

Management Affecting the Efficiency of Small Power Producer of Thailand

Piyapan Hannarkin¹, Sudawan Somjai², Chandej Charoenwiriyaikul³

^{1,2,3} Graduate School, Suan Sunandha Rajabhat University, Thailand

^{1,2,3} E-mail: s61584917007@ssru.ac.th, sudawan.so@ssru.ac.th, chandej.ch@ssru.ac.th

ABSTRACT

The objectives of this research were 1) to study the factors affecting the efficiency of small power producers and 2) to study the approaches for the development of efficiency of small power producers. For the quantitative research, the sample group consisted of industrial plants using electricity from small power producers in the industrial estates of the central region and eastern region. The respondents were a total of 360 electrical administrative engineers of industrial plants. The data was collected from the questionnaires and was analyzed with descriptive statistics. For the qualitative research, the data was collected from the in-depth interviews with 4 groups of key informants including the electrical administrative engineers, of 12 industrial plants, the executives of small power generating companies, Director of the Energy Policy and Planning Office, Ministry of Energy, and Director of Power Purchase Agreement Department, the Electricity Generating Authority of Thailand, totaling 15 people. The research results revealed that 1) the quality management had the greatest influence on the entire efficiency of small power producers, followed by service quality, corporate brand equity, and reliability management, respectively. 2) The guidelines for improving efficiency of small power producers was to prepare a manual for working standards covering all parts to train the employees to conform to the manuals for meeting the specified working standards. The inspection and maintenance on the equipment must be performed on a regular basis with the availability of substituting machine and equipment which were always ready to use. The coordination must be made with PTT Public Company Limited to maintain the constant fuel pressure with a quick replacement system in case of interruption.

Keywords

Small Power Producer, Management, Service Quality

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

Introduction

As Thailand has an increasing demand for electricity by approximately 1,200 megawatts per year, it is necessary to develop new power plants continuously (Pongdit Potchana, 2011). In 2012, Thailand imported energy accounted for 80% of the energy used domestically and accounted approximately for 1.6 trillion baht or accounted for more than half of the allocated budget of 2.6 trillion baht. However, only 20% of that could be produced in the country. As a result, Thailand has made efforts to promote renewable energy in order to reduce foreign energy imports. The energy crisis is a major problem because the original energy source generated from fossil fuel such as coal or natural gas is consumed energy. This makes renewable energy source an important future energy source which is seen to be more sustainable than conventional sources (EGAT Biznews, 2020).

The concerns over the electric power crisis have made the Cabinet approved the draft regulation for the purchase of electricity from small power producers (SPP). The 3 Electricity Authorities issued the regulations for the purchase of electricity from small power producers. The Electricity Generating Authority of Thailand (EGAT) issued the Notification to purchase electricity from SPP. Later, the purchase volume was expanded accordingly. The objective was to encourage small power producers to take part in power generation resulting in the use of energy source in the electricity generation to the maximum benefit. This could relieve the burden of government investment in the power production and distribution system (PPTC, Steam and electricity power plant, 2012).

Apart from the electricity generation to meet the demands of the Electricity Generating Authority, small power producers also have other services such as structuring, setting up power generation system, consultation, supervision, and maintenance of electrical systems for the factories. The small power producers often set up power plants in various industrial estates in order to be able to supply sufficient electricity to industrial plants in the settlement and facilitate customers in solving problems from electricity usage such as power drop due to insufficient voltage or damaged power poles, etc. From this reason, the small power producers have to consider the management in various areas in order to achieve maximum efficiency in the operation.

Research objective

1. To study the factors affecting the efficiency of small power producers.
2. To study the approaches for the development of efficiency of small power producers.

Literature Review

Concepts and theories on quality management

The researchers applied the concepts of quality management throughout the organization and the model of success in the use of Delone and McLean information system (DeLone & Mclean, 1992) to measure quality management. The model of information system success (IS Success Model) consisted of 6 components; system quality, information quality, use, user satisfaction, individual impact, and organizational impact. The success was measured in the quality of the

information quality system and user satisfaction. This was because quality system and information system were essential to the management of corporate information affecting the performance of employees in the organization. If the users were satisfied with the use of the system, it would play an important role for the achievement in implementing the system in the organization. In summary, the quality management refers to the management system to produce the employees in the organization to participate in the improvement and development of quality of the work system or the production process to be more efficient.

Concepts and theories on service quality

Parasuraman, Zeithaml, and Berry (1988) defined the service quality as perception or attitude about customer's products or services in the service industry. The service quality in the customer's views is the result of a comparison between the expectations of the customers before using the service and the actual performance the customer received. Parasuraman et al. (1988) developed a model that measured service quality called SERVQUAL developed from 22 items to remain only 5 dimensions; 1. Tangibles, 2. Reliability, 3. Responsiveness, 4. Assurance, 5. Empathy.

Concepts and theories on quality corporate brand equity

The competition today is more intense. Various products and services are similar. Therefore, modern marketing strategies are focused on developing brands for higher equity according to the brand equity concept. The brand equity concept that has been widely accepted is the concept of Aaker (Aaker, 1991; 1996) and Keller (Keller, 1993). Aaker (Aaker, 1991) suggested that brand equity was

comprised of four key elements; brand loyalty, brand awareness, perceived quality, and brand association. The good brand will create satisfaction for both manufacturers and customers. It can reduce the risk of transaction which is the equity from the ability to mitigate the risks and uncertainties associated with consuming a product under that brand (Kapferer, 2008). Keller (Keller, 1993) proposed that brand equity was brand knowledge which could be divided into 2 components; Brand awareness and brand image.

Concepts and theories on reliability management

Reliability is a key element of the quality of the relationship between customers and business organizations. The reliability management is an important issue that organizations should pay attention to. Reliability is one of the essential elements of business operation (Reichheld & Schefter, 2000), especially when it cannot be controlled by the organization. However, the reliability arises from many dimensions. It is a complex social component encouraging customers to be willing to purchase goods or services from the service provider they are bound to. In other words, the reliability arises from integrity and benevolence of the service provider. The reliability is the trust of the customers in the integrity of the service provider organization and the readiness to pay full attention to customer's needs including consistency that will remain honest as well as the unremitting attention and care of the customer needs (Gefen, Karah-anna & Straub, 2003). Thus, the customers who have reliability in a particular brand or organization will have a strong commitment to continue supporting that brand or organization (Moreira & Silva, 2015).

Planning Office, Ministry of Energy, and 4. Director of Power Purchase Agreement Department, the Electricity Generating Authority of Thailand, totaling 15 people.

Research methodology

For the quantitative research, the population used in this study is industrial plants using electricity from small power producers in the industrial estates of the central region and eastern region totaling 43 industrial estates having 6,641 industrial factories (Industrial Estates of Thailand, 2020). The questionnaire respondents were a total of 360 electrical administrative engineers of industrial plants using electricity from small power producers. The data was collected using the criteria of 20 times of the observed variables (Kline, 2005). Multistage sampling was used. The data was collected with questionnaires. They were tested for content validity with IOC values ranging from 0.80-1.00. The reliability of the meter was found to have the reliability coefficient (Cronbach Alpha value) of the measured observation parameters used. In this research, the values were between 0.875 and 0.951, and the whole version was 0.983 analyzed by structural equation model.

For the qualitative research, the in-depth interviews made on the key informants including the 1. electrical administrative engineers of 12 industrial plants as those who have good understanding on the efficiency of power generation of small power producers, 2. the executives of small power generating companies, 3. Director of the Energy Policy and

Research results

1. For the results of the model analysis, when considering entirely, it was found that all indices for consistency between the model and the empirical data (Diamantopoulos & Siguaw, 2000, Schumacker & Lomax, 2010) passed the criteria including (1) relative Chi-square (Chi-square / df) which was 1.65, (2) root mean square error of approximation (RMSEA) which was 0.043, (3) standardized root mean square residual (SRMR) which was 0.043, (4) goodness of fit index (GFI) which was 0.94, (5) adjusted goodness of fit index (AGFI) which was 0.92, (6) comparative fit index (CFI) which was 0.99, (7) parsimony goodness-of-fit (PGFI) which was 0.65, and (7) Critical N (CN) which was 290.36.

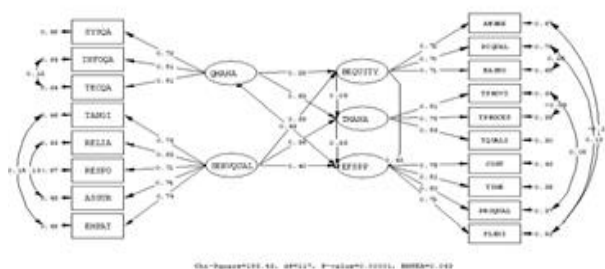


Figure 1. Model showing the adjusted coefficient of Small Power Producer efficiency (standardized)

Factors Affecting the Efficiency of Small Power Producers

From Table 1, it was found that quality management had the greatest overall influence on the efficiency of small power producers, followed by service quality, corporate brand equity, and reliability management, respectively. When considering only the factors affecting the efficiency of small power producers, it was found that quality management and corporate brand equity had the most direct influence on the efficiency of small power producers, followed by service quality and reliability management, respectively.

Table 1 Direct, indirect, and total influence of the studied factors

Influence of the variables	Causal relationship		
	Direct	Indirect	Total
Quality management	0.43	0.35	0.78
Service quality	0.40	0.30	0.70
Corporate brand equity	0.43	-	0.43
Reliability management	0.36	-	0.36

2. Approaches for the development of efficiency of small power producers

- 1) Formulate clear policy to emphasize the importance of organizational efficiency, to be communicated to all employees, and to realize the sakes of efficient power generation.
- 2) Prepare a manual or work standard that promotes work efficiency to cover all parts for training the employees to conform to the manual and meet the specified working standards.
- 3) Train the employees both in theory and practice to understand before working with regular revision and clarification on the purpose of the work as well as implementing.
- 4) Encourage the employees to get involved in the process of improving the quality of the organization (total involvement).
- 5) Inspect and maintain the equipment to always be ready to use and have a reserve system of machinery and equipment available at all time to minimize disruptions to customers by installing the protection devices as well as regularly inspecting and changing the transmission system equipment of the meter in the transmission system such as changing the connection point of the transmission line, over-voltage protective device, arrester, etc.

- 6) Stabilize the fuel system and maintain the source pressure in coordination with PTT Public Company Limited to maintain the fuel pressure constant and have a quick replacement system in case of interruption.

Discussions

1. The quality management was the most important variable that had direct and indirect influence on the efficiency of small power producers because the quality management focused on the customers by providing opportunities for all personnel to participate in the development of operations continuously for the organization’s success. This was consistent with the model of information system success (IS Success Model) consisting of the quality of the information system, quality of information, and service quality (DeLone & Mclean, 1992; 2003) including technical quality (Brady & Cronin 2001, Dagger, Sweeney, & Johnson, 2007, Caro & García 2008, Clemes, Wu, Hu, & Gan, 2009, Pollack). Nowadays, business sector are increasingly paying attention to online channels. Most of the important tools used are websites. The websites play the vital role in helping target customers gain awareness of products and services. They help achieving the brand awareness and organizations more. The website that will enable customers to make the decision to buy or use an online service must be reliable and easy to use. It must be able to create a sense of security in various areas such as keeping personal information and other information that the customer delivers to the service provider via the website (Lin, 2014). For the successful websites, part of them comes from creating good contents on the websites or other online media. The quality content makes it easy for customers to get the information which the organization needs to communicate (Demissie & Rorissa, 2015). Moreover, the service’s expertise reflects the competence and knowledge that the service provider has in the service (Dagger, et al., 2007). The results were consistent with the results of the Dong Cheng and Wu studies (Dong Cheng, & Wu, 2014). The results were similar to those of Chen Rungruengsamrit, Rajkumar and Yen (Chen, Rungruengsamrit, Rajkumar & Yen, 2013) and the study of Gorla, Somers and Wong (Gorla, Somers & Wong, 2010), Petter and Fruhling’s study (Petter & Fruhling, 2011).

2. The service quality had the second most direct and indirect influence on the efficiency of small power producers because the consumer perception plays an important role in assessing expectations and perceptions of service quality of consumers. Therefore, small power producers place great emphasis on service quality in the service business (Parasuraman et al., 1988). This is correspondent with the concepts of service quality in 5 areas; tangibility, reliability, responsiveness, assurance, and empathy that help customers achieve satisfaction from receiving the service. This affects the behaviors of buying more volumes and results in higher frequency of use (Griffin, 1995). As a result, small power producers are trying to meet consumer expectations in order to make service users or customers most satisfied with the products and services of the small power producers. When the user is satisfied with the product and the service, it will affect the

purchasing behaviors in more volume and the higher frequency of service usage (Griffin, 1995). The idea is that if consumers are satisfied with any business, it will also affect the number of repeat consumers' use as well. The results of the study are consistent with the researches of Gorla, Somers and Wong (Gorla, Somers & Wong, 2010) and Phuong and Dai Trang (Phuong, & Dai Trang, 2018).

3. The corporate brand equity had direct influence on the efficiency of small power producers. This is because the products with high brand equity can be improved in the competitive efficiency. It helps building the brand knowledge and encourages customers to respond to brands more. Meanwhile, smaller power producers that can create more positive awareness among customers will create an advantage in the competition and make customers choose to come back to the service again in the future (Aaker, 1991). Thus, modern marketing strategies focus on developing a brand that has a higher value according to the brand equity concept. This is consistent with the concept of Aaker (Aaker, 1991; 1996) and Keller (Keller, 1993) proposing that a distinctive brand can easily promote a product to build a reputation leading to the success of the organization. This is because the brand of high value will help to satisfy the customers. It reduces trade-off risk or brand value, the risk and uncertainty associated with consuming a product under that brand (Kapferer, 2008). The effort to create brand value for the brand to be well-known and have good image from the customer's perspective will make the customers remember more than other brands. It is inevitably the opportunity to be chosen more than any other brand in the same industry (Kimpakorn & Tocquer 2009) and eventually leads the customer to have loyalty to that brand (Hsu, et al., 2011; Tan, Devinaga, & Hishamuddin, 2012). It is also a key variable on customers' future purchasing decision (Kim, Kim, Kim, Kim, & Kang, 2008). This is consistent with the results of the studies of Alhaddad (Alhaddad, 2015) Chien and Chi (Chien, & Chi, 2019), and Wu et al (Wu, et al., 2011).

4. The reliability management influenced the efficiency of small power producers because small power producers can manage that reliability leading to increased competitiveness of the organization. Reliability is a key component of the quality of the relationship between customers and business organizations. The reliability management is an important issue that small power producers should pay attention to. It is one of the essential elements of business operation (Reichheld & Scheffer, 2000) especially when it is something that the organization cannot control. Reliability encourages customers to be willing to purchase a product or service from a provider. That reliability is the customer's belief in the honesty of the small power producers. It includes integrity, ready to pay full attention and care to customer needs including consistency that will remain honest as well as the unwavering interest and attention to customer needs (Gefen, Karah-anna & Straub, 2003). Therefore, the customers who have reliability in the brands of small power producers will have strong intention to support the brand of such organization consistently (Moreira & Silva, 2015). The reliability on the service provider is driven by the organization's efforts to build customer reliability as a service provider with the proficiency in a

specific area of service (Chaudhuri & Holbrook, 2001). Such efforts must be able to meet the needs and build the faith and trust of customers as well. Thus, it can be said that the reliability in the service provider can be successfully built (Chai & Kim, 2010). Reliability in the quality of products and services is another important factor that affects customer acceptance. This is consistent with the study of Carrizo-Moreira, et al (Carrizo-Moreira, et al., 2017) and Alhaddad (Alhaddad, 2015).

References

- [1] Industrial Estates of Thailand. (2020). Industrial estates in Thailand. Searched on 4th June, 2020, from <https://www.ieat.go.th/ieat-industry-port-factory/ieat-industrial-estates/ieat-industrial-estates-in-thailand>
- [2] Pongdit Photchana. (2011). Electricity crisis...the only remaining solution. EGAT Magazine, 5(5), 12-15.
- [3] Aaker, D. A. (1991). Managing brand equity: Capitalizing on the value of a brand name. New York. The Free Press.
- [4] Aaker, D. A. (1996). Managing brand equity. The Free Press, New York.
- [5] Alhaddad, A. (2015). Perceived quality, brand image and brand trust as determinants of brand loyalty. Journal of Research in Business and Management, 3(4), 1-8.
- [6] Brady, M. K., & Cronin Jr, J. J. (2001). Some new thoughts on conceptualizing perceived service quality: A hierarchical approach. Journal of marketing, 65(3), 34-49.
- [7] Caro, L. M., & Garcia, J. A. M. (2008). Developing a multidimensional and hierarchical service quality model for the travel agency industry. Tourism Management, 29(4), 706-720.
- [8] Carrizo-Moreira, A., Freitas-da Silva, P. M., & Ferreira-Moutinho, V. M. (2017). The effects of brand experiences on quality, satisfaction and loyalty: an empirical study in the telecommunications multiple-play service market. Innovar, 27(64), 23-36.

- [9] Chai, S., & Kim, M. (2010). What makes bloggers share knowledge? An investigation on the role of trust. *International Journal of Information Management*, 30(5), 408-415.
- [10] Chaudhuri, A., & Holbrook, M. B. (2001). The chain of effects from brand trust and brand affect to brand performance: The role of brand loyalty. *Journal of Marketing*, 65(2), 81-93.
- [11] Chen, J. V., Rungruengsamrit, D., & Rajkumar, T. M., & Yen, D. C. (2013). Success of electronic commerce websites: A comparative study in two countries. *Information & Management*. DOI: 10.1016/j.im.2013.02.007.
- [12] Chien, L., & Chi, S. (2019). Corporate image as a mediator between service quality and customer satisfaction: difference across categorized exhibitors. *Heliyon*, 5(3), e01307.
- [13] Clemes, M. D., Wu, H. C. J., Hu, B. D., & Gan, C. (2009). An empirical study of behavioral intentions in the Taiwan hotel industry. *Innovative Marketing*, 5(3), 30-50.
- [14] Dagger, T. S., Sweeney, J. C., & Johnson, L. W. (2007). A hierarchical model of health service quality: scale development and investigation of an integrated model. *Journal of service research*, 10(2), 123-142.
- [15] Demissie, D., & Rorissa, A. (2015). The effect of information quality and satisfaction on a parent's behavioral intention to use a learning community management system. *Libri*, 65(2), 143-150.
- [16] DeLone, W. H. & McLean, E. R. (1992). Information system success: The quest for the dependent variable, *Information Systems*, 3(1), 60-95.
- [17] DeLone, W. H. & McLean, E. R. (2003). The DeLone and Mclean model of Information systems success: A ten-year update. *Information System*, 19(4), 9-30.
- [18] Diamantopoulos, A. & Siguaw, J. A., (2000). *Introduction to LISREL: A guide for the uninitiated*. London: SAGE.
- [19] Dong, T.-P., Cheng, N.-C., & Wu, Y.-C. J. (2014). A study of the social networking website service in digital content industries: The Facebook case in Taiwan. *Computers in Human Behavior*, 30, 708-714.
- [20] EGAT Biznews. (2563). Top 5 coming trends in the energy market of 2020. Searched on 15th August, 2020, from <http://www.egatbusiness.com/egatbiznews/2563/Issue2/E-BOOK/index-h5.html?page=1#page=1>
- [21] Gefen, D., Karah-anna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, 27(1), 51-90.
- [22] Gorla, N., Somers, T., & Wong, B., (2010). Organizational impact of system quality, information quality, and service quality. *The Journal of Strategic Information Systems*, 19, 207-228.
- [23] Griffin J (1995). *Customer loyalty: How to earn it, how to keep it*. An imprint of Free Press; United States of America.
- [24] Kapferer, J. (2008). *The New Strategic Brand Management: Creating and Sustaining Brand equity long term* (4th ed). London: Kogan page.
- [25] Keller, K. L. (1993). Conceptualizing, measuring, and managing customer-based brand equity. *The Journal of Marketing*, 1-22.
- [26] Kline, R. B. (2005). *Principle and practice of structural equation modeling*. NY: Guilford.
- [27] Kim, K. H., Kim, K. S., Kim, D. Y., Kim, J. H., & Kang, S. H. (2008). Brand equity in hospital marketing. *Journal of business research*, 1(61), 75-82.
- [28] Kimpakorn, N., & Tocquer, G. (2009). Employees' commitment to brands in the service sector: Luxury hotel chains in

- Thailand. *Journal of Brand Management*, 16(8), 532-544.
- [29] Lin, H. F. (2014). Contextual factors affecting knowledge management diffusion in SMEs. *Industrial Management & Data Systems*, 114(9), 1415-1437.
- [30] Moreira, A. C., & Silva, P. M. (2015). The trust-commitment challenge in service quality-loyalty relationships. *International Journal of Health Care Quality Assurance*. ISSN: 0952-6862
- [31] Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). Servqual: A multiple-item scale for measuring consumer perc. *Journal of Retailing*, 64(1), 12.
- [32] Petter, S., & Fruhling, A. (2011). Evaluating the success of an emergency response medical information system. *International Journal of Medical Informatics*, 80, 480-489.
- [33] Phuong, N. N. D., & Dai Trang, T. T. (2018). Repurchase intention: The effect of service quality, system quality, information quality, and customer satisfaction as mediating role: A PLS approach of m-commerce ride hailing service in Vietnam. *Marketing and Branding Research*, 5(2), 78-91.
- [34] Pollack, B. L. (2009). Linking the hierarchical service quality model to customer satisfaction and loyalty. *Journal of Services Marketing*, 23(1), 42-50.
- [35] PPTC Steam Power and Electricity Generating Plant. (2012). Small Power Producer (SPP). Searched on 25th May, 2020, from <http://www.pptc.co.th/th/?p=520>
- [36] Reichheld, F. F., & Schefter, P. (2000). E-loyalty: Your secret weapon on the web. *Harvard business review*, 78(4), 105-113.
- [37] Schumacker, R. E. & Lomax, R. G., (2010). *A beginner's guide to structural equation modeling* (3rd ed.). New Jersey: Lawrence Erlbaum Associates.
- [38] Tan, T. M., Devinaga, R., & Hishamuddin, I. (2012). The common challenges of brand equity creation among local fast food brands in Malaysia. *International Journal of Business and Management*, 8(2), 96-106.
- [39] Wu, C. C., Liao, S. H., Chen, Y. J., & Hsu, W. L. (2011). Service quality, brand image and price fairness impact on the customer satisfaction and loyalty. In *2011 IEEE International Conference on Industrial Engineering and Engineering Management* (pp. 1160-1164). IEEE.