



**THE STUDY OF BUYING DECISION FACTORS AND  
ENVIRONMENTAL ATTITUDES FOR OUTDOOR  
STANDALONE TYPE LED SOLAR LIGHTING IN  
BANGKOK AND VICINITY**

**BY**

**MR. SARAN MAHAPUN**

**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTER OF SCIENCE PROGRAM IN MARKETING  
(INTERNATIONAL PROGRAM)  
FACULTY OF COMMERCE AND ACCOUNTANCY  
THAMMASAT UNIVERSITY  
ACADEMIC YEAR 2020  
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INDEPENDENT STUDY

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ENTITLED

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IN BANGKOK AND VICINITY

was approved as partial fulfillment of the requirements for  
the degree of Master of Science Program in Marketing (International Program)

on 23 MAY 2021  
on .....

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Independent Study Title	THE STUDY OF BUYING DECISION FACTORS AND ENVIRONMENTAL ATTITUDES FOR OUTDOOR STANDALONE TYPE LED SOLAR LIGHTING IN BANGKOK AND VICINITY
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Major Field/Faculty/University	Faculty of Commerce and Accountancy Thammasat University
Independent Study Advisor	Professor Kenneth E. Miller, Ph.D.
Academic Years	2020

## ABSTRACT

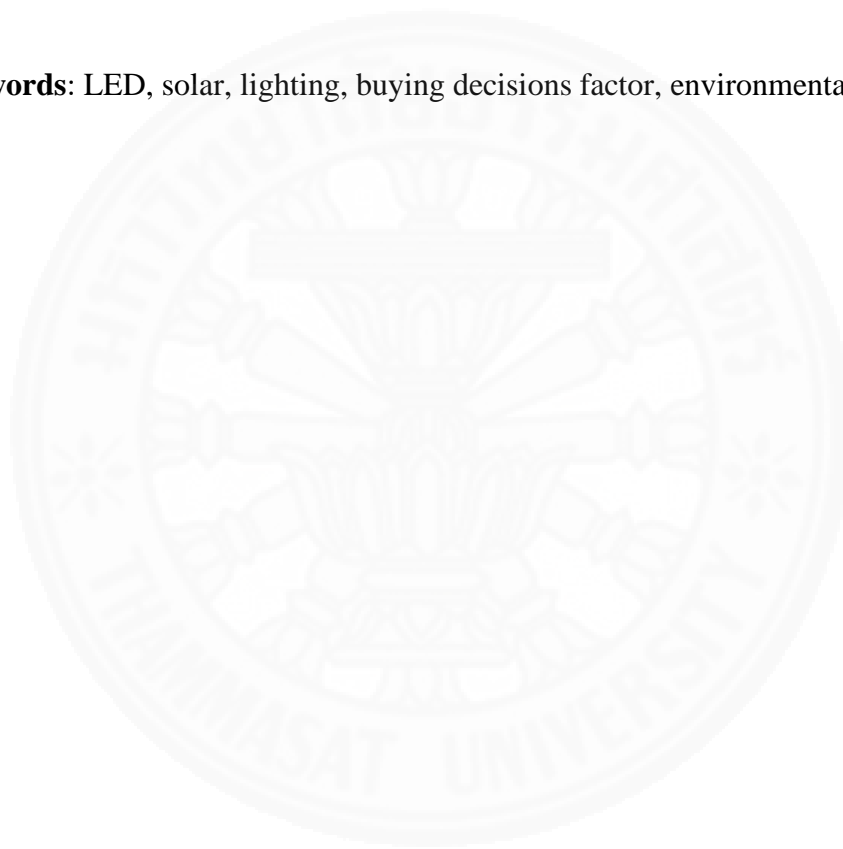
Illumination is becoming more critical due to the city's development, in which the requirement of lighting has become a basic need. Nowadays, House owners who want to add more lights for application or decoration have to pay high installation cost for construction work which is relatively high. So many people in Thailand are looking for a device that they can do D.I.Y. instead. Especially, the green trend is also coming to Thailand. Renewable energy, Solar energy has become a trend in Thailand. They can use clean power instead of the coal or oil that the powerplant uses to generate electricity and create pollution. When consumers use green products, they think that they are saving the world.

The objectives of this research were to explore the customer buying decision for the LED solar lighting, identify segmentation of customers who are willing to pay for LED solar lighting, and determine the marketing strategies to the segmented customer that are willing to pay for the LED solar lighting.

About Research design, this research will be conducted using exploratory research and descriptive research. The exploratory design comprises collecting secondary data and 13 in-depth interviews. These methods will measure customers'

decision factors, green attitudes, product understanding behavior, and barriers to purchase. Another method is descriptive design, which has been undertaken questionnaires by 213 respondents from online surveys. The descriptive method findings will help emphasize customer segmentation, marketing factors for customers who are willing to purchase LED solar lighting. Sampling selection will be carried out for respondents aged between 22 - 65 years old, living in a house with outdoor space in Bangkok and Vicinity.

**Keywords:** LED, solar, lighting, buying decisions factor, environmental, Bangkok



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Mr. Saran Mahapun

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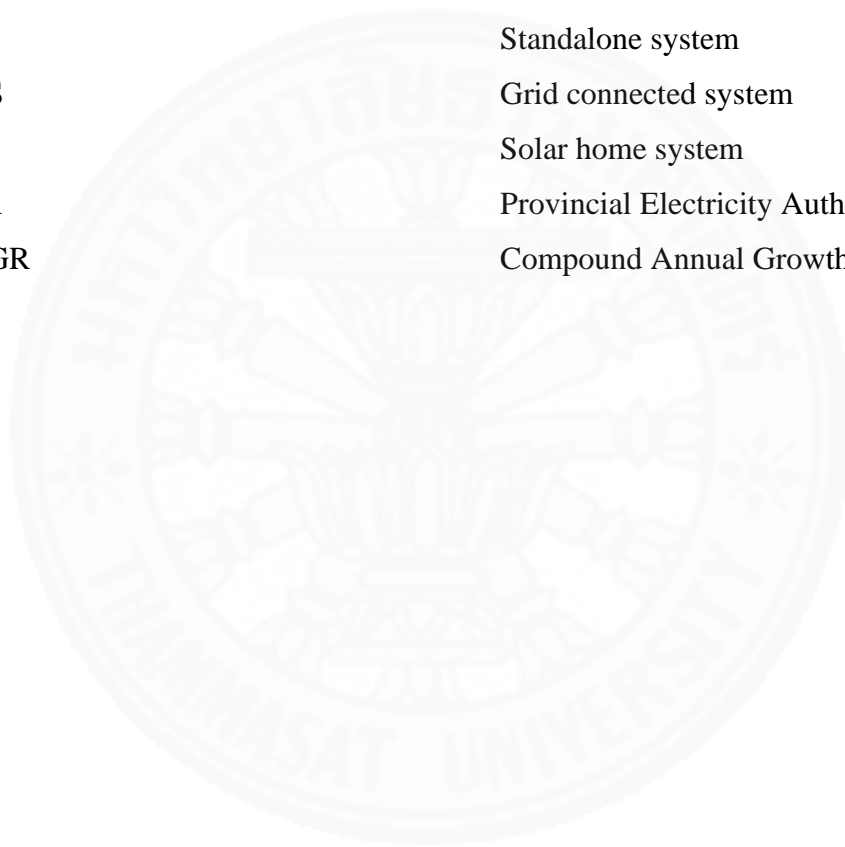
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## LIST OF ABBREVIATIONS

<b>Symbols/Abbreviations</b>	<b>Terms</b>
LED	Light Emitting Diode
PV	Photovoltaic
BOI	Board of Investment
DC	Direct current
SAS	Standalone system
GCS	Grid connected system
SHS	Solar home system
PEA	Provincial Electricity Authority
CAGR	Compound Annual Growth Rate



# CHAPTER 1

## INTRODUCTION

### 1.1 Research Introduction

The total market size of solar street lighting globally is valued at \$5.7 billion or 1,545.9 thousand lighting unit sales in 2019 and forecast to project a CAGR of 9.4% from 2020 to 2030. Smart cities' growth and price reduction of solar lighting are significant driving factors. Moreover, increasing Urbanization in a developing country is making opportunities for the solar lighting industry to grow.

Current users are concerned about solar lighting features like energy efficiency, low operational, and maintenance costs. The smart devices are applying smart building projects that can monitor and save energy consumption. Prediction to be high demand in the upcoming years. Due to independent operation and low maintenance costs, solar lighting has become a popular lighting source for remote areas such as street lights for home or business applying. (Prescient&Strategic Intelligence, 2020)

In Thailand, the fuel oil crisis has been set as a National Agenda for the Thai government to find other alternative energy sources. The current action plan is to promote renewable energy. Solar energy is one of the primary energy sources mentioned in the development plan in the year 2003 as sustainable renewable energy. The government has announced a big project called Solar home system (SHS), which has been invested together with the Provincial Electricity Authority (PEA). This project's value is more than 7.6 billion baht to support electricity for 290,000 homes in the rural area, where the utility grid could not be accessible. A set of solar lighting systems will include 120 watts photovoltaic (PV), a 125 Ah battery, an inverter set, two sets of lighting lamps for each home will have one. This project has made a big move to the solar energy market in Thailand (Pattarapremcharoen, Rakwichian, Ketjoy, & Intanon, 2007).

## 1.2 Research Objective

The objectives of this research are described below:

1. To explore the customer buying decision for the LED solar lighting
  - a. To explore the factors of the decision when purchasing LED solar lighting
  - b. To explore green environmental attitudes related to the decision to acquire LED solar lighting
  - c. To explore the customer understanding about LED solar lighting
  - d. To explore the barriers to purchasing LED solar lighting
2. To identify segmentation of customers who are willing to pay for LED solar lighting
  - a. To identify segmentation of customer by demographics
  - b. To identify segmentation of customer by psychographics
  - c. To identify segmentation of customer by problem
3. To determine the marketing strategies to the segmented customer that are willing to pay for the LED solar lighting
  - a. To determine the attributes of the solution
  - b. To determine the appropriate cost
  - c. To determine the distribution channel
  - d. To determine communication method

## **CHAPTER 2**

### **LITERATURE REVIEW**

The study would explain the customer buying decision for the LED solar lighting, segmentation of customers who are willing to pay for LED solar lighting and the marketing strategies to the segmented customer that are willing to pay for the LED solar lighting.

The definition of business is to create and maintain the customer. From this simple concept, the company is trying many ways to develop a strategy to build and keep their customer, calling it marketing. Marketing is to identify and capture consumers and social needs. They also have useful marketing definitions: "meeting needs profitably" (Kotler & Keller, 2016). Since there are different types of people and their requirement is variable from each other. That means there are several possible segmentation in the marketing context. The significant ones are *geographic*, *demographic*, *psychographic*, *behavioral*, and *benefit* segmentation (Schlegelmilch, 2016). The popular marketing tools that the firm always uses to achieve its marketing objectives is a marketing mix, which is a fundamental model for businesses—concluding of product, price, place, and promotion (4Ps). The marketing mix refers to four broad marketing decisions: product, price, place, and promotion.

#### **2.1 Product (Standalone system of LED solar lighting)**

The Standalone system (SAS) of solar lighting has few parts that make them very simple. Most of them conclude only two parts: the lighting part and Photovoltaic and battery parts. They usually apply with street lighting. The grid connected system (GCS) is a complicated device that only the authorized electrician or engineer can handle.

An example of the SAS type of popular lighting in Thailand is the solar wall light outdoor as figure 2.1



Figure 2.1 SAS type of solar wall light outdoor

## 2.2 Price (cost)

Since the SAS type is less complicated and more flexible than the GCS type, the SAS type cost is much lower than GCS. Most SAS types are entirely assembly units connected. We can buy a set of LED solar lighting composed of a solar panel, a battery, a charger controller, and LED lamps approximately 200 Thai Baht above. The GCS requires more devices for a completed set to operate with the on-grid system and larger battery capacity. This complicated condition is required authorized electricians or engineers to install the system. That makes the price of the GCS system is much higher.

Figure 2.2 Price of SAS type of solar wall light outdoor from Lazada, Thailand



**Solar Rooftop On-Grid 5Kw Solarcell โซลาร์เซลล์ โซลาร์รูฟท็อป ออนกริด 5Kw พร้อมติดตั้ง**

ราคาติดตั้งพร้อมใช้งาน 165,000บาท (ในเขตกรมและปริมณฑล)

★★★★★ ยังไม่มีคะแนน

แบรนด์: No Brand | เพิ่มเต็ม ไฟ จาก No Brand in TH

฿165,000.00

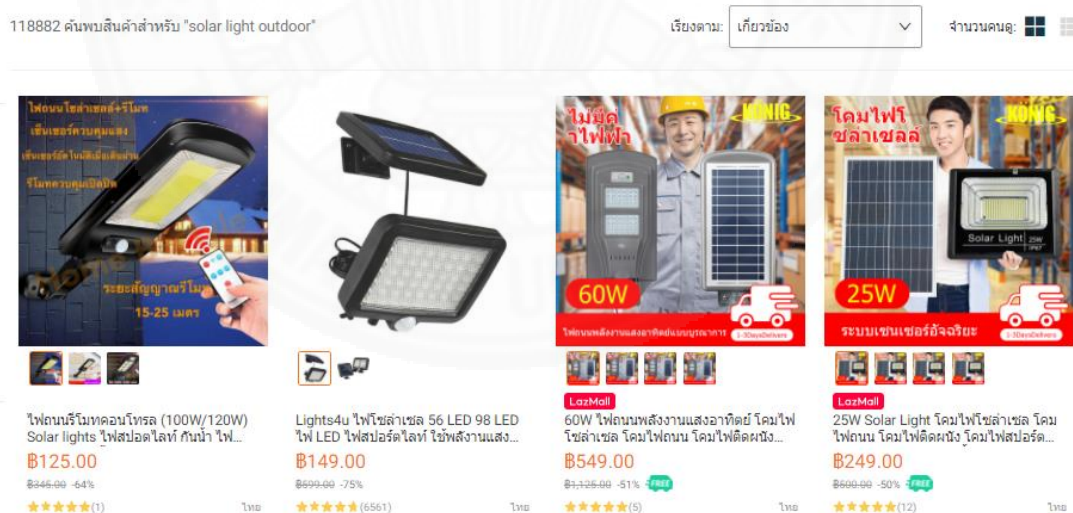
จำนวน: 1

ซื้อเลย | เพิ่มลงในรถเข็น

Figure 2.3 Price of GCS type of solar rooftop from Lazada, Thailand

## 2.3 Convenience to approach

There are many suppliers of the SAS in the market currently. Customers can easily find and buy SAS LED solar lighting from the electronic store or even online shop. So it is quite effortless for users to reach the product. This situation is much different for the GCS that has only a few suppliers in the Thailand market.



118882 คำพบสินค้าสำหรับ "solar light outdoor"

เรียงตาม: เกี่ยวข้อง

จำนวนคนดู: 4 8

ไฟถนนโซลาร์เซลล์+โคม เซ็นเซอร์ควบคุมแสง เซ็นเซอร์วัดอุณหภูมิ เซ็นเซอร์วัดความชื้น

฿125.00

฿346.00 -64%

★★★★★ (1)

Lights4u ไฟโซลาร์เซลล์ 56 LED 98 LED ไฟ LED ไฟสปอร์ตไลท์ ใช้พลังงานแสง...

฿149.00

฿599.00 -75%

★★★★★ (6561)

60W ไฟถนนพลังงานแสงอาทิตย์โคมไฟ โซลาร์เซลล์ โคมไฟถนน โคมไฟติดผนัง...

฿549.00

฿1,126.00 -51%

★★★★★ (5)

25W Solar Light โคมไฟโซลาร์เซลล์ โคมไฟถนน โคมไฟติดผนัง โคมไฟสปอร์ตไลท์...

฿249.00

฿600.00 -50%

★★★★★ (12)

Figure 2.4 The search shows 118,882 keywords of solar light outdoor from Lazada, Thailand

## 2.4 After-sales service

Since most SAS types are entirely assembly units connected, it is much easier for the sellers to provide installation and warranty services. On the other hand,

the GCS is a complicated system that has to be concerned about design, installation, and operational environments that have the condition to connect to the on-grid network or large battery capacity. The GCS consumers must concern about the after-sales service if they are intended to purchase the GCS type.

## 2.5 Contemporary Topic Description

LED solar lighting is quite well known in Thailand as clean energy from solar that can produce the lighting. The LED solar lighting consists of 4 parts. First is the lamp. LED lighting is a technology that uses less energy and more reliable because it has more efficiency to produce illumination with less loss from heat than other lights such as fluorescent, metal halide, and sodium lamp (Marketresearchfuture, 2020). The second is the battery. Most of them are using Lithium-Ion and Lead-acid as types of batteries. The third is the controller that use to control the input and output of solar lighting. The last and the most crucial technology of solar power is photovoltaics (PV). This device converts solar light into direct current (DC) electricity or calls it a solar cell. Electricity generation depends on the intensity of light that hits the solar cell. The measurement is called "Full Sun Hours," which means that it will create 1,000 Watts of electricity in an hour with a square meter's solar cell area. In southern Thailand, the average full sun hour per day is around 7. (Solaris, 2020)

The PESTEL analysis of this model is concluded as Table 2.1 (Tongsopit, Chaitusaney, Limmanee, Kittner, & Hoontrakul, 2015)

Table 2.1

### *Type of logic and Assumption*

<b>Type of logic</b>	<b>Assumption</b>
Political	Supported Policy for Photovoltaic <ul style="list-style-type: none"> <li>- Continued BOI privilege. (import duty and income tax exemption).</li> </ul>

Type of logic	Assumption
Economics	Module Pricing <ul style="list-style-type: none"> <li>- Global price is expected to decline to be \$0.6 per watt peak in 2035.</li> </ul>
Social	Green Consumer Awareness <ul style="list-style-type: none"> <li>- High awareness and interest in green power sources and reduce using fossil fuel.</li> </ul>
Technology	Solar Cell Technology <ul style="list-style-type: none"> <li>- Photovoltaic efficiency is improving through years.</li> </ul>
Environment	Climate Change <ul style="list-style-type: none"> <li>- Global warming is impacting atmosphere.</li> </ul>
Legal	Administrative Barrier <ul style="list-style-type: none"> <li>- Government permit may be restricted easily.</li> </ul>

## 2.6 Segmentation Analysis (Prescient&Strategic Intelligence, 2020)

### *The standalone solar lighting system is the fastest-growing category*

Standalone solar lighting structures do not require a grid connection to any electrical power system. A battery will supply and store the electricity that converts from solar by the PV system. This simple structure leads the standalone system to be more cost-efficient than the grid-connected system. In 2019, the standalone system witnessed the fastest growth in the solar lighting market and was expected to maintain growth.

### *The retrofit is a broader revenue-generating installation category*

As forecasting, the retrofit category will hold the larger market size in terms of installation segmentation since the LED lamps will come in place of incandescent lamps that can apply with the incandescent frame model. This is expected to drive the solar lighting industry over the period.

### *The street is the largest and fastest-growing application category*

The street category held the most extensive solar lighting market share since 2019. The category is expected to be the fastest growth in the market over the period. This application category can further push outdoor lighting demand because the

government is moving toward solar lighting system developments for the highway & roadway.

## **2.7 Green buying behavior**

Government and consumers are becoming cautious of environment-related problems. Recently, studies on consumers' environment-friendly behavior and attitudes towards green products have gained attention increasingly. Pro-environmental awareness and concerns influence consumers' attitudes towards green products. They lacked knowledge about green products, which they are not confident about their quality, and felt it was the government's responsibility and companies to follow green practices.

Awareness and buying decisions of eco-brands were affected by the desire to protect the environment crisis. The consumers who know current environmental circumstances and green products' availability in the market were more likely to purchase green products than consumers who were less aware of environmental issues. Green buying behavior is an outcome of consumers' beliefs, buying experiences, involvement in environmental activities, and seriousness about ecological topics. These consumers were more likely to purchase green products as it fulfills their commitment to solving the environment's problem (Arpita, 2014).

## **2.8 LED Solar Lighting**

Solar LED lighting refers to the type of lights that were powered by photovoltaic panels or solar panels. The photovoltaic panels will turn the sunlight into electricity and then charge power into a rechargeable battery that supplies power to LED lights. It is rapidly increasing its popularity for homeowners who seek cost-effective and environmentally friendly ways to illuminate their outdoor living spaces and gardens. Solar LED lightings are durable and reliable surviving extremes of temperature, weather, and UV rays. (Researchnester, 2020). The global market size of solar lighting is valued at \$5.7 billion, with sales of 1,545.9 thousand lighting units in 2019 and projected to witness a CAGR of 9.4% during the forecast period (2020–2030) (Prescient&Strategic Intelligence, 2020).

The government of Thailand has a goal that every household in the country must have accessibility to electricity. Consequently, the renewable energy project was created, and the government aims to promote the use of renewable energy, especially solar photovoltaic systems (PV systems). Solar Home System (SHS) will be the first solution to the no power supply problem. However, Thai people, especially in rural areas, are concerned about financial issues, and they lack technical knowledge of their PV system. This barrier could be system maintenance was still a reasonably tricky task. Overall, Thailand has a better opportunity to gain the advantage of its sunny location. A solar energy system is an excellent option for the off-grid area (Yaungket & Tetsuo, 2013).

There are two main applications of the solar energy system in Thailand. First, Stand-Alone System (SAS) will produce the electricity (Direct Current) from the solar panel and then directly used to DC electrical equipment or charged to keep in the battery for future use. SAS is flexible to use with low investment. Second, Grid Connected System (GCS), the solar panel will be wired to various equipment such as DC charger controller battery and DC to AC inverter then connect to grid line or other AC electrical equipment. (Pattarapremcharoen, Rakwichian, Ketjoy, & Intanon, 2007).

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Set of Objectives**

The study of understanding the decision factors, segmentation, and marketing strategy to purchase LED solar lighting to help understand Thai consumers' perception and attitudes toward LED solar lighting in the Thailand market.

The objectives of this study are clarified as follows:

1. To explore the customer buying decision for the LED solar lighting
  - a. To explore the factors of the decision when purchasing LED solar lighting
  - b. To explore green environmental attitudes related to the decision to acquire LED solar lighting
  - c. To explore the customer understanding about LED solar lighting
  - d. To explore the barriers to purchasing LED solar lighting
2. To identify segmentation of customers who are willing to pay for LED solar lighting
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  - b. To identify segmentation of customer by psychographics
  - c. To identify segmentation of customer by problem
3. To determine the marketing strategies to the segmented customer that are willing to pay for the LED solar lighting
  - a. To determine the attributes of the solution
  - b. To determine the appropriate cost
  - c. To determine the distribution channel
  - d. To determine communication method

### 3.2 Research Methodology

The research will be conducted using two research designs: exploratory research method and descriptive research method.

#### 3.2.1 Exploratory research

This research design explores the decision factors, green attitudes, customer understanding of solar light, and the barriers to purchase. The results obtained through this research method will be a guideline for the descriptive research design.

##### Secondary Data

Data and relevant statistical data will be acquired from published sources such as E-Journals, E-Article, business source, TU library, newspapers, associations, and Google search engine.

##### Individual In-depth Interview

Individual in-depth interviews are conducted to understand customers' perspectives in more detail and avoid the influence of others' responses. The researcher will select ten respondents, five people who live in Bangkok, and five people who live in the vicinity of Bangkok. The interview process will not take longer than 30 minutes for Individual in-depth interviews.

Table 3.1

#### *Individual In-depth Interview Procedure*

<b>Sampling units</b>	<i>Male/Females aged 22 – 65 years old.</i>
	<i>People who live in Bangkok and vicinity.</i>
	<i>All participants have outdoor space in their properties and/or used to purchase or apply solar light in the past.</i>
<b>Sample size</b>	<i>Ten respondents</i>
<b>Recruitment method</b>	<i>Personal connection method</i>
<b>Sampling method</b>	<i>Convenience sampling method</i>

**Screening Question:**

- 1) Are you aged between 22-65 years old?
- 2) Do you live in Bangkok and vicinity?
- 3) Do you have outdoor space in your properties?

**Vital information to be obtained:**

- The factor of the decision to purchase LED solar lighting such as problem, place of purchasing, cost to acquire, information channel.
- The green attitude related to solar lighting purchasing decision.
- The understanding of specification and application of solar lighting.
- The barrier to purchase for consumers.

**3.2.2 Descriptive research**

Descriptive research's target is to describe the market situation accurately. The method will be designed by using questionnaires.

**Questionnaires**

This method will be conducted using online questionnaires, with a total of 200 respondents. The questionnaires aim to identify the segmentation of customers who are willing to pay for the LED solar lighting from demographics, psychographics, and problems. Moreover, the questionnaire result will be used to determine the marketing strategy for the segmented customer.

**Vital information to be obtained:**

- The decision to purchase LED solar lighting such as problem, place of purchasing, the costing effect to acquire, information source.
- The green attitudes related to a solar lighting purchasing decision.
- The understanding of solar lighting.
- The barrier to purchase for consumers.
- The data of customers by demographics, psychographics, problem
- The consumer perception for the attribute of the lighting solution, appropriated cost, the distribution channel, and communication way

Table 3.2

*Questionnaires Procedure*

<b>Sampling units</b>	<i>Male/Females aged 22 – 65 years old.</i>
	<i>People who live in Bangkok and the vicinity.</i>
	<i>All participants have outdoor space in their own properties</i>
<b>Sample size</b>	<i>200 respondents.</i>
<b>Recruitment method</b>	<i>Personal connection method and social media such as Facebook, Twitter, etc.</i>
<b>Sampling method</b>	<i>Convenience sampling method.</i>

**3.3 Procedures for analyzing collected data**

The questionnaires will be collected and selected by a researcher. The data will be analyzed by “Statistical Package for the Social Sciences” (SPSS) program to gain information such as the value of frequency, means, and other necessary related values for statistical analysis. The recommendation from the researcher will be summarized from each stage of research, which can be described as follows:

**3.4 Analyze Data on Qualitative Research**

The analysis plan for qualitative data will follow the four fundamental principles as follow.

1. Set up the appropriate data analysis method for qualitative analysis matching to the subject and objective.
2. Collect data from sampling units referred to the respondent criteria.
3. Analyze the qualitative data, then transcribe and describe.
4. Interpret and rearrange the story.

**3.5 Secondary Research**

Secondary research data will be analyzed to get the overall concept of customer buying behavior and background in this market. We will understand the

essential decision factors and green attitudes of consumers toward LED solar lighting. The researcher will summarize data and develop dependent and independent factors for the research.

### 3.6 In-depth Interview

In-depth interview data will be analyzed to understand the essential decision factors, the green attitudes of consumers, customer knowledge of solar light, and the barriers to purchase toward LED solar lighting. The independent factors will be correlated to the dependent factors.

### 3.7 Analyze Data on Quantitative Research

The analysis plan for quantitative data will be as follows:

#### 3.7.1 Questionnaire

The questionnaire data will be analyzed to understand the customers' segmentation and determine the marketing strategy for the segmented customer by the SPSS program to calculate frequency, means, and other related methods.

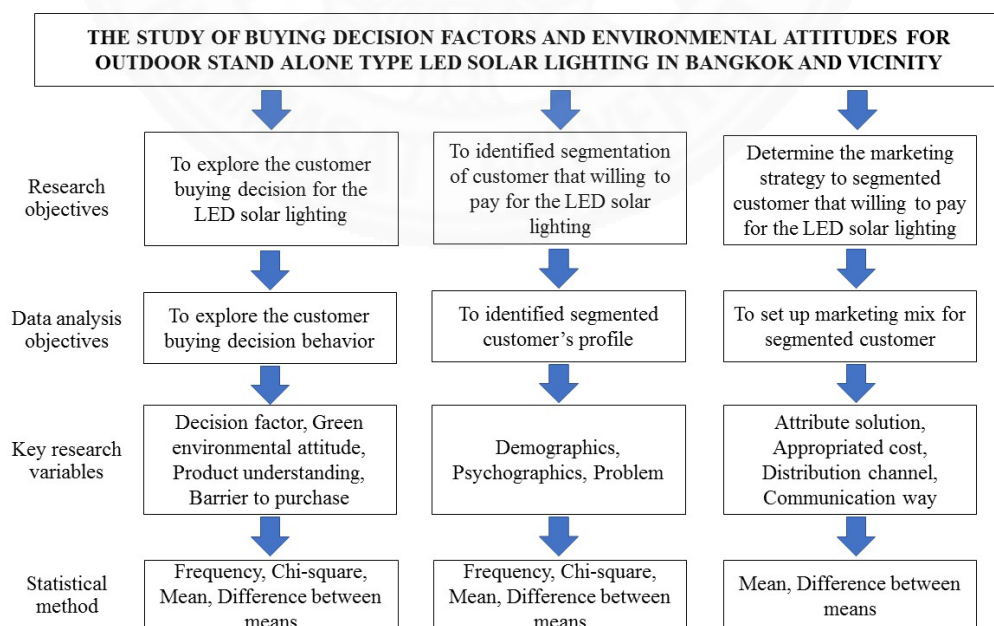


Figure 3.1 Structure of the data analysis plan

Table 3.3

*Examples of Dummy Tables*

<b>Objectives</b>	<b>Variables/ factors</b>	<b>Analysis Tool</b>
2.a	Age	Frequency, Mean, Median, Mode, Standard Deviation, and Range
2.a	Gender	Frequency and percentage of male and female
2.a	Graduation	Frequency and percentage of each level of education
2.a	Living area	Frequency and percentage of people who live in Bangkok and the vicinity area
2.b	Lifestyle	Likert scale, the value from one to five
2.b	Green attitude	Likert scale, the value from one to five
2.c	The problem of lighting at their properties	Likert scale, the value from one to five
2.c	The problem of understanding the LED solar lighting	Likert scale, the value from one to five
2.c	The problem of the barrier to purchase LED solar lighting	Likert scale, the value from one to five
3.a	The attribute of the solution	Likert scale, the value from one to five
3.b	The appropriated cost	Likert scale, the value from one to five
3.c	The distribution channel	Likert scale, the value from one to five
3.d	Communication way	Likert scale, the value from one to five

**3.8 Limitations**

Due to the study's time limitations, the sampling plan, data compilation, and data interpretation could not be reflective of the whole target customer since this study used convenience sampling and concentrated mainly on respondents in Bangkok and Vicinity. There could be some data that contradicts the consensus.

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Result of findings from Exploratory Research: In-depth Interviews

Sample size: 13 Sample sizes

In-depth interviews were conducted from the 18th of January to the 1st of February 2021, with respondents to obtain insight into their purchasing decisions and attitudes for outdoor standalone LED solar lighting. Seven people are interested in solar light and use it. On the other hand, others were not interested in the solar light or had never heard of it, but they had an image of a solar cell in their mind. The questions are aimed at potential respondents between the ages of 22 and 65 and have outdoor space in their properties.

The findings can be separated into two groups based on the people who responded. The first group of interviewees was those who had previously used solar lighting. Most of the interviewees are having issues with lighting and are concerned about the cable wiring installation. Since they got illumination problems in the outdoor areas, they decided to use solar light as a solution. However, they are concerned that they are unable to find a brand that can provide them with quality, warranty, spare parts, or service to support their online store at this time. Those who do not use solar light are the other group of interviewees. Most of them have never heard of this solar light.

Furthermore, they do not think that they have any issues with lighting in their homes. They were not particularly interested in purchasing the product, but they were curious about this innovation. In terms of this product's environmental issue. Although the respondent is concerned about the environment, it is not their primary concern to purchase the solar light. They use solar lights because they believe that it will save money on installation and operation.

Most of the respondents gather information and make purchases via the internet, social media, or e-commerce sites such as Google, Facebook, and Shopee. Some of them then decide to visit a modern trade store to see the actual products. After that, a product consultant will demonstrate the product to see if it is bright

enough for the requirement. Explain the model's other specifications, such as the duration and additional function.

#### 4.2 Result of findings from exploratory research: questionnaire survey

This survey has four screen questions which only the respondents who pass all screen questions can do this survey.

- A1 Are you aged between 22 - 65 years old? (384 Respondents)  
 - YES (338 Respondents) / NO (End of Survey) (46 Respondents)
- A2 Do you live in Bangkok and Vicinity? (338 Respondents)  
 - YES (294 Respondents) / NO (End of Survey) (44 Respondents)
- A3 Do you live or have a house exclude an apartment or condominium?  
 (Such as Detached House, Townhouse, etc.) (294 Respondents)  
 - YES (243 Respondents) / NO (End of Survey) (51 Respondents)
- A4 Do you have an outdoor space in your properties? (243 Respondents)  
 - YES (213 Respondents) / NO (End of Survey) (30 Respondents)

##### 4.2.1 Respondents' profile

The online survey received 213 responses in total. The Statistical Package for Social Sciences (SPSS) was used to analyze the data. The demographics of the respondents, such as gender and age, are summarized in Table 4.1.

Table 4.1

##### *Respondents' demographics (Frequency)*

		<b>Count</b>	<b>Percent</b>
Gender	Female	110	52%
	Male	103	48%
Age	20-26 Years Old	38	18%
	27-29 Years Old	64	30%
	30-50 Years Old	59	28%
	51-65 Years Old	52	24%

		<b>Count</b>	<b>Percent</b>
Marital status?	Single	132	62%
	Married	75	35%
	Divorce	6	3%
People are living with (including respondent)	1-2 People	36	17%
	3 People	52	24%
	4 People	53	25%
	5 People	40	19%
	More than 5 People	32	15%
Education	High School	1	0%
	High Vocational Certificate	5	2%
	Bachelor Degree	132	62%
	Master Degree	68	32%
	Ph.D. Degree	7	3%
Occupation	Student	19	9%
	Private Employee	103	48%
	Public Employee	22	10%
	Own Business or Freelance	44	21%
	Jobless	25	12%
Monthly personal income	< 20,000 THB	43	20%
	20,000 - 29,999 THB	35	16%
	30,000 - 49,999 THB	47	22%
	50,000 - 79,999 THB	33	15%
	>= 80,000 THB	55	26%
Province	Bangkok	131	62%
	Vicinity	82	38%

Since we asked a screen question, all of the respondents are appropriate and well balanced in their responses. The results of this survey will undoubtedly reflect the various types of people who can purchase solar light in Bangkok and the vicinity.

The psychographics of the respondents, such as behavior and attitude, are summarized in Table 4.2.

Table 4.2

*Respondents' psychographics (Frequency)*

		<b>Count</b>	<b>Percent</b>
J9. How much do you agree that you like to stay at home?	Strongly Disagree	3	1%
	Disagree	11	5%
	Neutral	52	24%
	Agree	89	42%
	Strongly Agree	58	27%

		Count	Percent
J10. How much do you agree that you like to go outside?	Strongly Disagree	6	3%
	Disagree	34	16%
	Neutral	105	49%
	Agree	46	22%
	Strongly Agree	22	10%
J11. How much do you agree with the green trend of pollution in the air?	Strongly Disagree	2	1%
	Disagree	4	2%
	Neutral	26	12%
	Agree	89	42%
	Strongly Agree	92	43%
J12. How much do you agree with the green trend of global warming?	Strongly Disagree	2	1%
	Disagree	4	2%
	Neutral	28	13%
	Agree	87	41%
	Strongly Agree	92	43%
J13. How much do you agree with the green trend of plastic recycling?	Strongly Disagree	0	0%
	Disagree	5	2%
	Neutral	39	18%
	Agree	87	41%
	Strongly Agree	82	38%
J14. How much do you agree to purchase the products that stand for green trends over those that did not?	Strongly Disagree	4	2%
	Disagree	22	10%
	Neutral	65	31%
	Agree	70	33%
	Strongly Agree	52	24%

The data generally showed that more than 60% of the respondents agree that they prefer to stay at home. The result shows that approximately 85%, 84%, and 79% of the respondents agree that they are aware of green trends for air pollution, global warming, and plastic recycling, respectively.

Table 4.3

*Respondents' psychographics (Mean, Median and S.D.)*

Marketing Mix	Overall		
	Mean	Med	S.D.
J9. How much do you agree that you like to stay at home?	3.88	4	0.92
J10. How much do you agree that you like to go outside	3.21	3	0.93
J11. How much do you agree with the green trend of pollution in the air?	4.24	4	0.81

Marketing Mix	Overall		
	Mean	Med	S.D.
J12. How much do you agree with the green trend of global warming?	4.23	4	0.82
J13. How much do you agree with the green trend of plastic recycling?	4.15	4	0.80
J14. How much do you agree to purchase the products that stand for green trends over those that did not?	3.68	4	1.02

According to the Mean and Median, most respondents are concerned about the current green trend and problem. The standard deviation is also not very high, implying that the majority of the respondents gave the same answers.

#### 4.2.2 Respondents' factors

The results of each objective of this research can be described by dividing the respondents into two groups: Target and Non-Target. From the question of B.9, How much do you possibly buy new outdoor standalone type solar lighting? We conclude the answer of "agree" and "strongly agree" with our target customer. The others are non-target customers. Then, finding the independent factor that affects respondents' decision to purchase will become our target group. From table 4.4, the result reveals the number and percent of target and non-target respondents who answer each question for demographic. According to the Pearson Chi-Square Tests, there is no difference between the target group and the demographic at the significant level of 0.05.

Table 4.4

#### *Demographic of respondents - Decision to Purchase*

		Target_NonTarget			
		NonTarget		Target	
		Count	Column N %	Count	Column N %
J1. What is your Gender?	Female	39	52.0%	71	51.4%
	Male	36	48.0%	67	48.6%
J2. How old are you?	20-26 Years Old	11	14.7%	27	19.6%
	27-29 Years Old	30	40.0%	34	24.6%
	30-50 Years Old	15	20.0%	44	31.9%
	51-65 Years Old	19	25.3%	33	23.9%

		Target_NonTarget			
		NonTarget		Target	
		Count	Column N %	Count	Column N %
J3. What is your marital status?	Single	48	64.0%	90	65.2%
	Married	27	36.0%	48	34.8%
J4. How many people are living with you? (including you)	1-2 People	10	13.3%	26	18.8%
	3 People	20	26.7%	32	23.2%
	4 People	16	21.3%	37	26.8%
	5 People	18	24.0%	22	15.9%
	More than 5 People	11	14.7%	21	15.2%
J5. What is your education level?	High School or Vocational Certificate	4	5.3%	2	1.4%
	Bachelor Degree	45	60.0%	87	63.0%
	Master Degree and Above	26	34.6%	49	35.5%
J6. What is your occupation?	Student	6	8.0%	13	9.4%
	Private Employee	34	45.3%	69	50.0%
	Public Employee	11	14.7%	11	8.0%
	Own Business or Freelance	15	20.0%	29	21.0%
	Jobless	9	12.0%	16	11.6%
J7. What is your monthly personal income?	< 20,000 THB	17	22.7%	26	18.8%
	20,000 - 29,999 THB	12	16.0%	23	16.7%
	30,000 - 49,999 THB	15	20.0%	32	23.2%
	50,000 - 79,999 THB	11	14.7%	22	15.9%
	>= 80,000 THB	20	26.7%	35	25.4%
J8. Which province do you live in?	Bangkok	45	60.0%	86	62.3%
	Vicinity	30	40.0%	52	37.7%

### Pearson Chi-Square Tests

		Target_NonTarget
J1. What is your Gender?	Chi-square	.006
	df	1
	Sig.	.939
J2. How old are you?	Chi-square	6.988
	df	3
	Sig.	.072

		Target_NonTarget
J3. What is your marital status?	Chi-square	.032
	df	1
	Sig.	.859
J4. How many people are living with you? (including you)	Chi-square	3.389
	df	4
	Sig.	.495
J5. What is your education level?	Chi-square	2.685
	df	2
	Sig.	.261a
J6. What is your occupation?	Chi-square	2.469
	df	4
	Sig.	.650
J7. What is your monthly personal income?	Chi-square	.672
	df	4
	Sig.	.955
J8. Which province do you live in?	Chi-square	.110
	df	1
	Sig.	.740

a. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.

From table 4.5, the result shows that there is a difference between the target group and the decision to purchase green trend product at the significant level of 0.05 with the mean of 3.9.

Table 4.5

*Psychographics of respondents - Decision to Purchase*

	Target NonTarget Mean	NonTarget Target Mean
J9. How much do you agree that you like to stay at home?	3.9	3.9
J10. How much do you agree that you like to go outside	3.1	3.2
J11. How much do you agree with the green trend of pollution in the air?	4.3	4.2
J12. How much do you agree with the green trend of global warming?	4.1	4.3
J13. How much do you agree with the green trend of plastic recycling?	4.1	4.2
J14. How much do you agree to purchase the products that stand for green trends over those that did not?	3.3	3.9

#### Comparisons of Column Means<sup>a</sup>

	Target NonTarget (A)	NonTarget Target (B)
J9. How much do you agree that you like to stay at home?		
J10. How much do you agree that you like to go outside		
J11. How much do you agree with the green trend of pollution in the air?		
J12. How much do you agree with the green trend of global warming?		
J13. How much do you agree with the green trend of plastic recycling?		
J14. How much do you agree to purchase the products that stand for green trends over those that did not?		A

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From table 4.6, the result shows that there is a difference between the target group and the requirement of lighting and the knowledge of outdoor standalone type solar lighting at the significant level of 0.05 with the mean of 3.5 and 3.2, respectively.

Table 4.6

*Problem of respondents - Decision to Purchase*

	Target_NonTarget NonTarget Mean	Target Mean
B3. In the outdoor space that you mentioned earlier, how much do you agree that this space currently have enough lighting?	3.4	3.5
B5. How much do you agree that this space requires more lighting?	3.1	3.5
B6. Please rate how much do you think you know outdoor standalone type solar lighting?	2.8	3.2

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

**Comparisons of Column Means<sup>a</sup>**

	Target_NonTarget NonTarget (A)	Target (B)
B3. In the outdoor space that you mentioned earlier, how much do you agree that this space currently have enough lighting?		
B5. How much do you agree that this space requires more lighting?		A
B6. Please rate how much do you think you know outdoor standalone type solar lighting?		A

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From table 4.7, the result reveals the number and percent of target and non-target respondents who answer each question. The Pearson Chi-Square Tests tells that there is a difference between the target group and the type of house and the existing solar light user at the significant level of 0.05.

Table 4.7

*House of respondents - Decision to Purchase*

		Target_NonTarget			
		NonTarget		Target	
		Count	Column N %	Count	Column N %
B1. What is the type of your house?	CommercialBuilding	10	13.3%	5	3.6%
	TownHouse	17	22.7%	38	27.5%
	SemiDetachedHouse	2	2.7%	10	7.2%
	DetachedHouse	46	61.3%	85	61.6%
B2. How big is the outdoor area of your house? (include all parking areas, pathways, gardens, etc.)	Less24sq.m.	18	24.0%	36	26.1%
	24-42sq.m.	20	26.7%	28	20.3%
	42-60sq.m.	8	10.7%	17	12.3%
	60-80sq.m.	9	12.0%	16	11.6%
	More80sq.m.	20	26.7%	41	29.7%
B4. What kind of lighting have you already installed? Standalone solar lighting					
- Traditional Wired Lighting	Yes	60	80.0%	112	81.2%
	No	15	20.0%	26	18.8%
- Standalone solar lighting	Yes	14	21.9%	50	78.1%
	No	61	40.9%	88	59.1%
- Do not have lighting outdoor	Yes	4	40.0%	6	60.0%
	No	71	35.0%	132	65.0%

### Pearson Chi-Square Tests

		Target_NonTarget
B1. What is the type of your house?	Chi-square	8.762
	df	3
	Sig.	.033*
B2. How big is the outdoor area of your house? (include all parking areas, pathways, gardens, etc.)	Chi-square	1.237
	df	4
	Sig.	.872
B4. What kind of lighting have you already installed? Standalone solar lighting		
- Traditional Wired Lighting	Chi-square	.042
	df	1
	Sig.	.838

		Target_NonTarget
- Standalone solar lighting	Chi-square	7.133
	df	1
	Sig.	.008*
- Do not have lighting outdoor	Chi-square	.105
	df	1
	Sig.	.745b

\*. The Chi-square statistic is significant at the .05 level.

b. More than 20% of cells in this subtable have expected cell counts less than

5. Chi-square results may be invalid.

From table 4.8, the result shows that there is no difference between the target group and the green environmental attitudes at the significant level of 0.05.

Table 4.8

*Green Trend of respondents - Decision to Purchase*

	Target_NonTarget	
	NonTarget Mean	Target Mean
H1. How much do you agree that outdoor standalone type solar lighting uses power from green energy can save your electricity bill?	4.3	4.4
H2. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce pollution?	4.2	4.1
H3. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce global warming?	4.1	4.2
H4. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce plastic usage?	3.8	3.7

**Comparisons of Column Means<sup>a</sup>**

	Target_NonTarget	
	NonTarget (A)	Target (B)
H1. How much do you agree that outdoor standalone type solar lighting uses power from green energy can save your electricity bill?		
H2. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce pollution?		
H3. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce global warming?		
H4. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce plastic usage?		

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From table 4.9, the result reveals the number and percent of target and non-target respondents who answer each question for the application of respondents. Pearson Chi-Square Tests showed a difference between the target group and structure of the street lighting with solar cell at the significant level of 0.05.

Table 4.9

*Application of respondents - Decision to Purchase*

		Target_NonTarget			
		NonTarget		Target	
		Count	Column N %	Count	Column N %
C1. Where is the place you would like to use at or used to?					
- The entrance of your house?	Yes	25	55.6%	91	70.5%
	No	20	44.4%	38	29.5%
- Parking area?	Yes	26	57.8%	77	59.7%
	No	19	42.2%	52	40.3%
- In the garden?	Yes	25	55.6%	74	57.4%
	No	20	44.4%	55	42.6%
- Around the fence?	Yes	23	51.1%	83	64.3%
	No	22	48.9%	46	35.7%

		Target_NonTarget			
		NonTarget		NonTarget	
		Count	Count	Count	Count
C2. What is the type you would like to use or used to?					
- Lighting is with solar cell?	Yes	28	62.2%	88	68.2%
	No	17	37.8%	41	31.8%
- Lighting and the solar cell is connected by wire	Yes	10	22.2%	46	35.7%
	No	35	77.8%	83	64.3%
- Street Lighting is with solar cell	Yes	16	35.6%	26	20.2%
	No	29	64.4%	103	79.8%
- Street lighting and the solar cell is connected by wire	Yes	5	11.1%	19	14.7%
	No	40	88.9%	110	85.3%
- Ground lighting for garden	Yes	21	46.7%	58	45.0%
	No	24	53.3%	71	55.0%

### Pearson Chi-Square Tests

		Target_NonTarget	
		Chi-square	Sig.
C1. Where is the place you would like to use at or used to?			
- The entrance of your house?	Chi-square	3.372	
	df	1	
	Sig.	.066	
- Parking area?	Chi-square	.051	
	df	1	
	Sig.	.822	
- In the garden?	Chi-square	.045	
	df	1	
	Sig.	.833	
- Around the fence?	Chi-square	2.453	
	df	1	
	Sig.	.117	
C2. What is the type you would like to use or used to?			
- Lighting is with solar cell?	Chi-square	.540	
	df	1	
	Sig.	.463	

		Target_NonTarget
- Lighting and the solar cell is connected by wire	Chi-square	2.760
	df	1
	Sig.	.097
- Street Lighting is with solar cell	Chi-square	4.321
	df	1
	Sig.	.038*
- Street lighting and the solar cell is connected by wire	Chi-square	.367
	df	1
	Sig.	.545
- Ground lighting for garden	Chi-square	.039
	df	1
	Sig.	.843

From table 4.10, the result shows that there is a difference between the target group and the understanding that outdoor standalone type solar lighting is a new technology at the significant level of 0.05.

Table 4.10

*Barrier to purchase of respondents - Decision to Purchase*

	Target_NonTarget NonTarget Mean	Target Mean
I1. How much do you agree that outdoor standalone type solar lighting is a new technology?	3.3	4.0
I1. How much do you agree that the information to educate the customer about the outdoor standalone type solar lighting is significantly less?	3.2	3.3
I1. How much do you agree that energizing the lighting by solar is unnecessary?	2.7	3.4
I1. How much do you agree that solar light is expensive if the price is more than 2 times that of wired light?	3.4	3.4
I1. How much do you agree that turning on-off the lighting outdoor is necessary?	3.8	3.8

### Comparisons of Column Means<sup>a</sup>

	Target_NonTarget NonTarget (A)	Target Target (B)
I1. How much do you agree that outdoor standalone type solar lighting is a new technology?		A
I1. How much do you agree that the information to educate the customer about the outdoor standalone type solar lighting is significantly less?		
I1. How much do you agree that energizing the lighting by solar is unnecessary?		
I1. How much do you agree that solar light is expensive if the price is more than 2 times that of wired light?		
I1. How much do you agree that turning on-off the lighting outdoor is necessary?		

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From table 4.11, the result shows that there is a difference between the target group and the Auto Turn On-Off function for night time and movement at the significant level of 0.05 with the mean of 4.3 and 4.1, respectively.

Table 4.11

#### *Attributes of solution of respondents - Decision to Purchase*

	Target_NonTarget NonTarget Mean	Target Target Mean
D1. How much do you agree that you are considering the product from the fame of its brand name	3.5	3.6
D2. How much do you agree that you are considering the product from the duration of usage (all night time)	4.2	4.1
D3. How much do you agree that you are considering the product from the photosensor (Auto Turn On-Off during night-day)	4.0	4.3
D4. How much do you agree that you are considering the product from the motion sensor (Auto Turn On when detecting movement)	3.7	4.1

	Target_NonTarget NonTarget Mean	Target Mean
D5. How much do you agree that you are considering the product with IP65 (completely protect dust and water spray from every direction)	4.1	Mean
D6. How much do you agree that you are considering the product is more convenient to install for not require wiring from the existing system	4.2	4.4
D7. How much do you agree that you are considering the product from its design (fashion)	3.7	3.9
D8. How much do you agree that you are considering the product have a professional service to install	3.2	3.5
D9. How much do you agree that you are considering the product from the warranty	4.1	4.1
D10. How much do you agree that you are considering the product that using green energy to help global warming	3.6	3.9

#### Comparisons of Column Means<sup>a</sup>

	Target_NonTarget NonTarget (A)	Target (B)
D1. How much do you agree that you are considering the product from the fame of its brand name		
D2. How much do you agree that you are considering the product from the duration of usage (all night time)		
D3. How much do you agree that you are considering the product from the photosensor (Auto Turn On-Off during night-day)		A
D4. How much do you agree that you are considering the product from the motion sensor (Auto Turn On when detecting movement)		A
D5. How much do you agree that you are considering the product with IP65 (completely protect dust and water spray from every direction)		
D6. How much do you agree that you are considering the product is more convenient to install for not require wiring from the existing system		

	Target_NonTarget NonTarget (A)	Target (B)
D7. How much do you agree that you are considering the product from its design (fashion)		
D8. How much do you agree that you are considering the product have a professional service to install		
D9. How much do you agree that you are considering the product from the warranty		
D10. How much do you agree that you are considering the product that using green energy to help global warming		

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From the table 4.12, the result show that there is a difference between the target group and the willing to pay for an additional cost for installation service at the significant level of 0.05 with the mean of 3.2.

Table 4.12

*Appropriate cost of respondents - Decision to Purchase*

	Target_NonTarget NonTarget Mean	Target Mean
E1. How much do you agree that you are considering the price should match the specification of the product	4.2	4.3
E2. How much do you agree that promotion pricing will influence you to purchase	3.8	3.9
E3. How much do you agree that you consider product only for a lower price	2.7	3.0
E4. How much do you agree that you are considering you can pay more from its brand famous	3.4	3.5
E5. How much do you agree that you will pay more if the product has a warranty longer than other	3.6	3.9
E6. How much do you agree that you would like to pay an additional cost for installation service	2.8	3.2
E7. How much do you agree that you would like to pay for an additional warranty of the product	3.1	3.4

**Comparisons of Column Means<sup>a</sup>**

	Target_NonTarget NonTarget (A)	Target (B)
E1. How much do you agree that you are considering the price should match the specification of the product		
E2. How much do you agree that promotion pricing will influence you to purchase		
E3. How much do you agree that you consider product only for a lower price		
E4. How much do you agree that you are considering you can pay more from its brand famous		
E5. How much do you agree that you will pay more if the product has a warranty longer than other		
E6. How much do you agree that you would like to pay an additional cost for installation service		A
E7. How much do you agree that you would like to pay for an additional warranty of the product		

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From table 4.13, the result shows that there is a difference between the target group and the product consultant and product sample at the significant level of 0.05 with the mean of 3.5 and 3.9, respectively.

Table 4.13

*Distribution channel of respondents - Decision to Purchase*

	Target_NonTarget NonTarget Mean	Target Mean
F1. How much do you agree that you mostly buy these products from modern trade (Homepro, Boonthaworn, Thaiwassadu, etc.)	3.7	3.9
F2. How much do you agree that you mostly buy these products from traditional trade (Local store, retail)	3.1	2.8
F3. How much do you agree that you mostly buy these products from online channels (Shopee, Lazada, Facebook, etc.)	3.5	3.6

	Target_NonTarget NonTarget Mean	Target Mean
F4. How much do you agree that you prefer to buy a product that has a product consultant at the point of sales for the offline channel	3.1	3.5
F5. How much do you agree that you prefer to buy a product with a sample to test	3.5	3.9

### Comparisons of Column Means<sup>a</sup>

	Target_NonTarget NonTarget (A)	Target (B)
F1. How much do you agree that you mostly buy these products from modern trade (Homepro, Boonthaworn, Thaiwassadu, etc.)		
F2. How much do you agree that you mostly buy these products from traditional trade (Local store, retail)		
F3. How much do you agree that you mostly buy these products from online channels (Shopee, Lazada, Facebook, etc.)		
F4. How much do you agree that you prefer to buy a product that has a product consultant at the point of sales for the offline channel		A
F5. How much do you agree that you prefer to buy a product with a sample to test		A

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

From table 4.14, the result shows that there is a difference between target group and the advertisement about its benefit at the significant level of 0.05 with the mean of 3.9.

Table 4.14

*Communication way of respondents - Decision to Purchase*

	Target_NonTarget	
	NonTarget Mean	Target Mean
G1. How much do you agree that you prefer to buy a product which has a website of its brand	3.6	3.7
G2. How much do you agree that you prefer to buy a product that has the service center to support you via call center, email, or social media	3.8	4.0
G3. How much do you agree that you prefer to buy a product which has an advertisement about its benefit	3.6	3.9
G4. How much do you agree that you prefer to buy a product which has a famous presenter to promote the brand	2.4	2.7
G5. How much do you agree that you prefer to buy a product which has a promotion for a new user	3.4	3.6
G6. How much do you agree that you prefer to buy a product which has a promotion for the existing user	3.5	3.6

#### Comparisons of Column Means<sup>a</sup>

	Target_NonTarget	
	NonTarget (A)	Target (B)
G1. How much do you agree that you prefer to buy a product which has a website of its brand		
G2. How much do you agree that you prefer to buy a product that has the service center to support you via call center, email, or social media		
G3. How much do you agree that you prefer to buy a product which has an advertisement about its benefit		A
G4. How much do you agree that you prefer to buy a product which has a famous presenter to promote the brand		
G5. How much do you agree that you prefer to buy a product which has a promotion for a new user		
G6. How much do you agree that you prefer to buy a product which has a promotion for the existing user		

Significance level for upper case letters (A, B, C): .05<sup>a</sup>

## **CHAPTER 5**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Conclusions**

##### **5.1.1 Conclusions from the in-depth interviews**

In general, respondents who own or are interested in LED solar lights have a problem with lighting in their home's outdoor area. They must hire an electrician or pay a high installation cost. Consequently, they looked for a solution that would allow them to install new lighting without having to deal with these issues. Solar light is one of their options, which they can learn more about it from the internet or product consultants at the stores. The major applications that they want from this product are the lumen and duration of solar light. Those who are uninterested in solar lighting have no lighting problems or unaware of solar light technology.

##### **5.1.2 Conclusions from the questionnaire**

According to each objective, the result can be analyzed and translate as below.

1. Segmentation of customer by demographics: From table 4.4, there is no difference between the target group and the demographic at the significant level of 0.05.
2. Segmentation of customer by psychographics: From table 4.5, there is a difference between the target group and the decision to purchase a green trend product at the significant level of 0.05 with a mean of 3.9.
3. Segmentation of customer by the problem: From table 4.6, there is a difference between the target group and the requirement of lighting and the knowledge of outdoor standalone type solar lighting at the significant level of 0.05 with the mean of 3.5 and 3.2, respectively.
4. Factors of the decision when purchasing LED solar lighting: From table 4.7, there is a difference between the target group and the

type of house and the existing solar light user at the significant level of 0.05.

5. Green environmental attitudes related to the decision to acquire LED solar lighting: From table 4.8, there is no difference between the target group and the green environmental attitudes at the significant level of 0.05.
6. Customer understanding about LED solar lighting: From table 4.9, the result, there is a difference between the target group and structure of the street lighting is with a solar cell at the significant level of 0.05.
7. Barriers to purchasing LED solar lighting: From table 4.10, there is a difference between the target group and the understanding that outdoor standalone type solar lighting is a new technology at the significant level of 0.05 with a mean of 4.0.
8. The attributes of the solution: From table 4.11, there is a difference between the target group and the Auto Turn On-Off function for night time and movement at the significant level of 0.05 with the mean of 4.3 and 4.1, respectively.
9. The appropriate cost: From table 4.12, there is a difference between the target group and the willingness to pay for an additional cost for installation service at the significant level of 0.05 with the mean of 3.2.
10. The distribution channel: From table 4.13, there is a difference between the target group and the product consultant and product sample at the significant level of 0.05 with the mean of 3.5 and 3.9, respectively.
11. The communication method: From table 4.14, the result shows that there is a difference between the target group and the advertisement about its benefit at the significant level of 0.05 with the mean of 3.9.

## 5.2 Recommendations

Based on the results of this survey, the following is a recommendation for the study of "Buying decision factors and environmental attitudes for outdoor standalone type LED solar lighting in Bangkok and vicinity:"

### 5.2.1 Recommendation for buying decisions factors

The lighting requirement to solve their illumination problem for their house influences the customer to purchase, and they must then try to figure out the solution. After that, these people began to buy solar lights, and they tend to repurchase them. Those who attempted to purchase are interested in the Street Lighting is with a solar cell, and they had the impression that the solar light is a new technology more than the respondents who are not interested.

In terms of the marketing mix, the factors that can influence a customer can be summarized as follows:

- Product: Auto Turn On-Off function for night time and movement are two functions that can influence customers. These features contribute to the buyer's perception that this is a new technology.
- Price: There is not much of a difference in price between targets and non-targets. On the other hand, target customers are willing to pay a premium for installation services.
- Place: The targets are preferred to have a product consultant and a product sample at the point of sale significantly compared to non-target.
- Promotion: The target group is likely to require advertising about the product's benefits. They do not have much information about the solar light product for each brand.

### 5.2.2 Recommendation for environmental attitudes

Green environmental attitudes have little impact on both targets and non-targets. The majority of them are concerned about the environment. On the other hand, the target customers are more likely to purchase products that are promoted as environmentally friendly.

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**APPENDICES**

## APPENDIX A

### QUESTIONS FOR IN-DEPTH INTERVIEW

#### Main structure:

Part A: Screening Question	(1 min)
Part B: To identify key factors	(10 min)
Part C: To identify demographic and psychographic	(5 min)

<b>Part A : Screening Question (1 min)</b>
<p>A-1. Are you aged between 22 - 65 years old?</p> <p>A-2. Do you live in Bangkok and Vicinity?</p> <p>A-3. Do you have an outdoor space in your properties? (Exclude balcony in apartment or condominium)</p>
<b>Part C : To identify key factors (10 min)</b>
<p>B-1 In the outdoor space that you mention earlier, does this space currently have lighting?</p> <p>B-1-1 If Yes, What kind of lighting you already installed?</p> <p>B-1-2 If No, Is it required to install more lighting in this space?</p> <p>B-2 Does it have any problems with lighting installation for this space?</p> <p>B-3 What are your options for lighting in this space?</p> <p>B-4 Are you interested in obtaining or assessing solar lighting?</p> <p>B-5 What is the reason that can make you decide to purchase solar lighting?</p> <p>B-6 What are you looking for when talking about using solar light?</p> <p>B-7 How much do you know about the specification and application of solar lighting?</p> <p>B-8 What is the application of a product that you are willing to have according to your properties?</p> <p>B-9 How much do you purchase? or what is your reasonable cost for it in your idea? (Depend on the application of the product)</p>

- B-10 Where did you find the place for purchasing solar lighting? or have you ever seen it?
- B-11 How can you get information about solar lighting? or have you ever heard?
- B-12 Do you have any obstacles to purchasing solar lighting?
- B-13 Solar lighting using power from green energy. Is it your reason for purchasing?

**Part C: To identify demographic and psychographic (10 min)**

- C-1 What is your gender?
- C-2 How old are you?
- C-3 Which area do you live in?
- C-4 What is your education level?
- C-5 What is your occupation?
- C-6 What's your monthly personal income?
- C-7 What is your hobby?
- C-8 What is your idea about the green trend?
- C-9 Will you purchase the product which stands for green trends over those that did not?

## **APPENDIX B QUESTIONNAIRES**

Dear Participant,

This questionnaire is part of an independent research project conducted by Master's students enrolled in Thammasat University's Marketing program. The goal is to learn more about the factors that influence purchasing decisions and environmental attitudes for outdoor standalone solar lights in Bangkok and the surrounding areas.

It takes an average of ten minutes to complete this questionnaire. The authors would like to express their gratitude to everyone who took the time to complete this survey. The information you provide will be kept private and only used for interpretation in accordance with the course's policy.

If you have any questions or need further assistance with the questionnaire, please contact Saran Mahapun at [saranmahapun@gmail.com](mailto:saranmahapun@gmail.com).

Sincerely,

Mr. Saran Mahapun

### **Part1: Screening Questions**

Please select one choice for each question that is most suitable to you. The instruction to proceed or the end of the screening question is presented next to the related answer.

#### **Part A: Screening Question**

A1 Are you aged between 22 - 65 years old?

- Yes
- No (End of Survey)

A2 Do you live in Bangkok and Vicinity?

- Yes
- No (End of Survey)

A3 Do you live or have a house exclude an apartment or condominium? (Such as Detached House, Townhouse etc.)

- Yes
- No (End of Survey)

A4 Do you have an outdoor space in your properties?

- Yes
- No (End of Survey)

– End of Screening Question –

## **Part 2: Survey Questionnaire**

### **Part B: The general information for a potential target of using outdoor standalone type solar lighting**

- What is the type of your house?
- How big is the outdoor area of your house? (include all parking areas, pathways, gardens, etc.)
- In the outdoor space that you mentioned earlier, how much do you agree that this space currently have enough lighting
- What kind of lighting have you already installed?
- How much do you agree that this space requires more lighting
- Please rate how much do you think you know outdoor standalone type solar lighting?
- Please rate how much are you interested in using outdoor standalone type solar lighting?
- Do you currently already purchase outdoor standalone type solar lighting?
- How much do you possibly buy new outdoor standalone type solar lighting?
- Please select the choice that is most suitable for you.
- You used to use or interested in buying outdoor standalone type solar lighting

**Part C: The general information for a target who is interested in using outdoor standalone type solar lighting**

- Where is the place you would like to use at or used to (Can select more than 1 choices)
- What is the type you would like to use or used to

**Part D: The opinion for the factor of product and service for outdoor standalone type solar lighting**

- How much do you agree that you are considering the product from the fame of its brand name
- How much do you agree that you are considering the product from the duration of usage (all night time)
- How much do you agree that you are considering the product from the photosensor (Auto Turn On-Off during night-day)
- How much do you agree that you are considering the product from the motion sensor (Auto Turn On when detecting movement)
- How much do you agree that you are considering the product with IP65 (completely protect dust and water spray from every direction)
- How much do you agree that you are considering the product is more convenient to install for not require wiring from the existing system
- How much do you agree that you are considering the product from its design (fashion)
- How much do you agree that you are considering the product have a professional service to install
- How much do you agree that you are considering the product from the warranty
- How much do you agree that you are considering the product that using green energy to help global warming

**Part E: The opinion for the factor of pricing for outdoor standalone type solar lighting**

- How much do you agree that you are considering the price should match the specification of the product

- How much do you agree that promotion pricing will influence you to purchase
- How much do you agree that you consider product only for a lower price
- How much do you agree that you are considering you can pay more from its brand famous
- How much do you agree that you will pay more if the product has a warranty longer than other
- How much do you agree that you would like to pay an additional cost for installation service
- How much do you agree that you would like to pay for an additional warranty of the product

**Part F: The opinion for the factor of a distribution channel to a customer for outdoor standalone type solar lighting**

- How much do you agree that you mostly buy these products from modern trade (Homepro, Boonthaworn, Thaiwassadu, etc.)
- How much do you agree that you mostly buy these products from traditional trade (Local store, retail)
- How much do you agree that you mostly buy these products from online channels (Shopee, Lazada, Facebook, etc.)
- How much do you agree that you prefer to buy a product that has a product consultant at the point of sales for the offline channel
- How much do you agree that you prefer to buy a product with a sample to test

**Part G: The opinion for the factor of communication to a customer for outdoor standalone type solar lighting**

- How much do you agree that you prefer to buy a product which has a website of its brand
- How much do you agree that you prefer to buy a product that has the service center to support you via call center, email, or social media
- How much do you agree that you prefer to buy a product which has an advertisement about its benefit
- How much do you agree that you prefer to buy a product which has a famous presenter to promote the brand

- How much do you agree that you prefer to buy a product which has a promotion for a new user
- How much do you agree that you prefer to buy a product which has a promotion for the existing user

**Part H: The opinion for the factor of a green trend to a customer for outdoor standalone type solar lighting**

- How much do you agree that outdoor standalone type solar lighting uses power from green energy can save your electricity bill?
- How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce pollution?
- How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce global warming?
- How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce plastic usage?

**Part I: The general information for a non-potential target of using outdoor standalone type solar lighting**

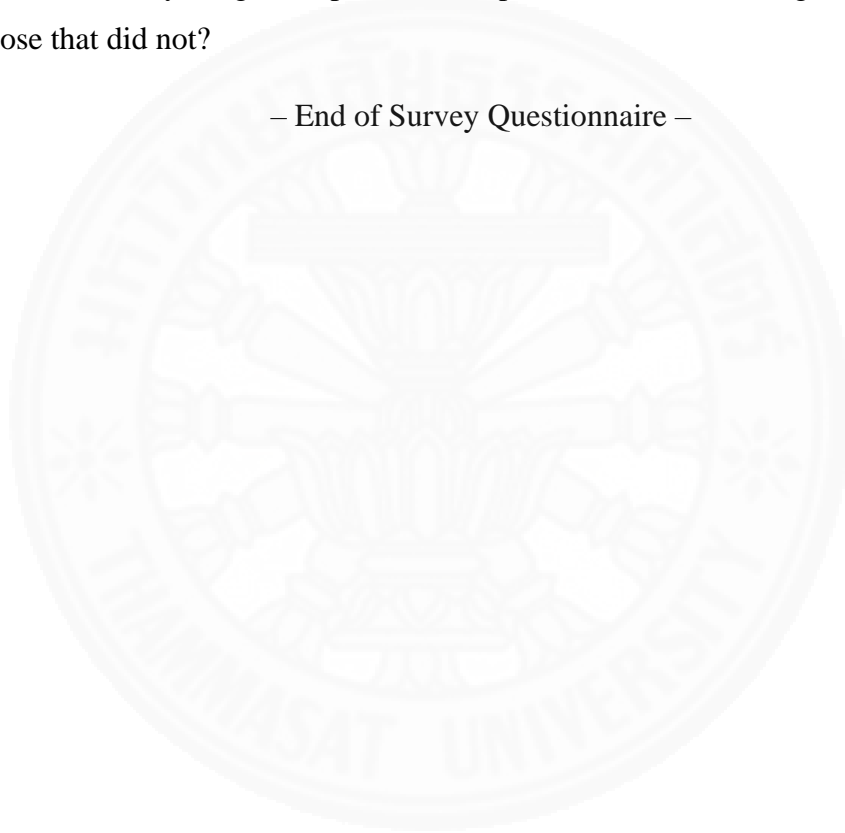
- How much do you agree that outdoor standalone type solar lighting is a new technology?
- How much do you agree that the information to educate the customer about the outdoor standalone type solar lighting is significantly less?
- How much do you agree that energizing the lighting by solar is unnecessary?
- How much do you agree that solar light is expensive if the price is more than 2 times that of wired light?
- How much do you agree that turning on-off the lighting outdoor is necessary?

**Part J: Demographic Part**

- What is your gender?
- How old are you?
- What is your marital status?
- How many people are living with you? (including you)
- What is your education level?
- What is your occupation?

- What is your monthly personal income?
- Which province do you live in?
- How much do you agree that you like to stay at home?
- How much do you agree that you like to go outside?
- How much do you agree with the green trend of pollution in the air?
- How much do you agree with the green trend of global warming?
- How much do you agree with the green trend of plastic recycling?
- How much do you agree to purchase the products that stand for green trends over those that did not?

– End of Survey Questionnaire –



**APPENDIX C**  
**MARKETING MIX INFORMATION (N = 213)**

Marketing Mix	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Overall		
	n	%	n	%	n	%	n	%	n	%	Mean	Med	S.D.
Product and Service factor for solar light													
D1. How much do you agree that you are considering the product from the fame of its brand name	3	2%	6	3%	66	38%	80	46%	19	11%	3.61	4	0.80
D2. How much do you agree that you are considering the product from the duration of usage (all night time)	1	1%	2	1%	28	16%	82	47%	61	35%	4.15	4	0.77
D3. How much do you agree that you are considering the product from the photosensor (Auto Turn On-Off during night-day)	2	1%	2	1%	20	11%	80	46%	70	40%	4.23	4	0.79
D4. How much do you agree that you are considering the product from the motion sensor (Auto Turn On when detecting movement)	2	1%	7	4%	39	22%	73	42%	53	30%	3.97	4	0.89
D5. How much do you agree that you are considering the product with IP65 (completely protect dust and water spray from every direction)	2	1%	2	1%	35	20%	64	37%	71	41%	4.15	4	0.86
D6. How much do you agree that you are considering the product is more convenient to install for not require wiring from the existing system	0	0%	5	3%	19	11%	61	35%	89	51%	4.34	5	0.79
D7. How much do you agree that you are considering the product from its design (fashion)	2	1%	8	5%	47	27%	75	43%	42	24%	3.84	4	0.88
D8. How much do you agree that you are considering the product have a professional service to install	10	6%	24	14%	53	30%	58	33%	29	17%	3.41	4	1.10
D9. How much do you agree that you are considering the product from the warranty	2	1%	3	2%	34	20%	76	44%	59	34%	4.07	4	0.84
D10. How much do you agree that you are considering the product that using green energy to help global warming	7	4%	6	3%	49	28%	56	32%	56	32%	3.85	4	1.04

Marketing Mix	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Overall		
	n	%	n	%	n	%	n	%	n	%	Mean	Med	S.D.
Pricing factor for solar light													
E1. How much do you agree that you are considering the price should match the specification of the product	0	0%	1	1%	21	12%	78	45%	74	43%	4.29	4	0.70
E2. How much do you agree that promotion pricing will influence you to purchase	0	0%	13	7%	40	23%	78	45%	43	25%	3.87	4	0.87
E3. How much do you agree that you consider product only for a lower price	17	10%	45	26%	57	33%	41	24%	14	8%	2.94	3	1.10
E4. How much do you agree that you are considering you can pay more from its brand famous	3	2%	20	11%	67	39%	57	33%	27	16%	3.49	3	0.95
E5. How much do you agree that you will pay more if the product has a warranty longer than other	0	0%	8	5%	58	33%	69	40%	39	22%	3.80	4	0.84
E6. How much do you agree that you would like to pay an additional cost for installation service	13	7%	34	20%	67	39%	40	23%	20	11%	3.11	3	1.09
E7. How much do you agree that you would like to pay for an additional warranty of the product	11	6%	26	15%	60	34%	54	31%	23	13%	3.30	3	1.08
Distribution factor for solar light													
F1. How much do you agree that you mostly buy these products from modern trade (Homepro, Boonthaworn, Thaiwassadu, etc.)	3	2%	10	6%	45	26%	69	40%	47	27%	3.84	4	0.95
F2. How much do you agree that you mostly buy these products from traditional trade (Local store, retail)	18	10%	31	18%	80	46%	41	24%	4	2%	2.90	3	0.96
F3. How much do you agree that you mostly buy these products from online channels (Shopee, Lazada, Facebook, etc.)	3	2%	16	9%	61	35%	64	37%	30	17%	3.59	4	0.94

Marketing Mix	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Overall		
	n	%	n	%	n	%	n	%	n	%	n	%	n
Distribution factor for solar light													
F4. How much do you agree that you prefer to buy a product that has a product consultant at the point of sales for the offline channel	9	5%	16	9%	67	39%	61	35%	21	12%	3.40	3	0.99
F5. How much do you agree that you prefer to buy a product with a sample to test	4	2%	7	4%	45	26%	79	45%	39	22%	3.82	4	0.91
Communication factor for solar light													
G1. How much do you agree that you prefer to buy a product which has a website of its brand	1	1%	10	6%	52	30%	86	49%	25	14%	3.71	4	0.80
G2. How much do you agree that you prefer to buy a product that has the service center to support you via call center, email, or social media	3	2%	4	2%	34	20%	91	52%	42	24%	3.95	4	0.83
G3. How much do you agree that you prefer to buy a product which has an advertisement about its benefit	2	1%	6	3%	44	25%	87	50%	35	20%	3.84	4	0.82
G4. How much do you agree that you prefer to buy a product which has a famous presenter to promote the brand	31	18%	34	20%	81	47%	25	14%	3	2%	2.63	3	0.99
G5. How much do you agree that you prefer to buy a product which has a promotion for a new user	7	4%	16	9%	48	28%	83	48%	20	11%	3.53	4	0.95
G6. How much do you agree that you prefer to buy a product which has a promotion for the existing user	8	5%	7	4%	49	28%	92	53%	18	10%	3.60	4	0.90

Marketing Mix	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Overall		
	n	%	n	%	n	%	n	%	n	%	n	%	n
Product and Service factor for solar light													
H1. How much do you agree that outdoor standalone type solar lighting uses power from green energy can save your electricity bill?	0	0%	2	1%	23	13%	62	36%	87	50%	4.34	5	0.75
H2. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce pollution?	1	1%	6	3%	32	18%	62	36%	73	42%	4.15	4	0.88
H3. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce global warming?	0	0%	8	5%	27	16%	71	41%	68	39%	4.14	4	0.84
H4. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce plastic usage?	5	3%	19	11%	43	25%	56	32%	51	29%	3.74	4	1.08
Green Trend factor for solar light													
J9. How much do you agree that you like to stay at home?	3	1%	11	5%	52	24%	89	42%	58	27%	3.88	4	0.92
J10. How much do you agree that you like to go outside	6	3%	34	16%	105	49%	46	22%	22	10%	3.21	3	0.93
J11. How much do you agree with the green trend of pollution in the air?	2	1%	4	2%	26	12%	89	42%	92	43%	4.24	4	0.81
J12. How much do you agree with the green trend of global warming?	2	1%	4	2%	28	13%	87	41%	92	43%	4.23	4	0.82
J13. How much do you agree with the green trend of plastic recycling?	0	0%	5	2%	39	18%	87	41%	82	38%	4.15	4	0.80
J14. How much do you agree to purchase the products that stand for green trends over those that did not?	4	2%	22	10%	65	31%	70	33%	52	24%	3.68	4	1.02

## APPENDIX D REGRESSION FOR MARKETING MIX

### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.577 <sup>a</sup>	.333	.182	.938

### ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.922	32	1.935	2.201	.001 <sup>b</sup>
	Residual	123.986	141	.879		
	Total	185.908	173			

a. Dependent Variable: B9. How much do you possibly buy new outdoor standalone type solar lighting?

### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	2.718	.724		3.754	.000
	D1. How much do you agree that you are considering the product from the fame of its brand name	.046	.126	.035	.362	.718
	D2. How much do you agree that you are considering the product from the duration of usage (all night time)	-.317	.131	-.235	-2.414	.017
	D3. How much do you agree that you are considering the product from the photosensor (Auto Turn On-Off during night-day)	.088	.157	.067	.558	.578
	D4. How much do you agree that you are considering the product from the motion sensor (Auto Turn On when detecting movement)	.099	.116	.085	.855	.394

D5. How much do you agree that you are considering the product with IP65 (completely protect dust and water spray from every direction)	-.036	.118	-.030	-.307	.759
D6. How much do you agree that you are considering the product is more convenient to install for not require wiring from the existing system	.001	.131	.001	.006	.996
D7. How much do you agree that you are considering the product from its design (fashion)	.089	.105	.076	.848	.398
D8. How much do you agree that you are considering the product have a professional service to install	-.071	.112	-.075	-.639	.524
D9. How much do you agree that you are considering the product from the warranty	-.177	.131	-.144	-1.353	.178
D10. How much do you agree that you are considering the product that using green energy to help global warming	.201	.104	.203	1.943	.054
E1. How much do you agree that you are considering the price should match the specification of the product	.138	.156	.093	.882	.379
E2. How much do you agree that promotion pricing will influence you to purchase	.125	.124	.105	1.011	.314
E3. How much do you agree that you consider product only for a lower price	.015	.090	.016	.171	.864
E4. How much do you agree that you are considering you can pay more from its brand famous	-.201	.098	-.184	-2.040	.043
E5. How much do you agree that you will pay more if the product has a warranty longer than other	.207	.126	.168	1.643	.103

E6. How much do you agree that you would like to pay an additional cost for installation service	.212	.104	.221	2.025	.045
E7. How much do you agree that you would like to pay for an additional warranty of the product	-.049	.102	-.050	-.477	.634
F1. How much do you agree that you mostly buy these products from modern trade (Homepro, Boonthaworn, Thaiwassadu, etc.)	-.088	.101	-.080	-.873	.384
F2. How much do you agree that you mostly buy these products from traditional trade (Local store, retail)	-.204	.093	-.189	-2.198	.030
F3. How much do you agree that you mostly buy these products from online channels (Shopee, Lazada, Facebook, etc.)	-.097	.089	-.088	-1.093	.276
F4. How much do you agree that you prefer to buy a product that has a product consultant at the point of sales for the offline channel	.156	.108	.149	1.443	.151
F5. How much do you agree that you prefer to buy a product with a sample to test	.050	.136	.044	.371	.711
G1. How much do you agree that you prefer to buy a product which has a website of its brand	.150	.116	.116	1.287	.200
G2. How much do you agree that you prefer to buy a product that has the service center to support you via call center, email, or social media	.063	.140	.051	.452	.652
G3. How much do you agree that you prefer to buy a product which has an advertisement about its benefit	.146	.131	.116	1.118	.265
G4. How much do you agree that you prefer to buy a product which has a famous presenter to promote the brand	.055	.109	.053	.507	.613

G5. How much do you agree that you prefer to buy a product which has a promotion for a new user	.227	.154	.209	1.481	.141
G6. How much do you agree that you prefer to buy a product which has a promotion for the existing user	-.216	.152	-.187	-1.419	.158
H1. How much do you agree that outdoor standalone type solar lighting uses power from green energy can save your electricity bill?	.172	.151	.124	1.135	.258
H2. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce pollution?	-.542	.189	-.460	-2.869	.005
H3. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce global warming?	.302	.203	.246	1.489	.139
H4. How much do you agree that outdoor standalone type solar lighting uses power from green energy can help the world reduce plastic usage?	-.214	.098	-.224	-2.184	.031

a. Dependent Variable: B9. How much do you possibly buy new outdoor standalone type solar lighting?

**APPENDIX E  
PICTURE OF SOLAR LIGHTING**

		
<p>Lighting is with solar cell</p>	<p>Lighting and the solar cell is connected by wire</p>	<p>Street Lighting is with solar cell</p>
		
<p>Street lighting and the solar cell is connected by wire</p>	<p>Ground lighting for garden</p>	

## **BIOGRAPHY**

Name	Mr. Saran Mahapun
Date of Birth	June 3, 1993
Educational Attainment	2016 – 2018, Master of Business Administration (MBA), King Mongkut’s University of Technology North Bangkok (KMUTNB)  2011 – 2015, Bachelor of Electrical Engineering, King Mongkut’s University of Technology North Bangkok (KMUTNB)
Work Position	2020 – Present, Assistant Product Manager, ZI-Tech Asia Solutions (Zuellig Industrial Group)
Work Experiences	2019 – 2020, Sales Engineer, M.P. Electric World 2018 – 2019, Engineer, GC Maintenance and Engineering (PTT Global Chemical Group) 2015 – 2018, Engineer, PTT Maintenance and Engineering