ul style="list-style-type: none">• Funding for interest rate support is available once a year, based on the principal and interest paid for that credit institution, excluding the overdue debt.• Project owners should meet but are not limited to these conditions: (1) Their projects have been complete, put into operation

	<p>and refundable to the credit institution; (2) Projects are certified by national or local authorities that they contribute to the environmental protection effectively or help overcome environmental problems; and (3) Projects have not received any fund from VEPF.</p> <ul style="list-style-type: none"> • Assistance level and legal authorities to decide: Interest rate support cannot exceed 50% of the interest rate offered by the credit institution and cannot exceed the ceiling rate defined by Ministry of Finance for VEPF. • Director of VEPF can decide which assistance level apply to a certain project; otherwise Chairman of the Management Council shall decide.
Guarantee for debt	<ul style="list-style-type: none"> • Guarantee level and legal authorities to decide <ul style="list-style-type: none"> + The guarantee level to a certain project cannot exceed the loan amount; + The General Director of VEPF can decide which guarantee level apply to a certain case; otherwise the Chairman of the Management Council shall decide; • Period for Dept guarantee: Debt guarantee duration is appropriate with the loan duration agreed by both project owner and the credit institution but cannot break VEPF's regulations on loan duration; • Fees of guarantee: An amount of fee need to be paid to VEPF and is equivalent to part of the guarantee amount in percent (%). Detailed fees are guided by the Ministry of Finance; • Drawing of standby financing in debt guarantee: Annually, VEPF sets up a fund for debt guarantee in percent (%). It is part of the total guarantee and is used when the project owner fails to return the debt to the credit institution in time. If the fund is not used up by the end of a year, it will be transferred to the next year's fund. If the fund is used up before the end of a year, the Management Council will report to the Minister of Natural Resources and Environment and the Minister of Finance in order to testify before the Prime Minister. That amount of fund is decided by the Ministry of Finance; • Set up the Risk Fund for debt guarantee: Annually, VEPF also sets up a fund for risk management of debt guarantee. It aims to cover the expenses paid to credit institutions that cannot be refunded by project owner later. This amount is also ruled by the Ministry of Finance; • Risk management and legal authorities to risk management: When the credit institution requires debtor to refund in time

	<p>while the project owner cannot meet the requirement, VEPF will substitute to pay.</p> <ul style="list-style-type: none"> + After taking responsibility for debt guarantee, VEPF requests project owner to sign a covenant with VEPF about the amount of money Vietnam Environment Protection Fund shall pay on behalf of the project owner, and at the same time, liquidate the assured assets to cover the expenses or prosecute a claim for damages if project owner intentionally violate his/her duties as mention in the guarantee contract with VEPF. + The General Director of VEPF is responsible for consulting the Management Council about assured assets liquidation or prosecution a claim regarding law regulations. + Risk management fund for debt guarantee is used when liquidation of assured assets cannot cover the cost that VEPF paid to the credit institution on behalf of the project owner. In that case, the Management Council should report to the Minister of Natural Resources and Environment and Minister of Finance in order to testify before the Prime Minister. <p>Application and procedure for debt guarantee is ruled in The regulations of operation of VEPF.</p>
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2. Hanoi VEPF (from interview with a Hanoi VEPF official)

- All environmental projects in Hanoi are subjected to access VEPF- Hanoi branch.
- Customer can borrow up to 70% of the total investment, during 3-10 year (depend on the characteristics and scale of the project), interest rate at 6% (this rate is often stable during borrow period)
- Customers can borrower up to 70% of the total investment during the period from 3 to 10 years (depend on the characteristic and scale of the projects), interest at 6% per year (this interest rate is often stable during the borrow period).