CHAPTER II

THEORY AND LITERATURE REVIEW

This chapter focuses on the fundamental theory and literature review of Electricity Industry . The chapter consists of two main sections by 5 topics in theory and 2 topics in literature review.

2.1 Theory

In the theory part , Industrial Organization is detailed in section 2.1.1.The detail of market structures , cost performance and production function are in section 2.1.2,2.1.3 and 2.14 as follow. Finally energy regulatory in Thailand is detailed in section 2.1.5

2.1.1 Industrial Organization

Industrial organization is the field of economics that builds on the theory of the firm in examining the structure of, and boundaries between, firms and markets. Industrial Organization theory have 3 main subjects following : Structure , Conduct and Performance.

2.1.1.1 Market structure

The Market structure consists of the relatively stable features of the market environment that influence rivalry among the buyers and sellers operating within this market. The main elements that influence market structure are, seller concentration, product differentiation, barriers to entry, barriers to exit, buyer concentration, and the growth rate of market demand. The common Structures which is studied are following:

- Perfect competition
- Monopolistic competition
- Oligopoly
- Oligopsony
- Monopoly
- Monopsony

2.1.1.2 Conduct

Conduct means what firms do to compete with each other. It includes pricing, advertising, research and development investment, decisions on product dimensions, merger and acquisition, etc. Conduct also can include collusion both explicit or tacit.

2.1.1.3 Performance

The performance of an industry or firm is measured by profitability. Profit is the difference between revenue and cost, and revenue is determined by price. Thus performance can be influenced through changing costs or prices. Profitability can also be affected by a firm's agility (i.e. ability to adjust to things like changes in market demand).

2.1.2 Cost Performance

In economics and engineering, the price/performance ratio refers to a product's ability to deliver performance, of any sort, for its price. Generally speaking, products with a higher price/performance ratio are more desirable, excluding other factors.

Price/performance is often written as "price-performance" or "cost-performance". Even though this term would seem to be a straightforward ratio, when price performance is improved, better, or increased, it actually refers to the performance divided by the price, in other words exactly the opposite ratio to rank a product as having an increased Price/performance. To avoid such confusion, the word ratio is often dropped or the dash used instead. Technical and news publications are often sloppy in their coverage of changes in these matters.

2.1.3 Production Function

In microeconomics and macroeconomics, a production function is a function that specifies the output of a firm, an industry, or an entire economy for all combinations of inputs. This function is an assumed technological relationship, based on the current state of engineering knowledge; it does not represent the result of economic choices, but rather is an externally given entity that influences economic decision-making. Almost all economic theories presuppose a production function, either on the firm level or the aggregate level. In this sense, the production

function is one of the key concepts of mainstream neoclassical theories. Some non-mainstream economists, however, reject the very concept of an aggregate production function.

2.2 Literature Reviews

In the literature review part , Electricity Industry in Thailand is discussed in section 2.2.1 and Cost Performance is discussed in section 2.2.2 as follow.

2.2.1 Electricity Industry in Thailand

Nakawiro, T., S. C. Bhattacharyya, et al. [1] Studied scenarios of electricity capacity expansion planning for Thailand for the period between 2011 and 2025 under two different assumptions of fuel prices to reflect the case of international high oil price affecting cost of fuels for power generation in Thailand. It is found that the lowest environmental emissions are obtained from the scenario where power generation is highly dominated by natural gas. In contrast, the least cost electricity generation is achieved from the case if nuclear power plant is added into the Thai power system. Reliance on natural gas for power generation increases the spending on gas purchase as a share of the gross domestic product (GDP)—between 2.38% and 3.61% of (GDP).

Sawangphol, N. and C. Pharino . [2] studied the latest situation on renewable powers and developmental strategies toward low carbon electricity generation in Thailand.Government recently has spent tremendous financial and legislative supports to promote the uses of indigenous renewable energy resources and fuel diversification while contributing in reduction of global greenhouse gas.They found that Life cycle of biomass energy production may cause other social issues on land and chemical uses. Nuclear power has already been included in the Thai power development plan 2010 (PDP-2010). However, public acceptance is a major issue. In the future, revision of electricity price is needed to allow fair competition between non-renewable and renewable energy once subsidy programs are ended.

Weiss, P., T. Lefèvre, et al. [3] studied an extension of the existing Renewable Energy Development (RED) model, including the CDM as additional incentive measure, is presented (RED-CDM). Several scenarios developed with the RED-CDM model show the influence of different incentive mechanisms on the Thai power market and their potentials for reaching the

policy targets stated in the Energy Strategy of Thailand for Competitiveness. The main results show that reaching the policy targets is possibl . Another important result is that a sectoral CDM approach could help financing about 20% of the incentives needed for a shift towards a more sustainable power grid .

Wisuttisak, P. [4] studied the issues related to regulatory reform and liberalisation leading toward competition in the Thai electricity sector. Following an overview of the current market structure of the Thai electricity sector. The author asserts that there are problems within the Energy Commission and the Energy Industry Act BE 2550 (2007) that contribute to the continuance of an uncompetitive electricity supply. Possible reforms to the Thai electricity regulation are proposed with the aim of creating market competition and efficiency in the Thai electricity sector.

Pham, T. B. T., K. Manomaiphiboon, et al. [5] studied Emission estimates found here show fair agreement with those in some selected past studies. A crude estimation of potential fugitive NMVOC emissionsspecifically from petroleum industry was also made, and the estimates found could be considered significant (nearly half of NMVOC emissions from industrial processes). Several temporal allocation profiles of emissions were also developed and suggested for power plants and industrial facilities, including monthly, daily, and hourly profiles.

Jerasorn Santisirisomboon. [6] studied estimate the potential of biomass power generation and its impact on power generation expansion planning as well as mitigating carbon dioxide emission from the power sector. The supplies of biomass are then applied as a constraint in the least cost electricity generation expansion-planning model. The cost of CO_2 emissions is also added to the fuel costs as carbon taxation to make biomass power generation competitive to fossil fuels, then the optimum value of CO_2charge is found out. In addition, levels of CO_2 limitation from power generation are also introduced to mitigate CO_2 emissions.

2.2.2 Cost Performance

Ali Akkemik, K. [7] studied estimating cost functions and investigates the degree of scale economies, overinvestment, and technological progress in the Turkish electricity generation sector for the period 1984–2006 using long-run and short-run cost functions. They found that empirical support for the Averch–Johnson effect in an environment where there are excess returns to capital. But this effect was reduced largely after 2002. Technological progress deteriorated

slightly from 1984–1993 to 1994–2001 but improved after 2002. Overall, the paper found that regulation of the market under the newly established regulating agency after 2002 was effective and there are potential gains from such regulation.

Nguyen, T. L. T. and S. H. Gheewala. [8] studied a life cycle analysis of the environmental benefits and limitations of using ethanol as an alternative transportation fuel in Thailand. In particular, the analysis compares the life cycle fossil energy use, air emissions and social costs of cassava-based gasohol E10 with those of gasoline. The results of the study show that, along its whole life cycle, E10 consumes less fossil oil (6.3%) and produces lesser amounts of CO2 (6.4%), CH4 (6.2%), CO (15.4%) and NOx (15.8%) than CG. Including externalities substantially changes the cost performance in favor of ethanol. After environmental costs are added, the cost of E10 and of gasoline become equal to each other whilst before that, E10 ismore costly.

Chan, G., L. D. Anadon, et al. [9] conducted a written expert elicitation of thirteen experts in fossil power and CCS technologies from the government, academia, and the private sector. Wc asked experts to provide their recommended budget and allocation of RD&D funds by specific fossil power and CCS technology and type of RD&D activity (i.e. basic research, applied research, pilot plants, and demonstration plants) for the United States. The elicitation instrument was structured around estimating the cost and performance of coal-fired power plants with and without CCS in the years 2010 and 2030 under four funding scenarios for federal fossil energy RD&D in the USA. The most important areas identified for basic research were chemical looping combustion and membrane technology. The most important area for commercial demonstration was integrated gasification combined cycle (IGCC).

Sakulniyomporn, S., K. Kubaha, et al. [10] studied evaluate the external costs related to human health degradation resulting from Thai electricity generation produced from fossil fuel which operated during the period from 2006 to 2008. Impact Pathway Approach (IPA)wasapplied in the analysis. The results showed that the criteria pollutants caused significant damage to both premature mortality and morbidity. The average damage cost was totally about 600 million 2005 US$ annually which ranged between 0.05 and 4.17 US$ cent kWh^{-1} depending on fuel types. It implies that the external costs are significant to the determination of electricity market price. With the damage costs being included, the electricity price will reflect the true costs of the generation which will be beneficial to the society as a whole.