

**THE KEY FACTOR THAT INFLUENCES SOLAR ENERGY
ADOPTION IN THE ENERGY BUSINESS AND ITS RESULT**

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ABSTRACT

This thematic paper comprehensively investigates the adoption of solar cells within the energy business sector and its profound impact on organizations. The analysis reveals a complex interplay of factors shaping solar energy adoption. Economic considerations, including cost-effectiveness and financial viability, are pivotal, with initial investment costs posing a notable challenge, albeit mitigated by technological advancements. Government policies and regulations, such as tax incentives and renewable energy targets, bolster the case for solar adoption, as do environmental factors like solar resource availability and emissions reduction goals.

Moreover, the paper emphasizes the pivotal role of collaboration, partnerships, and global trends in shaping strategies within the renewable energy sector. Strategic alliances with industry leaders in Taiwan and India have empowered organizations to leverage complementary resources and expertise, facilitating market expansion, knowledge exchange, resource pooling, and innovation. The ability to forge such partnerships, coupled with a keen awareness of global sustainability trends, underscores Company G's success in the renewable energy realm. Nevertheless, the adoption of solar energy systems brought its share of challenges, including communication breakdowns and employee resistance. A multifaceted strategy that fostered transparent communication, encouraged employee input, and organized team-building events successfully surmounted these hurdles, creating an environment conducive to the implementation of new technologies in the renewable energy sector.

Lastly, this thematic paper provides invaluable insights for professionals, policymakers, and researchers while highlighting the transformative potential of renewable energy in advancing sustainability goals and reshaping the energy business landscape.

KEY WORDS: Renewable Energy/ Solar Cell/ Solar Energy/ Energy Business

28 pages

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CHAPTER I

INTRODUCTION

The integration of renewable energy sources, particularly solar energy, has become a crucial aspect of the energy business in recent years. As the world seeks to transition towards a more sustainable and low-carbon future, the adoption of solar cells has gained significant attention due to their potential to harness clean and abundant solar power. However, the successful adoption of solar cells in the energy business is influenced by several key factors that shape the decision-making processes of organizations. Understanding these factors and their implications is essential for strategic planning and effective implementation of solar energy technologies.

This thematic paper focuses on exploring the key factor that influences the adoption of solar cells in the energy business and examines the resulting impact on the organization that adopts the solar cell as a power-generating source. By delving into this topic, it aims to provide analysis for professionals and decision-makers in the energy sector, as well as contribute to the existing body of knowledge on renewable energy adoption. Throughout this paper, we will examine the multifaceted factors that influence solar cell adoption, encompassing technological, economic, regulatory, and environmental aspects. We will delve into the challenges and opportunities faced by organizations in embracing solar energy technologies, while also assessing the potential benefits and outcomes associated with their adoption.

The findings of this paper will not only shed light on the drivers and barriers influencing solar cell adoption but also highlight the potentially transformative impact of renewable energy on the energy business and the broader implications for sustainability and environmental stewardship. Ultimately, this thematic paper seeks to contribute to the understanding of solar cell adoption dynamics and serve as a valuable resource for professionals, policymakers, and researchers in the field of renewable energy and sustainable business practices.

Thailand is one of the largest electricity consumers in Southeast Asia, driven by the growing population, increasing urbanization, and expansion of the economy. The country's electricity consumption has been steadily rising over the years from industrialization, urban development, and improved living standards. According to the International Energy Agency (IEA). The consumption of electricity was approximately 154TWh (Terawatt-hour) in 2011 and increased to 200TWh in 2019. The consumption rate from 2011 to 2020 is around 2.3 percent on average.



Figure 1.1 Thailand's Electricity Consumption (The International Energy Agency, 2021)

Table 1.1 Thailand's electricity consumption data from 2011 to 2020

Year	Electricity consumption	Units	Growth Rate
2011	153.9	TWh	-0.72%
2012	164.3	TWh	6.76%
2013	171.1	TWh	4.14%
2014	171.9	TWh	0.47%
2015	177.6	TWh	3.32%
2016	194.4	TWh	9.46%
2017	193.3	TWh	-0.57%
2018	195	TWh	0.88%
2019	200.1	TWh	2.62%
2020	193.4	TWh	-3.35%

The Solar PV (photovoltaic) development in Thailand had significant growth in recent years. The Thai government has implemented supportive policies,

incentives, and regulatory frameworks to encourage solar PV adoption and attract investment in the sector. Thailand's PV or Solar Panels has a capacity of approximately 200MW in 2011 and with the growth of the economy, increased electricity demand, and decrease in Solar Panel investment cost. The total PV capacity reach 3,000MW level in 2016 and finally reach almost 4,000MW level in 2020.

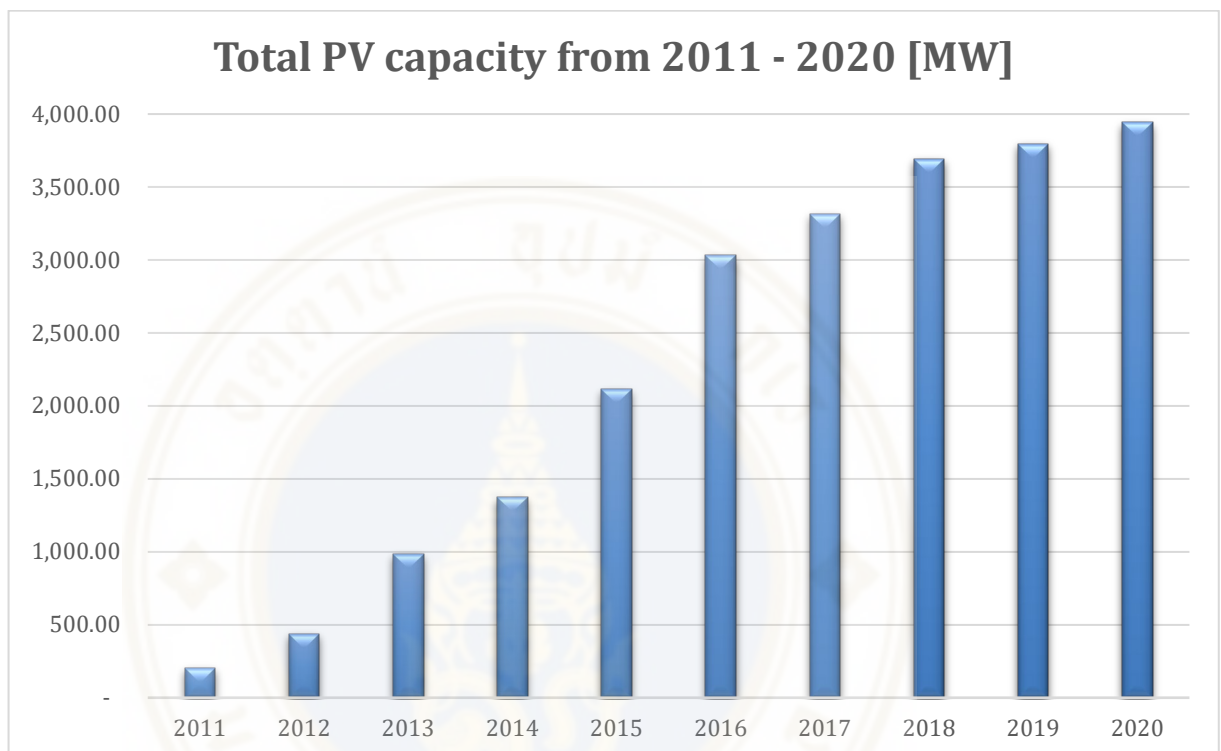


Figure 1.2 Thailand's PV power installment between 2011 to 2020 (The International Energy Agency, 2021)

Overall, Thailand has a high electricity demand, and a trend of zero carbon emissions, "NET ZERO", has increased and influenced renewable energies, especially solar energy, adoption in Thailand together with the lower investment cost of solar energy, and support from government policy.

CHAPTER II

LITERATURE REVIEW

The objective of this research is to study the factors that influence solar energy adoption in the energy business sector. The adoption of solar cells in the energy business is influenced by various factors that play a crucial role in shaping organizations' decisions and strategies. Therefore, the information from the literature research will be discussed in this chapter. The topic has been divided into three main parts, including Solar Energy in Thailand(2.1), Energy Business in Thailand (2.2), the factor that affects the solar energy adoption decision (2.3), and Maslow's Hierarchy of Needs (2.4).

2.1 Solar Energy

Solar energy is a renewable and green energy source of power that has gained significant attention worldwide as a sustainable alternative to conventional fossil fuels and play a substantial role in sustainable development energy solutions (Maka & Alabid, 2022). Solar energy offers several advantages, including its renewable nature, and low environmental impact for instance solar energy helps reduce greenhouse gas emissions, mitigates climate change, and enhances energy security by diversifying the energy mix. Solar power systems also have long lifespans, require minimal maintenance, and provide reliable and cost-effective electricity in off-grid and remote areas (Tanveer et al., 2021). Additionally, solar energy has the potential to create job opportunities and foster economic growth through the development of solar manufacturing, and installation (UN News, 2022).

The technological advancements of solar PV have played a crucial role in the widespread adoption of solar energy, the production and installation cost of solar PV has been decreased while the efficiency of its has been improved significantly over time (Abdallah et al., 2022). The experimental of new material in order to produce solar cells improves the efficiency and lowers the production costs of it. Furthermore, the innovations of energy storage systems such as batteries have enabled the utilization of

solar energy especially, after sunset hours (Qiu et al., 2022) Lastly, the integration of artificial intelligence (AI) and smart grid technologies had also optimized the energy distribution of solar energy in the grid system (Liu et al., 2022). Government policies and market dynamics are also one of key roles in shaping the adoption of the solar energy system. The importance of policies supportive such as tax incentives, subsidies, renewable energy targets, and carbon pricing, in driving solar energy adoption. Power purchase agreements (PPAs) and feed-in tariff schemes facilitate long-term contracts and stable revenue streams for solar energy producers (Gao & Zhou, 2022).

Despite the benefits of solar PV, solar energy adoption faces several challenges as solar energy relies on sunlight so it is dependent on the weather conditions and the time of day, and also requires the energy storage and grid system for smooth and efficient power storage and distribution. In addition, the solar PV system requires a high initial investment cost even if it is already decreased significantly but still remains a big barrier to solar PV adoption.

2.1.1 Solar Energy in Thailand

Solar energy has gained significant attention as an appropriate renewable energy source in Thailand due to its plentiful sunlight and potential for sustainable power generation. Thailand has been actively promoting solar energy through various government policies and initiatives. The importance of supportive policies, for instance, power purchase agreements (PPAs), feed-in tariff (FiT) schemes, net metering regulations, and the policy landscape. These policies have facilitated the integration of solar power into the national electricity grid and incentivized solar PV adoption. As mentioned in the introduction part, the solar PV market in Thailand has experienced significant growth over the years, the Thai government has set ambitious renewable energy targets and has actively promoted the development of solar PV projects, including utility-scale, commercial, and residential installations. For instance, Thailand was the first country to adopt the FiT framework in the South East Asia region. Introduced in 2007, this framework was known as the Adder scheme in Thailand. Under the Adder scheme, the power producer is entitled to get 0.22 USD/kWh over the regular electricity tariff for ten years (Sreenath et al., 2022).

2.2 Energy and Renewable Energy Business in Thailand

The energy business sector has driven economic growth and ensured sustainable development in Thailand for a long time. The energy business in Thailand started from the industrialized period in 1978 with the creation of the Petroleum Authority of Thailand (PTT), a state-owned oil and gas company, continuously developed through the Electricity Generating Authority of Thailand (EGAT) for a stable of energy and electricity supplies. As a rapidly developing country with a growing population and increasing energy demands, Thailand faces the challenge of balancing energy security, environmental sustainability, and economic competitiveness. In 2020, electricity production in Thailand came from 6 sources, 57.5% of the electricity produced was fueled by natural gas and large hydropower, approximately 18% was produced from Coal & Lignite, and the portion produced from renewable energy increased sharply from 2.1% in 2010 to 10% in 2020. The balance of electricity demand which approximately 14.3%, Thailand imported from neighboring countries (Tunpaiboon, 2021).

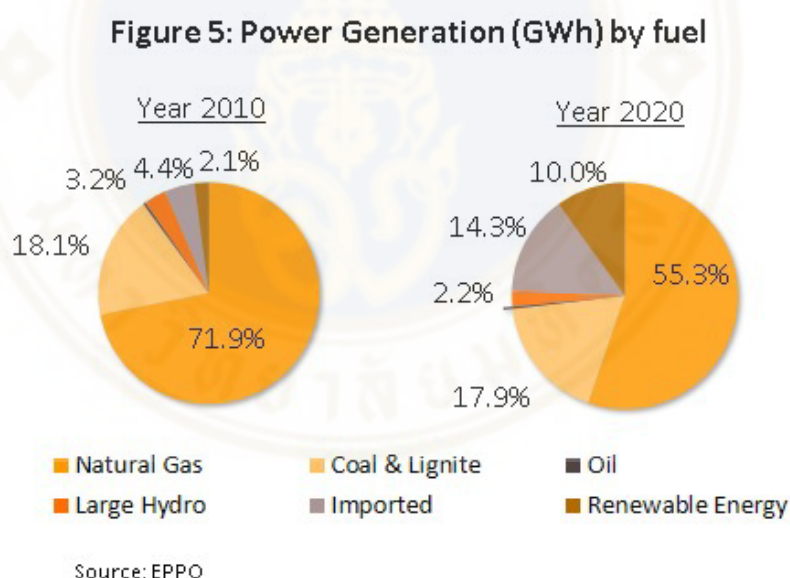


Figure 2.1 Thailand's Power Generation in 2010 and 2020 (Tunpaiboon, 2021).

With the target of zero carbon emission, the Thai government had supported and promoted renewable energy aims to create environmentally friendly and sustainable. Kahintapongs (2020) showed that Thailand is an agricultural country, Thailand is promoting biofuel production and consumption in the transport sector and

provides tax incentives for biofuel producers and automobile manufacturers and also the Thai government provides low-interest loans to palm oil producers. Moreover, the Thai government creates several policies to support the energy sector to transform itself into a renewable energy producer such as FiT Scheme, and Net Metering (NEM) (Sreenath et al., 2022).

2.3 The factor that affects the solar energy adoption decision

The decision to adopt solar energy systems is influenced by a range of factors that influence such as economic, technological, geographic, environmental, social, and policy. Nevertheless, the economic factor has played a crucial role in solar energy system adoption as everyone is considered the benefit and cost of adoption as the biggest factors due to the high investment cost and unpredictability of sunlight which affect the electricity production of solar energy systems.

Powell et al. (2021) mentioned that in Australia, the immediate economic benefits generated by solar energy systems were the main rationale for their adoption. All factors that contribute to increasing revenue and reducing costs have an impact on profitability and therefore the level of adoption. The up-front capital cost of the systems and the ongoing revenue they generate from energy export via a FiT were major drivers of the financial model, as most sugarcane irrigation pumps were connected to grid power. Moreover, the lack of technical knowledge influences the decision of the adopter since they need new skills to understand how the system works, some farmers decided to hold the investment until they feel that the advantage of technology is at its peak. The environmental benefits as co-benefits that improved the sustainability of farming such as a reduction of carbon emissions have effectively impacted the solar energy adoption since the organization could access the premium agricultural export market that is concerned about the sustainability of the product. Lastly, government policies and incentives are one of the main factors related to the adoption of solar energy systems. The policies influence the immediate benefit of FiT eligibility and government incentives to lower the cost of adoption which are provided by the RET and CEFC.

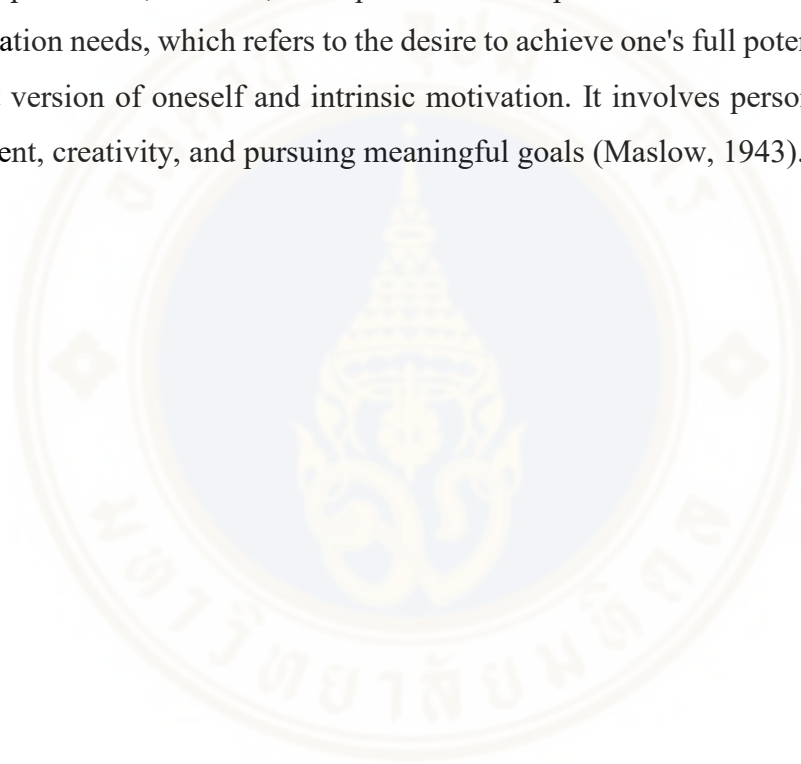
Wang et al. (2017) have described and examined as follows, in China, the adoption of renewable energy especially solar energy has been recognized as a way to reduce carbon emissions. In Wang's article, the investigation shows that geography is considered a main factor of solar energy adoption together with its characteristics and attributes. In addition, other research showed that not only geographic and environmental factors that influence the solar energy adoption but the willingness to adopt the solar energy is the financial incentive, and social interaction as well (Shi et al., 2021). Furthermore, key decision-making factors that organizations consider for foreign direct investment (FDI) are the institutional environment, tax incentives, higher tariffs, access to local finance, geography, landscape, and economic growth (Mahbub et al., 2023).

Articles that study the factors that influence solar energy adoption in Europe also show the same direction of factors that affect the decision to adopt. Dutch farmers considered technology as a crucial factor to adopt solar energy, followed by the economy since it could reduce their electricity cost and decreased the payback period of the farm investment (Moerkerken et al., 2023). In Scotland, farmers consider the government policy factor first as most farmers who adopt solar energy aim to get subsidies for energy production, then the second factor is the economic as most of them have a high demand for energy to operate the business, the solar energy is the answer for these demand while helps to reduce the operation cost in the business. Lastly, in Europe area the geographic factor is considered since they have large areas of land with rough grazing land which has only low agricultural potential, hence, they could gain more benefit by applying the area for solar energy application as an alternative income to farming (Brudermann et al., 2013).

2.4 Maslow's Hierarchy of Needs

Maslow's Hierarchy of Needs is a psychological theory proposed by Abraham Maslow in 1943. The theory suggests that individuals have a hierarchy of needs that they strive to fulfill in order to achieve self-actualization. The hierarchy consists of five levels: physiological needs, safety needs, social needs, self-esteem needs, and self-actualization needs. Maslow's Hierarchy of Needs has provided a comprehensive explanation of the five levels of the hierarchy and their significance in

understanding human motivation and behavior (Maslow, 1943). Physiological needs, Maslow highlights the orientation of the human toward the need for food. Safety needs are the next step in the pyramid of Maslow, the need drive human the search for stability, for instance, job stability, financial security, and citizen security. The third level of Maslow's pyramid is "Social Needs", it is referred to the individual need for a relationship, this involves forming relationships, and friendships, and seeking love and affection from family, friends, and a community. Once the social needs are fulfilled, individuals strive for recognition, and respect, "Self-Esteem Needs". These needs stand for the profession, success, and pride. At the pinnacle of the hierarchy is self-actualization needs, which refers to the desire to achieve one's full potential and become the best version of oneself and intrinsic motivation. It involves personal growth, self-fulfillment, creativity, and pursuing meaningful goals (Maslow, 1943).



CHAPTER III

RESEARCH METHODOLOGY

In this chapter, it will discuss the data collection (3.1), interview selection criteria (3.2), and interview questions (3.3).

3.1 Data Collection

The objective of this research is to identify and analyze the factors that influence solar energy adoption in the energy business sector. Hence, the qualitative methodology is used to explore further and study the reason behind the solar energy adoption in the energy business sector. Qualitative research is a proper methodology to get insight information and opinion of interviewees. In this research, the semi-structured interview is used to collect the data, semi-structured interviews are used as an exploratory tool in marketing, social science, survey methodology, and other research fields (George, 2022). In addition, since the semi-structured interview is a two-way communication, the interviewer and interviewee could discuss further and get more detailed information by expanding their conversation scope without too much pressure on the interviewee. However, these interviews are a mix of structured and unstructured interviews, since the interviewer knows what questions to be asked, but due to the two-way communication the sequence of interview questions could not be set.

3.2 Interview Selection Criteria

According to the plan and time constraints, 5 employees of Company G that had business in the energy business sector are selected from the position of management, manager, and staff level who had experienced and participated in the feasibility study process, decision-making process, and adoption of the solar energy system. Hence, it is expected to get insight information from the interviewee who adopted the solar energy system into their production and commercialized the energy produced from it.

The management has chosen to do this interview as they know and explain the insight about their decision-making process, on the other hand, the staff are chosen for this interview as they know the technology, and fieldwork process. Moreover, the staff level is the largest portion of an employee in the organization and their action could affect the result of the adoption of the solar energy system the most. The manager level has been selected as the middle man who mostly communicates with both management and staff levels, they have an important role to support management to communicate and control the work process with the staff level to make all the process go through smoothly.

The interview has done by using phone calls and web meeting interviews since the interviewee is not available for face-to-face interviews. The length of the interview is approximately 30 - 60 minutes per interviewee. The interviews started from the staff level first to get background information on the project, and all the information including the difficulty during the process from the study until now, then the manager level, and finally the management level to get all the information from the top level perspective. The interviewee's information and details as following table below (Table 3.1).

Table 3.1 List of interviewee's information

	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5
Age	54	52	44	36	33
Position	Vice President, Business Development Department	Vice President, Strategy and Subsidiary Management	Manager, Business Development Department	Engineer	Engineer

Table 3.1 List of interviewee's information (cont.)

	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5
Years of Experience in Company G	20	17	14	12	10
Interview date	June 17 & June 27, 2023	June 17, 2023	June 16, 2023	June 15, 2023	June 15, 2023
Duration (Mins)	45 and 30	40	40	30	60

3.3 Interview Questions

The interview questions are divided into two main parts: demographic questions and perspective questions. The first part is 3 simple demographic questions consisting of age, position, and responsibility. The second part is the perspective questions about the solar energy system. This part consists of 6 questions that can vary based on the interviewees' answers. These questions are designed from the research questions "What are the key factors that influence solar energy adoption in the energy business company" and "What is the result after adoption", all the questions are intended to be an open-end question so the interview could explore and get all information from each interviewee. The list of interview questions will be shown below (Table 3.2).

Table 3.2 List of interview questions

Topic	Questions
1. Demographic Question	1.1. How old are you?
	1.2. What is your position in the organization?
	1.3. What is the role and responsibility of your position?

Table 3.2 List of interview questions (Cont.)

Topic	Questions
2. In-depth Question	2.1. What is your perspective on renewable energy?
	2.2. From your perspective, what are the key factors that influence the adoption of solar energy?
	2.3. How does the cost and financial viability of solar energy systems impact the decision-making process for energy businesses?
	2.4. How do you assess the role of government policies and regulations in promoting the adoption of solar energy?
	2.5. Among all the factors, which factor is the most important factor that you considered to adopt the solar energy system?
	2.6. How do you evaluate the process of solar energy adoption in your organization?

All of the interview sessions are transcribed into Thai and translated into English. The interview sessions were held from June 15 to June 27, 2023. All findings will be analyzed and described in the next chapter.

CHAPTER IV

FINDING ANALYSIS

In this chapter, the interviews and data analysis, the findings about the factor that influence solar energy adoption, and its result will be discussed. The results will be organized and explained according to the theme of the findings. The topics are divided into two main parts: the story (4.1), and the factor and result analysis (4.2).

4.1 Story

Company G engaged in the production and distribution of electricity, steam, and utilities. The company was established in 2013 to focus on the power generation and energy business. The company operates in various segments, including power generation, steam and utilities, energy-related services, and other businesses. The company's power generation portfolio includes both conventional and renewable energy sources, such as natural gas, coal, solar, wind, and biomass. With the vision that aims to be a sustainable power company and recognize the importance of renewable energy sources and their positive impact on the environment. The realization that solar energy presented a tremendous opportunity for sustainable and clean power generation, the company made a strategic decision to integrate solar energy systems into its power generation portfolio.

In 2014, The company established a dedicated research and development team, comprised of brilliant engineers, scientists, and renewable energy experts. This team was tasked with exploring the potential of solar technology and finding innovative ways to integrate it into the existing infrastructure. In collaboration with leading solar cell manufacturers and research institutions, the R&D team conducted extensive studies and experiments. Furthermore, Company G also looked at the benefit of solar energy that could enhance their strategy and also extended their business to battery business together with the institution.

Solar energy or solar cells is clean and sustainable energy, easy to produce only needs an area with direct sunlight, and has a long lifespan with low maintenance cost. However, the disadvantage of solar cells such as high initial investment cost, requiring large spaces of land or rooftop to create a balance of cost and benefit, Geographic and weather dependent, and limited energy density means that solar cells need larger areas to generate the same amount of energy when compare with the conventional source. Finally, company G decided to invest in solar farms in several areas in Thailand mainly in the industrial estate area in Rayong, and leveraging the unused land and rooftops to generate energy.

Even though the R&D team had studied deeply in cost and benefits of solar energy and done several experiments on a lab scale, there are several struggling points that the company faced in the first commercial solar cell adoption, for instance, the resistance to change of the employee in the company since the conventional way is the engineering team's exports according to the following statements, "*the engineering team does not want to use the technology they untrust*", "*We don't have confidence in the technology we don't know*" said by the R&D manager and engineering staff, respectively. Moreover, Integration with Existing Systems is also an issue for Company G when they started to adopt solar cells into their power generation. Since Company G start in the power and energy business from conventional sources such as natural gas and coal, the infrastructure including the system of production and storage energy is different and the engineering team does not have experience with it so it takes time for the team to understand and able to work with a new solar cell system.

4.2 Factors Analysis

The interviews analyzed and come out with key factors that influence the adoption and what the company faced due to that adoption as below.

4.2.1 Cost and Benefit

The first thing management consider is the economic perspective, the cost and benefit analysis of the project including the financial, social, and environmental costs and benefits of the project, and the further plan of the company. In term of financial

cost and benefit, the company need to put high investment cost to establish the solar energy system including the land cost, low maintenance cost, and also has low operational costs. Nevertheless, the company expects a lot of financial benefits since solar energy does not require any raw material but sunlight, hence, the company does not have any raw material cost.

Furthermore, the government also supports renewable energy through a lot of regulations such as the FiT schemes, net metering, and tax subsidies. An environmental benefit that the company expects to gain from this project is to reduce carbon emissions and carbon footprint, reducing greenhouse gas emissions, both benefits could lead to mitigating climate change. Social benefits wise, the company could get more brand awareness, and success to reach the SDG goals. Lastly, the solar energy system can lead to the future project of battery since the solar energy system require a good energy storage system which requires good battery efficiency. The battery also creates the potential for electric vehicles business, so this solar energy project is what the company called “The New S-Curve”.

4.2.2 Collaboration, Partnership, and Global Trend

The management was also aware of the importance of fostering cooperation and strategic alliances between organizations in response to evolving global trends, the impact of global trends on business strategies, and the role of partnerships in navigating these trends. The collaboration enables organizations to leverage complementary strengths, resources, and expertise. By working together, organizations can achieve outcomes that may be unattainable individually. Company G had collaborated and partnered with two big players in the renewable energy business in Taiwan and India, the company accessing the benefits of sharing knowledge, accessing new markets, pooling resources, and driving innovation through partnerships. The partnership with Taiwan and India company creates differences in working culture including the communication style, decision-making processes, and cultural norms that enhance Company G’s employees in working with foreigners. Moreover, Taiwan is one of the big players in solar energy, battery, and EV business.

By partnering with a Taiwanese company, the company has opportunities to get an insight into innovative information about battery technology which eventually

become the battery project of the company for both energy storage system and electric vehicles. Moreover, Company G has invested in another Taiwanese company that has a solar farm in Taiwan, the main purpose is to study how to operate solar farms so the company could train their employee in Thailand to have more knowledge and could operate the solar farm in Thailand smoothly. On the other hand, the company has partnered with an Indian company that focuses on renewable energy is also a strategic decision, India has a high demand for energy, plenty of unused land that can turn into a solar farm, and high economic growth. The management decided to partner and invest 40% with company A as they are experts in solar panel manufacturing, as a partner company G can get competitive and cheaper prices of solar panels to invest in Thailand. In addition, global trends are crucial for organizations to remain competitive and responsive to market dynamics. Company G kept track of global trends mainly the sustainable development goal and NET Zero carbon emissions which became a global goal by 2050. The Company actively supports most of the SDG goals, 7 out of 17 goals on the UN's SDG.

4.2.3 Communication and Employee Resistance in the Organization

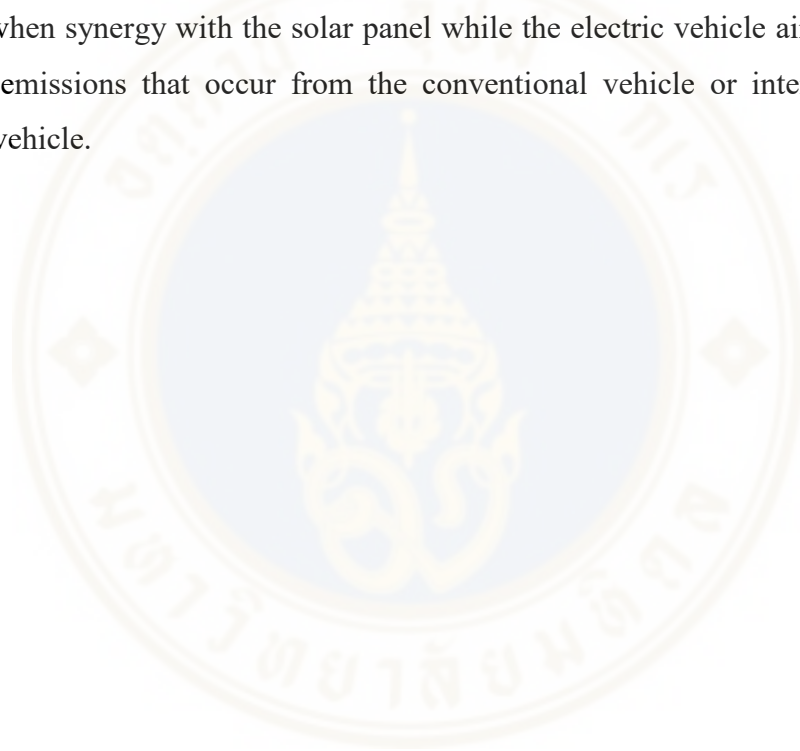
The company faced a communication issue with the employee, around the challenges of new technology adoption, poor communication negatively impacted the organization's culture and finally, leads to misunderstandings, and eroding trust among the employees and between employees and the management level. A lack of communication lead to the misalignment of goal, and expectation at the employee level, according to Maslow's Hierarchy of Needs, this lack of expectation and misalignment of goal lead to a lack of social needs and self-esteem needs which further leads to decreased motivation, bad job satisfaction, and increased of turnover rate. Moreover, when the company adopts the new technology of renewable energy sources, it encompasses the challenges and barriers faced by employees when confronted with changes in their work processes, tools, or systems. Even though the company had prepared to face the situation by sending the employee to a partner company to train how to work with solar energy systems in advance, there are still resistance from the team. According to the interview, it is clear that the engineering team is not confident with the new technology, and it led to resistance from their unknown and also a lack of understanding of new technology.

The company and management team overcome the communication and employee resistance issues through several strategies such as promoting a culture of open and transparent communication and encouraging employees to share their ideas, concern, and feedback about the project, for instance, the company creates the event called “Lunch with Management” that invite 2-3 staff to have lunch with CEO, HR manager, and VP of the team every Monday, Wednesday, and Friday. The lunch is created for staff to share their idea with top management and bond the relationship between staff and management again. It is a two-way communication channel to let employees have a chance to communicate directly with the manager and management level. Moreover, the CEO set a weekly townhall every Friday to communicate and update about the company’s direction with all employees, held a company outing to strengthen the relationship between the staff and give the budget to each department to create department events which mostly are department’s trips for 2days and 1 night, monthly company event, for instance, bowling event, and golf event. Lastly, provides a training and development program to enhance not only communication skills but also technical skills to deal with technical issues and keep improving communication and technical skills through regular evaluation.

4.2.4 The Result of the Solar Energy Adoption

The adoption of solar energy has been the first and significant movement that pushes the company to become more sustainable and create more strategies for the company. The company had focused on the policy to scale up all the renewable energy plants and targeted to accelerate the production ratio of renewable energy sources in their production portfolio with only 3 percent of solar energy sources in 2016. The ratio of solar energy sources had increased significantly to 18 percent of the company’s production portfolio by the end of 2021. The current production of the company is at approximately 6,500 MW while around 35 percent of its production has come from renewable energy sources such as Solar Energy, Hydroelectricity Energy, Wind Energy, and Biomass Energy which solar energy accounting for around 28 percent out of 35 percent or approximately 1,800 MW. Moreover, the company targeted to reach the production of 8,000 MW by 2025 by increasing only the renewable energy sources rather than the conventional energy sources which will make the production portfolio of the company to 45 percent of renewable energy sources. In term of Commercial, the

company successfully reduced its operation costs by 15 percent on average since its main raw material for production and operation cost are natural gas and coal cost. Solar energy does require raw material only sunlight. In terms of policies, the company aims to enhance the green portfolio to more than 50 percent by 2030, targeted to be carbon neutrality by 2050 and become net zero by 2060. Lastly, the company had created a strategy that aims to synergy with the company's and government's goal of net zero by promoting the Battery, Energy Storage System (ESS), and Electric Vehicle (EV) that could benefit the company, the country, and the world. The battery is a key material for both energy storage systems and electric vehicles, energy storage system is needed and useful when synergy with the solar panel while the electric vehicle aims to reduce the carbon emissions that occur from the conventional vehicle or internal combustion engine vehicle.



CHAPTER V

CONCLUSION

The conclusion presents a findings summary (5.1), recommendations (5.2), and limitations of this research (5.3).

5.1 Findings Summary

This thematic paper aimed to explore the key factors influencing the adoption of solar cells in the energy business sector and examine the resulting impact on organizations. The findings of this research indicate that solar energy adoption is influenced by various factors. Economic considerations, such as cost and financial viability, play a crucial role in decision-making, the initial investment cost of solar PV systems remains a significant barrier, although advancements in technology and decreasing costs have mitigated this challenge to some extent. Government policies and regulations, including tax incentives, subsidies, and renewable energy targets, have provided support and incentives for solar energy adoption. Environmental factors, such as the availability of sunlight and the desire for carbon emission reduction, also contribute to the decision to adopt solar energy. Additionally, social factors, including the megatrend, the willingness to adopt new technologies, and social interaction, influence the adoption process.

Moreover, the recognition of the significance of collaboration, partnerships, and global trends in shaping their business strategies and navigating the renewable energy sector. The management understood the benefits of forming strategic alliances with organizations in response to evolving global trends. By collaborating with two prominent players in the renewable energy industry in Taiwan and India, the company was able to leverage complementary strengths, resources, and expertise. This collaboration allowed them to access new markets, share knowledge, pool resources, and drive innovation. The company's collaboration, partnerships, and awareness of global trends have contributed to its success in the renewable energy sector. These

strategic decisions have allowed them to access new markets, acquire valuable knowledge and resources, drive innovation, and align with global sustainability goals.

As a result of the adoption of solar energy systems in the context of Company G, communication issues and employee resistance posed significant challenges during the adoption of new technologies. This lack of effective communication results in decreased motivation, job dissatisfaction, and an increased turnover rate. Despite the company's proactive approach in preparing employees by providing training on solar energy systems, there was still resistance from the engineering team as the team lacked confidence and understanding of the new technology, leading to resistance and further barriers. To overcome these communication and employee resistance issues, the company implemented several strategies. They fostered a culture of open and transparent communication, encouraging employees to share their ideas, concerns, and feedback about the project. The company established events like "Lunch with Management", weekly town hall meetings, company outings, and department budgets for team-building activities. were provided to strengthen relationships within the organization. Monthly company events, such as bowling or golf events, further promoted a sense of unity and camaraderie among employees.

Recognizing the importance of continuous improvement, the company also implemented training and development programs, these programs aimed to enhance not only communication skills but also technical skills to effectively address technical challenges. Regular evaluation of communication and technical proficiency ensured ongoing improvement in these areas. Finally, the company successfully tackled communication challenges and employee resistance through a combination of strategies. By fostering open communication channels, encouraging feedback, and organizing events to strengthen relationships, the company aimed to create a positive work environment. The focus on training and development programs aimed to enhance both communication and technical skills, facilitating the successful implementation of new technologies in the renewable energy sector.

In terms of commercial and policy, the company successfully adopt solar energy by reducing their operating costs by around 15 percent while the policy aims to increase their production portfolio from only 3 percent after the first project to 35

percent at the current production portfolio or approximately 1,800 MW. The success of solar energy adoption supports the company to work on their company's goal of net zero. Lastly, the company had synergy of the technology of solar energy and renewable energy to their new strategic project the battery project which leads to an energy storage system project and electric vehicle project to extend the company's capability to be competitive in the global market.

5.2 Recommendations

The findings of this thematic paper have several implications for professionals, policymakers, and researchers in the field of renewable energy and sustainable business practices. Understanding the key factors that influence solar energy adoption can guide strategic planning and decision-making processes for organizations in the energy sector. The insights from this research can help organizations overcome barriers and leverage opportunities associated with solar energy adoption. Based on the research findings, the following recommendations are provided.

5.2.1 Encourage further technological advancements

Continued research and development (R&D) in solar PV technology is crucial for the growth of the renewable energy sector in Thailand. R&D efforts should focus on enhancing the efficiency of solar photovoltaic (PV) systems, reducing production costs, and improving energy storage technologies. By investing in R&D, the company can benefit from technological advancements that increase the competitiveness and viability of solar energy and other renewable energy as a coming mainstream power source. Research can also explore innovative solutions such as new materials for solar panels, advanced energy storage technologies (e.g., batteries), and smart grid systems that optimize the integration and distribution of solar energy.

5.2.2 Foster awareness and knowledge sharing

Building awareness and understanding of solar energy adoption is essential for its successful implementation in Thailand. Organizations and stakeholders should

actively engage in knowledge-sharing initiatives to educate professionals and decision-makers in the energy sector about the benefits, challenges, and opportunities associated with solar energy. This can be achieved through various means such as organizing seminars, workshops, and training programs. These initiatives should target different stakeholders, including government officials, policymakers, industry professionals, and the general public. By fostering awareness and knowledge sharing, Thailand can create a supportive environment for the adoption of solar energy and encourage informed decision-making.

5.2.3 Facilitate financial mechanisms

The initial investment cost of solar energy systems can be a significant barrier for organizations looking to adopt renewable energy. To overcome this challenge, financial institutions and stakeholders should explore innovative financing mechanisms. One approach is to promote leasing options where organizations can lease solar panels and equipment instead of making a large upfront investment. Green bonds, which are financial instruments specifically for funding environmentally friendly projects, can also be explored to attract investment in solar energy projects (Alharbi, 2023). Additionally, public-private partnerships can be established to share the financial burden and make solar energy more accessible and affordable for organizations.

5.3 Limitations of This Research

Regarding the time constraints, this research contains some limitations that can be expanded to study further in the future. The study focused on a specific organization within the energy business sector in Thailand, and the findings may not be generalizable to other contexts or industries. Additionally, the research relied on qualitative data from a limited number of interviews, and further research using quantitative methods and a larger sample size could provide more comprehensive insights. Future research could explore the long-term outcomes and impacts of solar energy adoption on organizations, including financial performance, operational efficiency, and environmental sustainability. Additionally, comparative studies across different countries or regions can provide insights into the contextual factors that

influence solar energy adoption. Furthermore, research on emerging solar technologies, such as floating solar PV and solar-powered transportation, can contribute to a deeper understanding of the potential of solar energy in variou



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