



THE EVOLUTION OF GREEN HOSPITAL CONCEPT FOR THAILAND'S HOSPITAL

BY

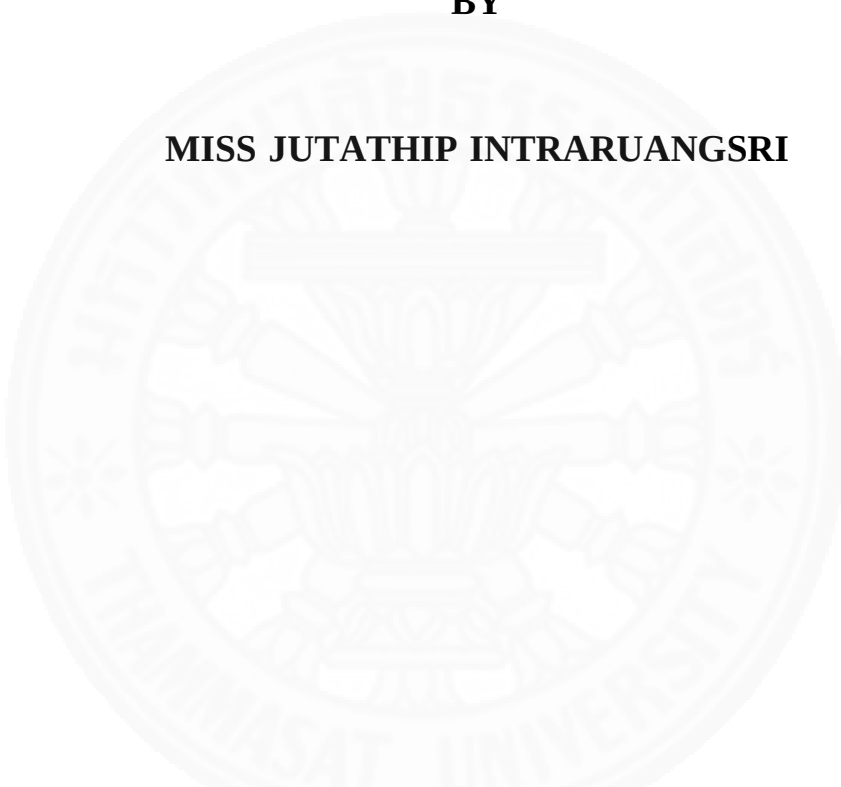
MISS JUTATHIP INTRARUANGSRI

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE
(INNOVATIVE HEALTHCARE MANAGEMENT)
CHULABHORN INTERNATIONAL COLLEGE OF MEDICINE
THAMMASAT UNIVERSITY
ACADEMIC YEAR 2018
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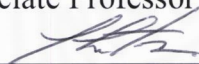
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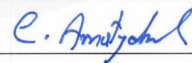
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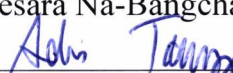
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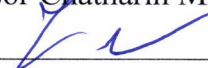
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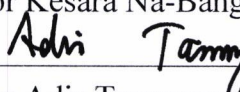
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Thesis Title	THE EVOLUTION OF GREEN HOSPITAL CONCEPT FOR THAILAND'S HOSPITAL
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ABSTRACT

The Green Hospital concepts have started to play an important role in hospital management because the hospital is the large source of pollution. Many hospitals have tried to apply the green hospital concept to solve some environmental problems. There's no definite definition and protocols for establishing a green hospital, as well as award hunters for this category. It is interesting that there are only a few hospitals that have received awards. It shows the success of the management with the Green Hospital concepts.

This research is a qualitative research and aims to study the evolution of the green hospital concept and the application of concepts for success and sustainability. Research hypothesis are 1) the evolution of the green hospital concept makes hospitals that are different, change to be better 2) Hospitals have different methods to apply green hospital concepts for different success and sustainability. The steps to conduct the research as follows: 1) Determine the conceptual framework. 2) Define the research hypothesis layout. 3) Determine the target group by choosing method. 4) Data were collected by in-depth interviews with semi-structured open-ended interviews from hospital leaders. 5) Approach phenomena; interpret data using content analysis methods, convert qualitative data into quantitative data. 6) Summarize to create new knowledge.

The results showed that hospitals with different characteristics can apply green hospital concepts and be able to succeed. This achievement is the evolution of applying concepts and makes the hospital better living. Depending on the strategy that the hospital uses to manage, choose activities that are suitable for different problems and resources.

Keywords: Green Hospital, Eco Hospital, Green Hospital Management



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I would like to thank the information providers from all 5 hospitals that have provided us with useful information. If we do not have this information, other hospitals in Thailand do not have a management approach according to the Green Hospital concept.

I would like to thank The Healthcare Accreditation Institute (Public Organization) for providing knowledge about the methodology of knowledge and lesson learned capturing, which I have applied to apply this writing. In addition, I would like to thank Em-Amorn Kumnuch, Ph.D. Miss Traisuda Waitruardrok, Torranong Pilalai, M.D., Miss Suphannee Suwannasree for encouraging the thesis.

Finally, I have to show my deepest gratitude to my mother and brother for their continued support and encouragement that I can successfully complete this thesis. This success will not be possible without them. Thank you.

Miss Jutathip Intraruangsri

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CHAPTER 1

INTRODUCTION

1.1 Background

At present, the world is facing an intensive environmental problem. The need for better living of people is one of the causes of environmental problems. Humans around the world have used a large number of natural resources such as water, fuel, trees, and soil to create their civilization. Using a large number of natural resources to produce products and services enables humans to get what they want and get undesirable things, such as pollution and dirty water. Using a large number of resources in a short time causes the nature imbalance, environmental problems such as unsafe water, greenhouse gases, carbon dioxide, an increasing amount of waste, natural fuel shortages, and various smoke in the air. When environmental problems become more severe, it affects human health status such as the pattern of illness changing, humans consume unsafe food and water, low immunity, and mortality rate from diseases and natural disasters is higher. According to Prüss-Üstün, A., Corvalán, C. F. and WHO (2006) that "one-quarter causes of illness and death is caused by environmental changes, including unclean water consumption, poor sanitation, and hygiene, air pollution, work hazards, accidents industry, traffic accidents, incorrect resource management. In developing countries, all types of industries require natural resources to produce products and services. The study of National Health Services for sustainable development units (NHS) (2009) found that 25% of carbon footprints came from public sectors, including "hospitals," which are the health care services industry.

Florence Nightingale discussed the environmental theory in the book "The lady of the lamp" that shows the connection between nurses, patients, and the environment, she said. "Nursing ought to signify the proper use of fresh air, light, warmth, cleanliness, quiet, and proper control of vital power to the patient." (Gonzalo, 2011) The mention of the link between the environment and people of Florence

Nightingale is consistent with the statement of the Hippocratic Oath that shows the relationship between patients, doctors, and the environment.

The primary mission of the public health service is "prevention and treatment of diseases," and healthcare providers should be aware. The hospital is a public sector that is releasing the final affecting product to the environment, both upstream and downstream. Hospital is open 24 hours a day, seven days a week, so it requires a lot of natural resources to provide services while also allowing waste to the environment as well. For examples, natural resources are used in medical activities such as electricity and fuel, which are used to provide light, heat, the energy required in ventilation systems, equipment, sterilization, washing, equipment, cooking, laundry, using a lot of water, using energy to create good air to reduce infection etc. Hospitals around the world are generating medical waste and general waste, as well as releasing large amounts of environmental pollution throughout the year (Suwasano & et al., 2013). The department of public health tries to solve the problem.

They also try to deal with the effects that occur in a variety of ways. They still cannot protect people from illness. Products from public health processes are still the cause of significant pollution. The organization in the world are playing to address environmental health problem as Leadership Energy, and Environmental Design (LEED) certified projects of U.S. Green Building Councils that is a rating system for the design, construction, operation, and maintenance of green building, homes, and neighborhoods. It also recognized as an international mark of excellence for green building in over 132 countries. The Environment Protection Agency (EPA), an organization in the U.S. that is to protect all American human health and the environment. In Thailand, the Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy to be responsible for regulation, supervision, promotion, and assistance provision to the designated factories and building to comply with laws and regulations for efficient use of energy and savings. Thailand Greenhouse Gas Management Organization (TGO) is the governmental organization with a specific purpose as an implementing agency on greenhouse gas (GHG) emission reduction in Thailand to promote low carbon activities, investment, and marketing on GHG emission reduction. All organizations have the same purpose that is managing the effects of the environmental health problem. They are making the

green hospital concept play an essential role in the environmental treatment process. Corporate executives began looking for new management concepts that would help solve the pollution problems caused by hospital work processes, in which the concept must solve problems both upstream to downstream.

Hospitals in Thailand have a variety of services characteristics, size, and purpose of the organization. The implementation of the green hospital concept is both success and failure. Therefore, it is not clear how the concept of the green hospital will be driven forward. However, there's no definite definition and protocols for establishing a green hospital, as well as award hunters for this category. It would be interesting to know how the leaders of the hospital face a wave of challenges, including globalization, concern with environmental impact, increase regulatory scrutiny and a global economic recession but also them to understand with green hospital concepts and essential elements that are composed of green hospital concepts. These answers would let them easily to communicate this model to others and learn about developmental opportunities with the green hospital's concept. Green hospital concepts can help identify new models that encourage sustainable use of products and services or facilitate wider adoption of new environmentally friendly technology in hospitals.

1.2 Objective of research

This research has two objectives as follow:

- 1.2.1** To study the evolution of green hospital concepts
- 1.2.2** To study the method of applying this concept

1.3 Hypothesis of research

This research has two hypotheses as follows:

1.3.1 The evolution of the green hospital concept makes hospitals that are different, change to be better

1.3.2 Hospitals have different methods to apply green hospital concepts for different success and sustainability.

1.4 Scope of research

This study is a descriptive study by:

1.4.1 Focus on the green hospital concepts by literature reviewing and in-depth interviewing from the critical informant of the hospital.

1.4.2 Conceptual framework of green hospital concepts was developed by theoretical definition method from literature reviewing and intensive internet searching of definition by using the term "green hospital and green hospital concepts.

1.4.3 In-depth interviewing and content analysis method was used in this research for data gathering and analysis data, respectively. The method of data gathering was interviewing with a semi-structured interview from 5 informants. Key informants were leaders of the green hospital, which was an award-winning. Data analysis was done by comparing foreign literature reviewing and the data obtained from the interviewing to find the evolution of green hospital concepts and then applying this concept for success and sustainability.

1.5 Operational definition

Operational definition in this study as follow:

1.5.1 Green hospital

Green hospital refers to the hospital that does initial activities in the line of saving the earth, save energy or well-known with good practices to operate in their organization.

1.5.2 Evolution

Evolution refers to a gradual process of change and development or the process by which the physical characteristics of types of creatures change over time, new types of creatures develop, and others disappear.

1.5.3 Concepts

Concepts refer to the abstract or generic idea generalized from particular instances, an idea of what something is or how it works.

1.5.4 Hospital

Hospital refers to a healthcare institution is provided the patient treatment by medical and health personnel with various degree of specialization. It is also classified as follow:

1.5.4.1 Community hospitals are located in a district or sub district with 10 – 150 inpatients beds.

1.5.4.2 General Hospitals are located in the province with 150 – 500 inpatients beds.

1.5.4.3 Regional Hospitals, University hospitals, and other large public hospitals are located in the province and have over 500 – 1000 inpatient beds and medical specialists in all fields.

1.5.4.4 Private Hospitals are operated as a business entity with both full time and part time staff and clients are required to pay for services and 100 – 400 inpatient beds.

1.6 Expected benefit

This research has two expected benefit as follows:

1.6.1 The result of the evolution of the green hospital concepts.

1.6.2 The guidelines for successfully concept applying.

CHAPTER 2

REVIEW OF LITERATURE

This research provides a summary of a conceptual framework that the researcher has developed to systematize and identification of green hospital concepts based on several kinds of literature as follows:

2.1 The evolutions and definition of green hospital

Over the past two decades, new ideas for organizational management have been continuously developed. Most of the concepts that are focused on the organization can adapt, cope with future changes in politics, economy, society, technology, environment. Based on the world's worst environmental changing, many agencies around the world that work with the environment, energy, ecology, and health systems, collaborate to study the effects of environmental health. One of the causes of natural disasters comes from the practice of providing health services. Notably, the productivity of the hospital work process. Hospital uses many resources for direct and indirect operational. At the same time, it produces various forms of pollution to the environment. The concept of the Green Hospital has started to play a role in managing various pollutants and is also a concept that executives look for to solve various organizational problems. However, no scholars, both domestic and foreign, have clearly defined the concept of the green hospital. Most scholars specify important activities that hospitals should take to solve environmental problems.

2.2 Components of Green Hospitals concepts

Many global corporations are competing to build and operate "green hospitals" around the world as follow:

2.2.1 Karliner, J and Guenther, R. (2011)

Karliner, J and Guenther, R. (2011) try to create and support sustainability in environmental health care by doing activities in the organization as follows:

2.1.1.1 Leadership

Leadership: Demonstrate leadership support for green hospitals in order to: create long-term organizational culture change; realize widespread hospital worker and community engagement; and foster public policy that promotes environmental health.

2.2.1.2 Chemicals

Chemicals: Choosing and supporting to use safer chemicals, materials, products, and processes, beyond the requirements of environmental compliance to make the health of patients, staff, communities, and the environment.

2.2.1.3 Waste

Waste: reducing the volume and toxicity of waste produced by the hospital and implementing the most environmentally sound waste management and disposal options to protect communities.

2.2.1.4 Energy

Energy: Reduce fuel energy; advocate energy efficiency as well as alternative, renewable energy use with the long-term goal, supplied by on-site or community renewable energy sources.

2.2.1.5 Water

Water: Create water conservation measures, reduce water use, reuse water, reduce emissions into water sources and provide clean drinking water for communities.

2.2.1.6 Transportation

Transportation: Develop strategies for transportation both inside and outside the hospital to reduce air pollution and greenhouse gas emissions.

2.2.1.7 Food

Food: Reduce hospitals' environmental footprint while fostering healthy eating habits in patients and staff — support access to locally and sustainably sourced food in the community.

2.2.1.8 Pharmaceuticals

Pharmaceuticals: Reducing pharmaceutical pollution by reducing the number of prescriptions, reducing improper disposal of pharmaceutical waste, arranging medicines for patients as needed, promoting the return of medicines to manufacturers in order to destroy them properly

2.1.1.9 Building

Building: Design buildings are convenient for work.

2.2.1.10 Purchasing

Purchasing: Purchase equipment materials from vendors with social and environmental responsibilities.

2.2.2 Hospital 2020 (2012)

Hospital 2020 (2012) mentioned the seven elements of the green initiative as follows: food, water, and waste, alternative energy, green building design, and energy efficiency, transportation in and around the hospital.

2.2.3 Artemia (2012)

Artemia (2012) suggested that create a strategy that supports to be a leader in sustainable health care, health food services, reduce energy consumption, reduce waste, and increase recycling, use environmentally friendly products. Applying these solutions to reduce hospital costs helps patients receive better care at reduced costs.

2.2.4 Scannell, T. (2013)

Scannell, T. (2013) suggested that seven ways that a hospital can use resources more efficiently as follows:

2.2.4.1 Establishing a green team

Establish a team to take responsibility for the project; the leaders continue to support the team by leaders, set specific and clear work goals.

2.2.4.2 Document destruction services

Organize patient document destruction systems by destroying documents securely and reusing materials according to HIPAA requirements (The Health Insurance Portability and Accountability Act)

2.2.4.3 Medical device reprocessing

Bring some devices that can be sterilized repeatedly to reduce waste.

2.2.4.4 Document management services

Improve the process of managing office documents and materials to reduce paper usage, including correct disposal of electronic waste.

2.2.4.5 Capital equipment re-selling and recycling

Selling some medical equipment is still in good condition but not used for those who need to reduce the impact of increasing the amount of waste and increase revenue for the hospital.

2.2.4.6 Computer hardware disposal

Safely eliminate waste from technology, taking into account the confidentiality of patients.

2.2.4.7 LEED certification

LEED certification: Having a building LEED (Leadership in Energy and Environmental Design) certified will help:

- (1) Lower operating costs
- (2) Conserve energy, water, and other resources
- (3) Provide a healthier environment for occupants
- (4) Qualify for money-saving incentives, such as tax rebates and zoning allowances. Besides, LEED design encourages the use of natural light and healing gardens, since research has shown a link between nature and stress reduction and the improvement of an overall sense of well-being.

2.2.5 Researcher

Thus, in this proposal, the researcher defines green hospital as the hospital that has taken the initiative essential critical activities on the green hospital concept as follows:

2.2.5.1 To advocate the policy and support team

To advocate the policy and support for the green hospital team

2.2.5.2 Energy efficiency

Reduce energy consumption and hospital expenses by setting energy conservation measures.

2.2.5.3 Green building design

Build or improve various buildings to respond to local weather conditions and adjust to suit energy needs and reduced resource usage.

2.2.5.4 Alternative energy generation

Produce or use alternative energy to achieve flexibility in using backup energy.

2.2.5.5 Transportation

Consider the use of alternative fuels for hospital vehicles, promote walking and cycling, promote patient staff and use of community public transport systems for hospital activities.

2.2.5.6 Food

Hospital provide quality food for employees and patients such as vegetables, locally grown fruits or consuming vegetables, seasonal fruits, using organic vegetables for cooking.

2.2.5.7 Waste

Create a waste management system such as waste reduction, reuse, recycling, to reduce waste incineration.

2.2.5.8 Water

Water - Conserve water, check water systems in hospitals, create water-saving guidelines, and cultivate people to save water.

2.2.5.9 Use safe chemicals, materials, products, and medicines.

Reduce the number of unnecessary chemicals or use natural materials.

2.2.5.10 Green supply chain and purchasing

Use the green supply chain, green logistic management, and purchasing.

2.3 Related articles and researches on green hospital concepts

2.3.1 Winfield (2011)

Winfield (2011) noticed that the department responsible for sterilization used a large amount of blue paper to wrap the tools before entering the sterilization process. Sometimes she found that wrapping the paper was torn, wasting the work time of the staff that had to wrap the tool and bring that tool into the sterilization process again. Therefore, she decided to use sterilization containers instead of blue paper. Then she collected data comparing the amount of waste that occurred and the cost to buy the blue paper, and she found that after using the sterilization containers instead of wrapping with blue paper, the amount of waste was significantly reduced and saving money.

2.3.2 Gillmeister (2012)

Gillmeister (2012) stated that she considers essential issues in the strategic management of the various waste of hospitals as follows:

2.3.2.1 Understand the rules and regulations related to garbage disposal

2.3.2.2 Use materials or containers that can be reused

2.3.2.3 Track usage

2.3.2.4 Establish a team responsible for work to analyze waste management, clearly identify various risk factors

2.3.2.5 Provide A separate waste appropriately

2.3.2.6 Training to educate employees so segregated, packaged, stored, and transported correctly

2.3.3 Rico and Oruezabala (2012)

Rico and Oruezabala (2012) surveyed 15 problems in the procurement process within a hospital in France, using a semi-structured interview with purchasing managers. It was found that

2.3.3.1 Perceived dimensions, concerns about environmental problems of executives

2.3.3.2 Purchasing process is a process that does not change, also require documents as a component in the work process.

2.3.3.3 Role The procurement department - the role and position of the purchasing department have been challenged in the organization, so it should be clear in almost every function.

2.3.3.4 Evolution to expand networks - apart from internal stakeholders and suppliers. Directly, the extended network seems to be the primary driver of evolution towards green procurement.

2.3.3.5 Green procurement is noticeable. Help for patients - patients are not found to be central to the process of purchasing sustainably

2.3.3.6 The benefits of green procurement is challenging to assess

2.3.4 Panun Kanokwongnuwat (2011)

Panun Kanokwongnuwat (2011) develops a green hospital model and evaluates the performance of the green hospital model. The technique used in this research was Participatory Action Research (PAR) according to the action research spiral of Kemmis and McTaggart (1990, cited in Panun Kanokwongnuwat, 2011) and Zuber-Skerritt (1992, cited in Panun Kanokwongnuwat, 2011). The research processes were preparation eight steps; 1) organization structure 2) evaluate energy management matrix 3) setting energy conservation policies 4) self-assessment team works 5) setting energy conservation goals 6) activities planning 7) implementing 8) monitoring and evaluating. The key persons, a representative from every department, working on the basis they can do with joint evaluation. The strategies to develop a green hospital model consist of; 1) create a team to the participation 2) people ware; give knowledge, awareness in mind and behavior modification for reducing energy use 3) system ware; management of energy efficiency 4) hardware; deploying energy-saving equipment 5) internal energy audit.

The model of green hospital proved to be highly effective. According to personnel behavior changes in reducing energy cooperation, the specific energy consumption index 110.82 megajoule/inpatient-day, reduce power

consumption 1,701,874.47 kWh/ year, 2007-2009, to be community learning center and study visits 12 times a year. Critical success factors were integrated with creative energy conservation, and environmental sustainability to 5 S works to everyone's job. Thailand Energy Awards 2010 - outstanding building and team awards.



CHAPTER 3

RESEARCH METHODOLOGY

A qualitative approach was run in this thesis. The conceptual framework of “The Evolution of green hospital concepts for Thailand’s Hospital” was developed from previous literature and explored the concepts through the leader of hospitals or the experts’ perspectives.

3.1 Define the conceptual framework

The researcher defined the conceptual framework by studying from both Thai and foreign literature review Focus on the study of the results from the development of the implementation of the Green Hospital concept. Also, study activities that each hospital performs.

3.2 Create assumptions

The researcher sets the hypothesis as a guideline for research studies.

3.3 Population and sample

This thesis used quota sampling. A hospital as a sample in this paper was discovered from the website. The hospital that proposed activities related to the concepts of the green hospital or has been awarded in the field of environmentally friendly management activities. The researcher has selected the hospitals and the critical information as the administrator in the highest levels of 5 hospitals as follow:

3.3.1 Community hospitals

Community hospitals with 10 -150 inpatients beds have one hospital.

3.3.1.1 Sriprajun Hospital, Supanburi: 100 inpatient beds (Eco-Hospital Award 2012)

3.3.2 General hospitals.

General hospitals with 150 – 500 inpatient beds have one hospital.

3.3.2.1 Pathum Thani Hospital)

Pathum Thani Hospital, Pathum Thani: 377 inpatient beds
(Thai green market to the green hospital)

3.3.3 Regional hospitals, university hospitals, and other large public hospitals.

Regional hospitals, university hospitals, and other large public hospitals have over 500 – 1,000 inpatient beds have two hospitals.

3.3.3.1 Thammasat University Hospital, Pathum Thani

Thammasat University Hospital, Pathum Thani: 600 inpatient beds (Eco-Hospital Award 2013)

3.3.3.2 Prapokklao Hospital, Chanthaburi

Prapokklao Hospital, Chanthaburi: 700 inpatient beds
(Thailand Energy Award 2010)

3.3.4 Private Hospital

Private Hospital is operated as a business entity with both full-time and part-time staff, and clients are required to pay for services. Most are over 100 – 400 inpatient beds.

3.3.4.1 Kasemrad Rattanatibeth Hospital, Nonthaburi

Kasemrad Rattanatibeth Hospital, Nonthaburi (Eco-Hospital Award 2012)

3.4 Material in this research

An opened – end and a semi-structured questionnaire were used in this research. The questionnaire was developed from one of the knowledge management tools that are a lesson learned. Questions were created with the 5W1H technique. The process of creating tools for data gathering as follows:

3.4.1 Study the theoretical concepts

Study the theoretical concepts related to the green hospital concepts from textbooks, journals, research papers, both local and abroad. To be taken as a summary of the basic concepts and operational definitions by the content analysis method.

3.4.2 To create queries, respectively, in the questionnaire

To create queries, respectively, in the questionnaire. Structure of the interview is divided into two parts, as follows:

3.4.2.1 Part 1 General Data

- (1) Name of key informant and responsibility
- (2) Name of Hospital
- (3) Address & Location of hospital
- (4) Number of inpatient beds and outpatient visit/day
- (5) Award and accreditation-related green hospital concept

3.4.2.2 Part 2 Concepts of the green hospital (Please give some detail)

- (1) What is the beginning of green hospitals?
- (2) What activities did the hospital start during the first two years?
- (3) What are the activities that reflect on being Green Hospitals, and what are the performances?
- (4) What is the green hospitals' concept?
- (5) How do the hospitals apply this concept?
- (6) Since the day that the hospital has received an environmental award, what activities are the hospitals currently doing continuously?

3.4.3 To offer the questionnaire to the advisor checked to construct validity and content validity before the interview.

3.4.4 Official letter from Thammasat University

3.4.5 Send the official letter of Thammasat University and thesis proposal to a hospital as a sample to request and schedule for interview.

3.4.6 Send the open-ended questionnaires to the critical informants for consideration before the interview

3.5 Data collection

3.5.1 Approached the phenomenon that occurred

3.5.2 Conduct in-depth interviewing hospital leaders and recording information

3.5.3 Data from the interview are collected and made into text such as field notes, transcripts.

3.5.4 Check the completeness and accuracy of the information.

3.6 Data analysis

Content analysis is a research technique for systematically analyzing written communication. Content analysis can help identify the concepts of the green hospital as follow:

3.6.1 Group the collected data

3.6.2 Provide the information code of each hospital

3.6.3 Codes are transformed into categorical labels or themes.

3.6.4 Materials are sorted by these categories, identifying similar phrases, patterns, relationships, and commonalities or disparities.

3.6.5 Sortable materials are examined to isolated meaningful patterns and processes.

3.6.6 Identified patterns are considered in light of previous research and theories, and a small set of generalizations are established.

3.6.7 Analyze the phenomena that occur.

3.6.8 Interpret summary of consistency with the conceptual framework and assumptions

3.6.9 Summarize the knowledge gained

3.7 Interpret and summarize

3.7.1 Interpret summary of consistency with the conceptual framework and assumptions

3.7.2 Summarize the knowledge gained



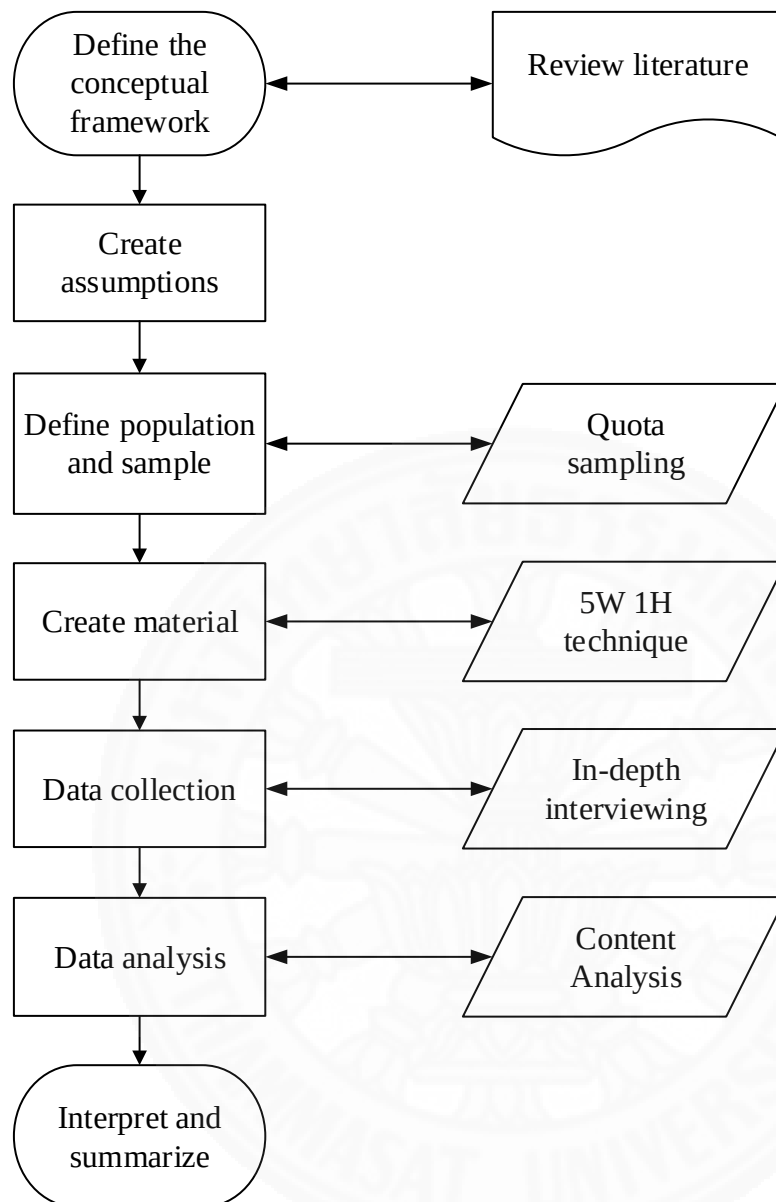


Figure 3.1 shows the process of conducting research.

CHAPTER 4

RESULTS AND DISCUSSION

The researcher proposed the summary from the interview and discussed the findings as follows:

4.1 Results

The information from the interviewing is sorted by the following questions as follows:

4.1.1 General information of hospitals

4.1.1.1 Sriprachan Hospital

Sriprachan Hospital is a community hospital located in Sriprachan district, Suphan Buri province and away from downtown to the north about 2 kilometers. The area around the hospital is a field. It opened since the year 2522 B.E. In the present, there are 60 in-patients beds and provide for two medical majority areas as obstetrical and medical. They have 227 healthcare workforces. They received the Eco-Hospital Award in 2012.

4.1.1.2 Pathum Thani Hospital

Pathum Thani Hospital is a general hospital located in Mueang district, Pathum Thani province. It is near the city hall. In the present, they provide 380 in-patients bed and 1600 outpatients/day. They specialize in Non-Communication Diseases (NCDs). The hospital has been continuously certified with HA (Hospital Accreditation) for the quality of the work process. They are also the original green market model. (Thai green market to the green hospital)

4.1.1.3 Kasemrad Rattanatibeth Hospital

Kasemrad Rattanatibeth Hospital is a private hospital located in the urban area of Bang Yai District, Nonthaburi province. It is in the secondary service level by the Office of the Permanent Secretary (OPS). They

inclusively service for population all around and boundaries of Nonthaburi province and Bangkok. Services integrated with four aspects; curing, protection, rehabilitation, and promotion, including specific service. The hospital has been continuously certified for the quality of the work process from various accredited institutions such as HA (Hospital Accreditation), JCI (Joint Commission International), etc. They received the Eco-Hospital Award in 2012.

4.1.1.4 Prapokklao Hospital, Chanthaburi

Prapokklao Hospital, Chanthaburi is located on Leab Noen Rd, Tambon Wat Mai, Amphoe Mueang Chanthaburi, Chanthaburi province. The hospital has a total of 755 in-patients beds and provides complex care services in tertiary care. The hospital offers treatment services to the general public in the eastern region. Besides, there is also a medical education level along with providing public services as well. The hospital has been continuously certified with HA (Hospital Accreditation) for the quality of the work process. They received the Thailand Energy Award 2010.

4.1.1.5 Thammasat University Hospital, Pathum Thani

Thammasat University Hospital, Pathum Thani is a university hospital with 600 beds in-patients with the highest level of care for all secondary care. The hospital located on Phaholyothin Road, Rangsit District, Pathum Thani Province. This hospital is designed to support medical education, on an area of over 24,000 square meters, with a canal connecting the entire university. The building consists of a school building, a dormitory and a green space about 40 - 50% of all buildings that are well maintained. The hospital has been continuously certified with HA (Hospital Accreditation) for the quality of the work process. They received the Eco-Hospital Award in 2013.

4.1.2 In your opinion, what does the Green Hospital Concepts means?

4.1.2.1 Sriprachan Hospital

Green Hospital Concepts refers to the hospitals that have organized work processes with waste management, reduce chemical use, manage the environment, plant trees, have resting places for customers, save and conserve energy, prepare food safely, all activities must be measured Carbon Footprint. Including, using essential management strategies, including leaders with roles, transparent

policies, supporting knowledge and resources for implementation, establishing responsible teams, communicating clearly, and exchanging knowledge with the network.

4.1.2.2 Pathum Thani Hospital

Green Hospital Concepts are the hospital that must be a place to relax. They should have the smell of medicine and chemical as little as possible, and a warm atmosphere, have a pleasant environment and should be the prototype of an organization that is environmentally friendly.

4.1.2.3 Kasemrad Rattanakibeth Hospital, Nonthaburi

Green Hospital Concepts refers to the organization must have leaders with clear policies; order each activity, establish responsible teams, thorough communication, support resources, and knowledge.

4.1.2.4 Prapokklao Hospital, Chanthaburi

Green Hospital Concepts refers to hospitals that have clear organizational policies. They have to protect the environment and maintain trees in hospitals for shady. They also reduce unnecessary energy consumption, consider relevant standards when reusing materials, save energy, maintain the pH of the water, and manage wastewater before releasing to the community. Including cultivate awareness for the next generations.

4.1.2.5 Thammasat University Hospital, Pathum Thani

Green Hospital Concepts refers to hospitals that the hospital's actions must demonstrate the care of the environment. Do not produce large amounts of waste, do not pollute, and instill awareness for the next generation.

The researcher summarizes the meaning of the green hospital concept as follows:

Table 4.1 shows the meaning of the Green Hospital concept of each hospital.

Content	Sripajun Hospital	Pathum Thani Hospital	Kasemrad Rattanaibeth Hospital	Prapokklao Hospital	Thammasat University Hospital	Total
Environment management	✓	✓ (pleasant smell, warmth atmosphere)	-	✓	-	3
Policies	✓	-	✓	✓	-	3
Plant trees	✓	-	-	✓	-	2
Resting places	✓	✓	-	-	-	2
Save and conserve energy	✓	-	-	✓	-	2
Leadership& roles	✓	-	✓	-	-	2
Strategies	✓	-	✓	-	-	2
Cultivate awareness	-	-	-	✓	✓	2
Waste management	✓	-	-	-	-	1
Reduce chemical use	✓	-	-	-	-	1
Safe food	✓	-	-	-	-	1
Measure by carbon footprint	✓	-	-	-	-	1
A prototype of an environmentally friendly organization	-	✓	-	-	-	1
Related Standard	-	-	-	✓	-	1
Water management	-	-	-	✓	-	1
Not produce pollution	-	-	-	-	✓	1
Demonstrate of environmental care	-	-	-	-	✓	1

As shown in table 4.1, that hospitals place importance in order as follows: the first is policy and environmental management. The second is tree planting, resting place, energy saving, leadership, strategy, awareness building. The third is waste management, reduction chemicals, food safety, carbon footprint measurement, prototyping, relevant standards, water management, non-pollution, attention began environment.

4.1.3 What is the beginning of Green Hospitals?

1 Concepts?

4.1.3.1 Sriprachan Hospital, Supanburi

The hospital has been cut its operating budget and has been pressured to reduce costs, but they must continuously improve patient care. They tried to find a solution. Hospital administrators consider the concept of a green hospital, which they believe will help reduce costs and help reduce global warming. They decided to start some activities.

4.1.3.2 Pathum Thani Hospital, Pathum Thani

The starting point is that the leader of the organization has the idea that "food makes good health." The nutrition department must provide healthy food for employees and patients. They believe that food is the source of blood, cells, and the body, and at the same time, food causes disease as well. As they concerned, the benefits of eating are the responsibility of the nutrition department. Following the Ministry of Public Health's policy is safe food and Thai food to the world. Hospitals must respond and manage food safety concepts. In 2008, the hospital director announced the green hospital policy under the seven green ideas as follows:

- (1) The hospitals are a safety service unit.
- (2) Hospitals business must be a green business that is a non-profits unit.
- (3) Hospitals are a big unit that uses a lot of energy, so they must use green energy to reduce environmental impact.
- (4) Some patients and healthcare workforce spend the time at the hospital more than their home, so how we change our hospital to green living and safety.
- (5) About food, how the patients can have safe food. For this reason, the nutrition departments just began not only macrobiotics food by the MOA foundation concept of Mokiji Okada but also just started the green market.

4.1.3.3 Kasemrad Rattanatibeth Hospital, Nonthaburi

The starting point comes from a self-awareness of the leader. He realized the impact of the environment and community. Their ideas related to

standards of practice that must be approved by many institutions. Based on this idea, leaders announced environmental care policies and awareness for all employees. The system is as follows:

- (1) Energy as energy saving, reduce energy use, promote self-awareness.
- (2) Resource conservation as using water, quality control of water, paperless.
- (3) Environmental health: the waste released into the community as foam or, plastic box, chemical agent.
- (4) To promote employee sanitation that is in their responsibility.
- (5) Sanitary of hospital workforce.

They also have particular strategies of energy as follow:

- (1) To avoid using a chemical agent – to reduce power using and disposal of chemical in atmosphere and human.
- (2) To use renewable materials or the device is a certified industry.
- (3) There is clarifying engineering improvement activity as equipment improving to be useful or manipulated the temperature of air condition by the time.
- (4) Urging awareness and give the knowledge to pass the events.

4.1.3.4 Prapokklao Hospital, Chanthaburi

They want to do something useful for their organization and respond to hot social issues. People are important. They think if they were trying to put something into someone's heart, it would take a long time. But something that made from the heart is more sustainable than being forced. At the same time, they must make it easy, convenient, useful, and not burdensome.

4.1.3.5 Thammasat University Hospital, Pathum Thani

They start from the problem. They have to pay a lot of electricity per year. There are 2-3 reasons; they think that hospital management with this concept will allow them to solve the problem. Also, they respond to the policy of Thammasat University, which announced as a green university, and awareness of environmental connections between universities and hospitals. Then they carried out

activities in all parts. They focused on raising awareness to the employee, reinforcing good habits, and made them see the importance of electrical consumption and how to use the air conditioning. Both of them are important because they had to pay 90 Million baht a year. They had to use a lot of electrical because their area is extensive. All fields must be illuminated for all day available service and safety. For this reason, they had to use a lot of electrical and air condition. If they could save this cost, the hospital would save a lot of money.

4.1.4 What are the activities that started in the first 2 years?

4.1.4.1 Sriprachan Hospital

They began by applying "Green and Clean hospital Project" produced by the Department of Health, Ministry of Public Health. Somdejprasangkharach XVII hospital is their network, so they used the power of the system to run these activities. This project consists of 5 activities as follows:

- (1) G-Green refers to garbage management,
- (2) R-Rest refers to restroom management,
- (3) E-Environment refers to environmental management,
- (4) E-Energy relates to energy management, and
- (5) N-Nutrition refers to safety food.

This project consists of 5 strategies are as follow:

- (1) C-Communication refers to public communication to reduce global warming,
- (2) L-Leader refers to the critical role on the excellent model on green hospitals project,
- (3) E-Effectiveness refers to the effectiveness of implementation,
- (4) A-Activities refers to conducting activities to build awareness and participation,
- (5) N-Network relates to the involvement from networks.

They got the reward in the excellent model of Health Promotion Center Region 5 (HPCG5) but also won in the prototype of reducing global warming by measurement the amount of carbon footprint in 2011. Therefore, they decided to join in Eco Hospital Award Projects. They need the third party who

accredits the hospital and guarantee their activities. They want people to know that their actions are useful and able to reduce global warming. The awards are the key to driving activities and also engage employees to be always running.

4.1.4.2 Pathum Thani Hospital

Since 2008, the director started "seven green projects." They turn to consider the outstanding unit. The nutrition department is one of those units. They thought the term "green" was consistent with seven green policies. They joined the green fair, and we met the group of the green market. So they decided to make green food by the green market. They run all activities on not benefits. When they have brands, they need to show responsibility and continuous control of quality.

4.1.4.3 Kasemrad Rattanathibeth Hospital

They have done all activities such as energy saving, water management, chemical management, waste management through teamwork. Each team had different responsibilities but got coordinated. They believe that one person cannot achieve sustainability, but the cooperation of all parties causes it.

4.1.4.4 Prapokklao Hospital, Chanthaburi

They started to think about what to do and about the process. They had to find someone to their team. They thought it would not benefit, so they had to aim for something. Their highest target was the national award. They had a common goal, and then they build a team. They look for someone who had the same ideas, spoke the same language, and abide in save earth concepts. Their team consists of pharmacists, technicians, nurses, doctor, and multidisciplinary teams. They helped each other with environmental conservation by starting from energy conservation. They look for someone who knew energy, and we invited them to teach us. Department of Alternative Energy Development and Efficiency (DEDE), the Ministry of Energy defines steps of energy management into eight steps. They began to follow the level of energy conservation and tried to follow their footsteps. The early phase of the Ministry of Energy would like the hospitals, or the schools save energy. At that time the Ministry of Energy was also no clear indication for them. They started to collect data and take the information that they had come into the analytical process. Then, they presented to the Ministry of Energy, but he said that the hospital must indicate that it was more precise than that. Finally, they had energy comparison

indicators. They compare the energy consumption per unit as per bed, outpatient department, or in-patient. Ultimately, they generate the formulation of energy comparison that they use until now.

4.1.4.5 Thammasat University Hospital, Pathum Thani

The two big problems of their hospital were waste system management and waste management. Their big problem of waste is toxic chemical agent and infection waste. Hospital had connection canal all of hospital and area of university, so they had to mention on this point. They learn from training with the Department of Energy, study trip both domestic and on board. They got useful from criteria of accreditation. They know that the surveyor was looking for something and they tried to answer of this question. They had to change or improve their system for fitting with criteria. These activities were performed before sending to Eco Hospital Award. So the first activities that were reflected to be green hospital were awareness cultivating of employee. In each department of hospital couldn't see overview of green concept. For example, when we announced about energy saving, almost of the employee only mentioned energy saving but they didn't know how to practice as waste sorting, useful of biogas.

The researcher summarizes the activities that each hospital initiated during the first two years are as follows:

Table 4.2 shows the events that each hospital commenced during the first two years

Activities	Sripajun Hospital	Pathum Thani Hospital	Kasemrad Rattanaibeth Hospital	Prapokklao Hospital	Thammasat University Hospital	Total
Waste Management	✓	-	✓	-	✓	3
Energy management	✓	-	✓	✓	-	3
Safe food	✓	✓	-	-	-	2
Cleanliness of toilet	✓	-	-	-	-	1
Water management	-	-	✓	-	-	1
Chemical management	-	-	✓	-	-	1
Environment management	✓	-	-	-	-	1

As shown in table 4.2, the first activity that the hospital started to do the most was the first, energy management and waste management. The second is safe food management. The last is water management, chemical management, environmental management, toilet cleanliness.

4.1.5 What are the activities that reflect to be Green Hospital and what are the performances?

4.1.5.1 Sriprachan Hospital

(1) Chemical management

The first activity that their hospital started doing was chemical management. The hospital faced a foul odor problem because there were many customers. They invited the person who was expertise with Effective Microorganisms (EM) using from Somdejprasangkharach XVII hospital to coach their person to produce it. After they can provide it by themselves, they announced the cancelation using chemical for cleaning policy since 2553 B.E... The staff who want the EM solution was able to use it without paying. Their director was the role model with leading activities to the community by the Thai social system as the mutual exchange of goods. For example, producing EM solutions had to mix the bergamot flavor, but they don't have. So they would exchange the bergamot with an EM solution that was utterly mixing with a villager. This EM solution was manufactured according to the standard of the Department of Health as quick drying, not a bad smell, and no allergy. They also exchange an EM solution with used plastic bottles with restaurants. They reuse the used plastic bottles to fill the EM solution. It is possible to decrease community garbage in the other way. After they announced the policy, they can reduce the chemical fee from 112,000 baht per year to 5,000 baht per year. They were proud to be a part of bringing excellent service to employees, people, and reducing costs. Moreover, they are the original model of other hospitals that lead to more results.

(2) Waste management

Their hospital separated the garbage as something that they can reuse. This aim was to reduce the amount of waste, the amount of carbon dioxide in the atmosphere. They used the waste food to produce Biogas, feed the fish,

produced the compost and organic fertilizer. Non-biodegradable wastes were separated from the source. Some of the trash that flew along the sewage pipe was separated by double sieve and dry out. These activities were able to reduce logistics costs and reduce the spread of the infection to the community. Chemical waste as a vaccine, antibiotics, and the other that affect human life was destroyed as infectious waste. Their hospital was the center of gathering the infectious waste from Health Promoting Hospital (HPH) that was in the vicinity. These wastes included waste from dialysis would be transported to Bang Pa-in industrial estate to get rid of. They also provided the infectious waste bags for the patient with kidney disease. They get the 3rd innovation prize from the design of double sieve in the province level. The cost of the double sieve is 700 – 800 baht so that it can reduce the costs of waste management about 20,000 baht per year.

(3) Food management

They produced compost from dung, dry leaf, bran, molasses, and microorganism solution. The fertilizer was poured into the vegetable demonstration garden. Some of the ingredients could not found in the hospital. Whereas it could be found in the meadow or pasture, rice mills; therefore, they exchanged the organic vegetable with the villager and rice mill owners. They can continually plant organic vegetables. Their hospital located near the agricultural area. There was an outstanding farmer who plants organic rice. They can buy it on the cheap and cook it for the patient. They thought, supporting the farmer was as same as reducing chemical use.

(4) Energy saving

They compared electric consumption in each month and year. As a result, they aim to reduce electrical consumption by about 10% per year. The Department of Alternative Energy Development and Energy Conservation (DEDE) supported to change the old device. As the air conditions that have a lifetime over seven years, lighting reflector, and coil ballast to electronic ballast. DEDE also educated about saving and energy conservation. They apply eight steps of the energy conservation engagement system to practice and provide activities that engage the staff. They convened and progressive reported twice a month. They used to think about solar using energy; however, they still hold this project because DEDE

suggested that the breakeven point is too long. The other project was heated conversion from air condition to the hot water system to reduce water heater using, but production costs are relatively high.

(5) Transportation

As long as their hospital is small size, that made them are easily managed transportation. The hospital has an amount of building and a low rise. Hence, the internal transportation system is easily handled. In part of external transit, if the staff of the hospital is in the neighborhoods have to travel, we will travel together. They rotate their car for saving fuel. Mostly of villagers have a private vehicle by occupation; they go to the hospital by their cars.

4.1.5.2 Pathum Thani Hospital

(1) Food management

The green market started without paid since 2010. The group of a green market network, farmer, and team leader joined in planning for budget, structure, and responsibility of the green market group. The hospital provides area and supports healthy food. The group of green market network team urged the market, publication, advertise, and conclude a week. They also extracted lessons learned from performance and used the view of outer people to solve the problem, relayed to interested people. From these activities, they could see the progressing of action. They chose the vegetables from the producer who didn't use a chemical agent. The food court had to use organic vegetables. Hospital requirements audited the food shops in the green market. The seller must not cook with bleach sugar. If they met, they would admonish. Besides, the nutritionist must advise people about seasonal dietary food. Some vegetables, like carrot, were planted with a chemical agent because the producer needs to sell throughout the year. So the consumer should eat seasonal food as indigenous crop, morning glory, okra, sesbania at least two to three a week. They directly bought safety food and dried foodstuff from Nonthaburi, Ang Thong farmers by the connection of the network group of the green market. They bought coconut sugar, shrimp paste, dried shrimp from the safety food assembly of Samutsakorn province. The farm served all-conference in the hospital green catering to table concepts. All about the green market, a variety of goods is relatively small. The

external markets have more types of food than the hospital. Taste of general foods might be better than foods made from safe ingredients.

For this reason, the market share is lower level. Since 2011 during the flood, some traders, who used to sell vegetable in hospital but their garden was not flooded. They brought the plants to the hospital where the hospital didn't have to pay them. The network group of green market donated stuff to the hospital. For this reason, they had a long engagement and became a learning center of the hospital in Thailand and foreign.

(2) Procurement

They announced ethical hospital policies, "*Green business*." It had shown transparency of procurement even in parts of the administration.

(3) Energy management

Green energy and technology: they set the committee who is responsible for energy saving and environmental friendliness. For example, changing the ordinary light bulbs to LED, some area switched to a jerky switch. Solar cells were used in some areas. They use air condition power saving No.5, to promote the campaign of saving energy, walking up and down stairs instead of the elevator using and Effective Micro-organism using (EM). They used to think about Biogas, but their hospital was limited and had a long time of breakeven point.

(4) Environment management

Green environment, Green art, and Green living: The hospital had limited area, but they improved it to green space and used all areas. It was decorated to be a little garden in all corners because the tree helped oxygen increasing. Leader supported budget for all unit to paint the beautiful. Green space feels relax and like at home. It is in the part of art therapy. Their restrooms were cleaner than the other public place.

4.1.5.3 Kasemrad Rattanathibeth Hospital

(1) Energy management

They set the aim of energy using goal, not over 400 MJ/ bed/ day. They controlled to achieve my target, and they also try to continuous electrical power perusing area. All about fuel, we manage on Kilowatt per square, reduced LPG

by at least 10% per year. They still do not think of using renewable energy because of the high cost and long-term breakeven point.

(2) Water management

They can reduce and control water using to a minimal level about 1.83 – 1.84 Liter/bed/day. The water pollution regulations define the value of biological oxygen demand (BOD) not more than 20 mg. /L; however, they can control in the lower level that is about 6 – 7 mg. /L.

(3) Resource management

They reduce paper using to the lowest level; except for some units is also need paper as a financial department. All about tissue paper, we control at 1.8 roll/ bed/ day because they have to clean their hands related to infection control. They have developed a film X-ray system sending online, so they use film one pieces/ month in the dental department.

(4) Waste management

They divided the group of waste and controlled mistakes before they left the hospital. Their hospital had to submit the waste to a private organization that clears up it. They educated about the reduced and recycled paper to all workforce by reusing before recycling. They replaced the plastic bag with a fabric bag. Especially, the patients that often see the doctor. They use an only plastic bag for waste. Several plastic bags are 0.11 pieces/ bed/ day. They cancel some material that made from foam but replaced by paper material.

(5) Safety food

They continually tasted and controlled the quality of food and ingredients. Notably, all pieces of meat have to get guaranteed from slaughterhouses and sources of production. They can trace back.

(6) Chemical agent management

They cancel some product that is toxic to the environment. They define the time for giving and take the blood from the blood bank to reduced blood stocking and returned to the blood bank before expired. They also managed medicine stock controlling to overcome the overstocking and medical error. They canceled toxic chemical agents as acetic acid, hydro colic acid, Aluminum Sulfate, and a lot of artificial product buying. They buy ready to use the package as mixed

formalin, a single dose of alcohol with cotton. They can reduce chemical exposing of the workforce and reduce chemical cycle using.

(7) Transportation system management

Their hospital has three buildings. In each building has been designed to interconnect. They define duration time of food transportation; lift that use for food – waste – fabric stain. They replaced lift using by pneumatic transportation system for reducing time and workload. They still use petrol because of us aware of the gas explosion.

(8) Procurement

Their hospitals have many branches. The supply of medical devices must respond to all branches, which made the hospital more bargaining power. They set the standard in each product group and considered the quality of the product from product certification by Thailand. If possible, they will choose environmentally friendly products.

4.1.5.4 Prapokklao Hospital, Chanthaburi

(1) Energy management

All about alternative energy, they were limited by regulation of governance. They have a magnificent idea, but they have to choose what they can do and not against the rules. All about alternative energy, they were limited by regulation of governance. They have a magnificent idea, but they have to choose what they can do and not against the rules. The first project of them was an electrical pole that uses solar power. They got the budget for the construction from donations, welfare, and funding from the Ministry of Energy. At that time, the leader agreed with the team because it was useful for our organization and the globe.

Meanwhile, they had many ideas. They make a pipeline for heat water and bring it to the washing machine. Or changed using fuel to Liquid Petroleum Gas (LPG) because it was low cost, but they had been limited with procurement policy. Biogas was the second project. Hospitals had to co-pay in ratio 40: 60 with the Ministry of Energy. Now, they use Biogas in their kitchen. Biogas must be installed safety systems for explosion protection by expertise. It was accredited from The Faculty of Engineering, Chulalongkorn University. They manage about electric as we replace the wall-type power switch by rope jiggles switch.

Everyone knows that whenever they left from their seats, they have to turn off this switch. They also survey and analysis about electrical bills, they met 60 – 65% of invoices from using air condition, so they promote the duration of air condition using. The old air conditioner that was a long life more than 25 years would be replaced. The maternal and child department need to use an electric kettle. They usually use the pot about 30 minutes, but they plug in over 8 hours, so that team campaign by stickers "plugin when use - disconnect plug when not in use." After they won the Thailand Energy Award, they are trusted by people, so they opened the learning center for the students of municipal, parents, and external organizations. They also collaborate with the provincial energy agency for training and knowledge sharing.

(2) Chemical agent management

The pharmaceutical unit provides the box for returning medicine that the elder often incompletely has cured. They also replaced the plastic bag with a fabric bag.

(3) Food management

They concern about food and organic vegetable. They provide the area for the market that the farmer can sell the natural plant. Both of farmers in the project and not in the project can sell in our area. They provide free space, although the price is higher than the external market. Hospitals would like to buy organic vegetables. They have to purchase by electronic auction because the retailer cannot fit into this system, so they helped them by providing a free market for them. At least, the hospital staff and patients can buy from small traders every day. They try to do both things in parallel.

(4) Water management

They use tap water for six months a year and use natural water for six months. They have a natural fountain so they can produce tap water by themselves. In the dry season, the natural spray is not enough; they use tap water from provincial waterworks authority. The area of works as in-patients and outpatients department did not use the natural fountain in the dry season. The city of staff as housing officer used tap water from external all year. They always checked to leak water and campaign water saving as electrical saving. They bring used water to the

wastewater treatment system then they clean house of waste, watering a tree and wash a car. The remaining liquid was checked before discharged to public canals.

(5) Transportation

Transportation within the hospital, they focused on the method of transportation improvements within the hospital because they have limited space. Thus they concentrate on vertical transportation management. Passenger lifts are regular routes. Some people want to go up to only one floor, but they also use the passenger elevator, which causes unnecessary energy waste. Therefore, they have campaigned for people to exercise by walking up the stairs instead of using passenger elevators to save energy. The front of the passenger elevator is a source of many people gathered. Therefore, they use this area to label with many announcements. For example, campaigning about water usage economically, using both sides of the paper, using cloth bags instead of plastic bags, etc. As for the transportation around the hospital, the hospital is located far from the city about 1 kilometer, and most people in this province are farmer, that made most families have their cars. These causes made public vehicles using is not accessible. That is why the hospital faced with the problem of parking not enough to meet the needs. In the past, we never thought of having to build a parking building, but today, this concept might have to be reviewed.

(6) Building

They adjusted the slope area to be appropriate and make a path to connect between buildings on each floor as possible. Including, installing a motor in a food truck, garbage truck, and cloth truck to reduce the energy consumption of employees. It makes employees work happily.

(7) Waste management

They organized a waste recycle center. They study waste management because they need confidence in system management of the hospital.

(8) Procurement

They predict the number of medical supplies per year and order one time, but they let suppliers deliver 12 times, which makes them save energy, save paper, and budget. However, logistics management in the hospital is not as good as it should be because they have a variety of supplies.

4.1.5.5 Thammasat University Hospital, Pathum Thani

(1) Energy management and renewable energy

They had only Biogas that is renewable energy. It was produced enough to cooking, but it couldn't replace in all systems. They had 800 kilograms a day of waste food, and they used to sell it. But they thought a lot of waste food was able to renewable more than a sale, they also feel about Biogas. So, they change a lot of waste food to Biogas for cooking.

(2) Waste management

A part of waste products and the hazardous agent was destroyed by outsourcing. They try to make a proper landfill. They consult the municipal president because they can support and improve the area to better landfill. They concerned about needle, blade, and specimens. They have the technology for destructing infectious waste. Hazardous waste, chemical agents, and chemotherapy drugs were burned with heating 100°C. The subcontract transferred it. They monitored the performance of subcontracting. Garbage and non-hazardous waste were sent to a municipal landfill. Lamp and battery were returned to the firm. They bought "ready to use the material" because we want to reduce the plastic bag. Likewise, they also try to purchase reuse material because they can repack and re-sterilize, but some stuff needs to single use. They control equipment that it was re-sterilized by the sterilization indicator.

(3) Water management

Their wastewater treatment plant has a capacity which is a sufficient quantity of wastewater in both the present and the future. After wastewater was treated, the first part was released into the connection canal of the university, the second part that was in the clarifier was watered the tree. They can completely manage the wastewater system because they didn't expose pollution to people. They also continuously campaign saving water.

(4) Food management

They have a requirement of the food procurement that has to buy only food safety, such as fruits and vegetables that are planted without chemical fertilizer. They also directly contact with the farmer in the community to import

vegetables. These ingredients were cooked for the patient. The faculty of nursing provides a green market that is a choice for safe food consumption.

(5) Transportation

The first part, they concern about parking. Half of the customers are nearby the hospital that is north of Bangkok. The other is neighboring provinces such as Saraburi, Sing Buri, and Phra Nakhon Si Ayutthaya provinces. Most patients will travel to hospital by private car. Using public transportation is relatively small. The director team planned to build additional parking. They considered that they want the people brings many vehicles into the hospital or not? It might not be suitable if everyone brings the car into the hospital. In the second part, the hospital consists of 5 buildings. In each building is an incomprehensive self. They designed the support department is the back of the hospital. Thus the food, clothing, and medical supplies must be sent from the support department to each building. They also designed a connection way between support department buildings to service buildings that were on the second floor. They use this way that is major for private transportation. They also modified manual vehicles to automatic vehicles.

(6) Procurement

They tried to set the rules for purchase. For example, fruits and vegetables brought into the hospital must not plant with chemical fertilizer. They bought a lot of material at a time. It can reduce the number of transport. They guess if they perform with guidelines-fairness-justice, they are good governance because good governance is nearly green procurement, it has shown fairness.

(7) Building

They strive to ensure compliance with the principles of economy. Replacing chiller is inefficient. They study how to properly use electrical in an area that is not in use. They install equipment that allows sunlight through the cafeteria. The Breakeven point of them is about two years; they think it's worthy. Their goal in the first period is the Thailand Energy Award. Most of their building was decorated quite a long time and related to the budget. It's a weakness point. Although they had an engineer who is responsible, they are not ready in many aspects. They can only prepare in part of the basis.

Nevertheless, they still plan to build a new building that is a stand-alone building. It was decorated to be modern and energy-efficient buildings. The new building consists of outpatient departments and in-patient departments. They clearly define their goal that will send a new building to compete Thailand Energy Award.

(8) Chemical agent management

All about a chemical agent, they define the procedure about chemical using for procurement. They tried to reduce chemical using from 5 – 6 types to 3 types and monitored in all processes of chemical utilizing an agent.

(9) Personal health

The workforce is important. The workplace has many critical factors as mercury in a thermometer. If it had broken and personal hadn't known how to deal, they might have been dangerous. They replaced it with a digital thermometer. Likewise, they invested with employee health such as decorating area, improve the fitness of hospital and they also subsidize a fee if their employee uses the external fitness.

The researcher summarizes the activities that reflect the status of a green hospital and hospitals continue to do as follows:

Table 4.3 shows the actual events that reflect the green hospital status of each hospital and hospitals continue to do.

Activities	Sripajun Hospital	Pathum Thani Hospital	Kasemrad Rattanaibeth Hospital	Prapokklao Hospital	Thammasat University Hospital	Total
Safe food	✓	✓	✓	✓	✓	5
Energy management	✓	✓	✓	✓	✓	5
Chemical management	✓	N/A	✓	✓	✓	4
Waste management	✓	N/A	✓	✓	✓	4
Transportation	✓	N/A	✓	✓	✓	4
Procurement	N/A	✓	✓	✓	✓	4
Water management	N/A	N/A	✓	✓	✓	3
Building	N/A	N/A	N/A	✓	✓	2
Environmental management	N/A	✓	N/A	N/A	N/A	1

Activities	Sriprajun Hospital	Pathum Thani Hospital	Kasemrad Rattanakibeth Hospital	Prapokklao Hospital	Thammasat University Hospital	Total
Resource management	N/A	N/A	✓	N/A	N/A	1
Personal Health	N/A	N/A	N/A	N/A	✓	1
Note: ✓ Refers to there are clear actions in this area. N/A Refers to does not appear to have an explicit action.						

As shown in table 4.3, every hospital made food management and energy management. Chemical management, waste management, transportation, and Procurement are activities that four hospitals perform. Water management is an activity that three hospitals perform. The building is an activity that two hospitals perform.

4.1.6 How do you apply this concept or what important strategies are used in practice?

4.1.6.1 Sriprachan Hospital, Supanburi

The essential strategy is as follows:

- (1) Set the team
- (2) Invite the leader of a remarkable group and communicate with them (Director of the hospital, nurse leader, pharmaceutical leader, e.g.)
- (3) Plan and share knowledge with all staff level
- (4) Offer apparent benefits for the hospital as lower costs, reducing pollution.
- (5) Apply the other activities for always work improvement
- (6) To be the source of study
- (7) Always take After Action Review and looking for good practices.

4.1.6.2 Pathum Thani Hospital, Pathum Thani

Sustainable of green hospital should action as follow:

- (1) The leader must mention, clearly announce policies, support all activities and perform with an ethic
- (2) Employees have to collaborate
- (3) There are always driving and improving
- (4) Focus on the participation of the community and make a good conscience to the community. The hospital has no brand and quality is in the heart of producer
- (5) The prices are sensible and depend on the satisfaction of seller and buyer
- (6) There are quality improvements to compete with external market
- (7) There are controlling and monitoring in various ways
- (8) There are implementations by quality assurances of hospital
- (9) To cultivate the conscience of the employee for sustainable

4.1.6.3 Kasemrad Rattanatibeth Hospital, Nonthaburi

The key strategies that they use in operations as follow:

- (1) Establish a policy that shows the commitment to be a green hospital by winning various energy-saving contests
- (2) Establish a team responsible for the work clearly
- (3) Communicate to all employees of the organization
- (4) Determining environmental energy conservation as part of performance evaluation
- (5) There is an obvious communications policy both direct and indirect service department about energy saving, waste recycling and sorting of waste
- (6) There is a setting of green hospital activities into key performance indicators (KPI).
- (7) Workforces are continuously encouraged conscious by continuous quality improvement (CQI) activities.

4.1.6.4 Prapokklao Hospital, Chanthaburi

The critical strategies as follow:

- (1) Make employees feel that the activity is not a burden
- (2) Making the event consistent with daily life
- (3) Set the highest target and common goal
- (4) Build a team with someone who has the same ideas
- (5) Looking for knowledge
- (6) Follow their steps

4.1.6.5 Thammasat University Hospital, Pathum Thani

Their strategies as follow:

- (1) Communicate for cooperation
- (2) Share knowledge
- (3) Cultivate employee behavior "Make the same both at home and work."

Table 4.4 shows the guidelines for applying the green hospital concept.

Application methods or key strategies	Sripajun Hospital	Pathum Thani Hospital	Kasemrad Rattanaibeth Hospital	Prapokklao Hospital	Thammasat University Hospital	Total
Set team	✓		✓			2
Plan & share knowledge	✓				✓	2
Always applied to improve work	✓	✓				2
Leader clearly announced policies		✓	✓			2
Communicate throughout the organization			✓		✓	2
The select leader from a vital group	✓					1
Offer obvious benefits	✓					1
Take after action review	✓					1
Looking for good practice	✓					1
Leader support all activities with an ethic		✓				1
Employee collaborate		✓				1
Focus on community participation		✓				1
Make good community conscience		✓				1
Determined as part of employee evaluation			✓			1
Set Green activities to KPI			✓			1

Application methods or key strategies	Sriprajun Hospital	Pathum Thani Hospital	Kasemrad Rattanatibeth Hospital	Prapokklao Hospital	Thammasat University Hospital	Total
Make employees feel that the activity is not a burden				✓		1
Making the activity consistent with daily life				✓		1
Cultivate employee behaviour "Make the same both at home and work."					✓	1

As shown in table 4.4, the strategies that hospitals use to perform are establishing a responsible team, planning, and knowledge sharing, improve work, leader clearly announced policies, communicate throughout the organization.

4.1.7 Since the day that your hospital has received an environmental award, what activities are you currently doing continuously?

Activities that exist and make the hospital change to better things as follows:

4.1.7.1 Sriprachan Hospital, Supanburi

They continue to do all the events that have been done. The transition to the better is to get cooperation from the community. It makes the hospital work according to the green hospital concept is sustainable. Although there is no competition today, our people continue to do that activity.

4.1.7.2 Pathum Thani Hospital, Pathum Thani

They continue to do all the activities; the evolution of the green hospital is a commitment to become a non-toxic food learning center.

4.1.7.3 Kasemrad Rattanatibeth Hospital, Nonthaburi

They followed the concept gradually, and reducing the cost of the hospital; the idea is embedded in the person. Everyone continues to do activities without competition.

4.1.7.4 Prapokklao Hospital, Chanthaburi

Activities that continue to be done are energy saving because it is a long-term result. The result of this change is that the hospital can reduce the cost and not be a burden.

4.1.7.5 Thammasat University Hospital, Pathum Thani

They do all the activities. Change to the better is the behavior of people who have changed, expressing actions without having to be rewarded as a lure, but as a habit.

4.2 Discussions

The researcher discussed the results on five issues as follows:

4.2.1 The starting point of applying the concept of green hospital.

From the study, it was found that the hospitals were different characteristics as follows: 1) The objectives of the hospital establishment 2) The population characteristics of the service 3) The number of beds provided 4) The expertise of the organization 5) Location and the surrounding environment. However, there are similar opinions in the decision to apply the Green Hospital concept for two crucial reasons:

4.2.1.1 The concept of the Green Hospital can solve the problems of the hospital.

Following Mulvihill's study (2012) that the applying of the green hospital concept in the operating room of Metro West Medical Center in Framingham, Massachusetts. It can reduce the amount of waste from steaming, which is as much as 5,606 lbs., which costs about \$ 29,843 and Winfield (2011) studies that she decided to replace the blue wrap with rigid sterilization containers. That is a significant amount of waste and cost savings. Minnema (2008) found that Inova Fairfax Hospital in Virginia tried to do their work for environmentally friendly, such as turning off the lights at the vending machine, saving him \$ 15,000 per year.

4.2.1.2 Awareness of the hospital's work processes that will affect the environment

Awareness of the hospital's work processes that will affect the environment in line with Dunlop (2009) hospitals that are more environmentally friendly or have a green building. They also think of the situation that will encourage employees to have good health, and the patients receive positive health effects. For example, the removal of the mercury-based thermometer, providing organic foods for patients and employees, along with energy saving.

4.2.2 The meaning of the green hospital concept

From the study, it was found that the leaders gave the meaning as the characteristics of the hospital that should be, the hospital activities should be practiced and the strategies that the hospital would achieve. The researcher summarizes the meaning based on the results of the study. The Green Hospital Concept refers to the idea that will make the work process of hospitals does not affect to the environment. Such as energy management, waste management, water management, chemical management, food management, etc. These processes require strategic planning to achieve the work target.

4.2.3 Activities initiated by the hospital during the first 2 years

Activities that the hospital has applied in the first two years found that the hospital that wanted to solve the problem began to do activities that can respond to the question as follows. Sri Prachan Hospital has 5 activities according to the concept of the Department of Health, namely waste management, toilet management, environmental management, energy management, and food safety management. Thammasat University Hospital started to manage waste. As for hospitals that are aware of the impact on the environment, start doing activities that are of interest, and have sufficient support resources in that area.

4.2.4 Activities and results that reflect the green hospital status and activities that are still doing until now

The study found that after the hospital has started actions to meet the needs in the first period. Therefore, the results have been extended to start other activities at a later time. Johnson's study (2010) reported that Holy Cross Hospital in California was awarded the California Waste Reduction Award for environmentally

friendly policies. They set policies on reducing waste and reducing greenhouse gases. In 2009, they were able to recycle approximately 2,200 tons of debris, saving more than \$ 14,330. They also have plans to renovate buildings to obtain a California LEED award. Martin (2009) reported that the Dell Children's Medical Center of Austin, Texas, has six courtyard facilities in the hospital area full of trees. More than 80% of hospitals have solar access. The hospital is designed with bright glass surrounding. The hospital was completed in the year 2007. It is the world's first award-winning platinum-level certification. That is the highest level of the US Green Building Council's Leadership in Energy and Environmental Design Program. Key features of this building also include the use of non-toxic building materials, water management strategies that turn off unneeded lights and on-site natural gas power plant that provides 100% of the facility's electricity. Karliner and Guenther (2011) proposed that green and healthy hospitals should have the duties and responsibilities that show the status of green hospitals are as follows: 1) Leadership-prioritize environmental health, 2) Chemicals-Substitute harmful chemicals with a safer alternative, 3) Waste-Reduce, treat and safely dispose of waste, 4) Energy-Implemented energy efficiency and clean energy generation, 5) Water-saving potable water, 6) Transportation-Improve transportation strategies for patients and staff, 7) Food-Purchase and serve sustainably grown, healthy food, 8) Pharma-Safely Manage and dispose of pharmaceuticals, 9) Buildings-Support, and 10) Purchasing-Buy safer and more sustainable products and materials.

These studies showed that some activities at individual hospitals do not have equal. There is a high probability that choosing a business depends on the SWOT Analysis of each hospital. Including considering the possibility and input factors that will make the work successful. However, purchasing is an activity that most hospitals have not done thoughtfully. Karliner and Guenther (2011) suggest that the improvement of the purchasing process involves many external groups. Hospitals should choose products from companies that use raw materials, create products from environmentally friendly methods, in which these products often have high production costs. For this reason, it is possible that hospitals in Thailand have limited budgets and procurement that are restricted by law. Therefore, this activity cannot be taken seriously.

4.2.5 Important strategies that make it successful

A necessary approach that makes the Green Hospital concept to be applied successfully, mostly starting with the leader having a clear working policy. In line with Karliner and Guenther (2011) that says leaders have an impact on organizational leadership must be a good model and set clear policies. Leaders must have communication policies throughout the organization, plan, and encourage the exchange of knowledge, drive and improve continuous work.



CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This research is qualitative research. The researcher aims to study the evolution of the green hospital concept and the application of concepts for success and sustainability. The research hypothesis is 1) the evolution of the green hospital concept makes hospitals that are different, change to be better, and 2) the hospitals have different methods to apply green hospital concepts for different success and sustainability. The steps of conduct the research are as follows: 1) Determine the conceptual framework used in study by documentary research, find the meaning and context of the word "Green Hospital" from the Internet 2) Define the research hypothesis layout 3) Determine the target group by choosing the hospital that has received the environmental management award or the hospital that is known for its operations regarding "Green Hospital" in 5 different populations 4) Approach the phenomenon that occurred. Data were collected through in-depth interviews with semi-structured open-ended interviews from hospital leaders. 5) Analyze phenomena; interpret data using content analysis methods, convert qualitative data into quantitative data. 6) Summarize to create new knowledge. The results of the research are as follows:

5.1.1 Definition of green hospital concept

The Green Hospital Concept refers to the idea that will make the work process of hospitals does not affect to the environment. Such as energy management, waste management, water management, chemical management, food management, etc. These processes require strategic planning to achieve the work target.

5.1.2 The beginning of applying the green hospital concept

For the results, the leaders of community hospitals and university hospitals decided to use the green hospital concept because they wanted to reduce

budget problems and reduce hospital costs. These two hospitals have different general characteristics but face the same problem. General hospital leader Center Hospital Large private hospitals and university hospitals have decided to apply the concept because leaders recognize the impact of the environment on society. For other reasons, the leaders decided to use the idea to meet the policy and to meet standards.

5.1.3 Activities that reflect the status of a green hospital and hospitals continue to do

The activities that reflect the status of a green hospital concepts as follows: 1) provide safe food 2) energy management 3) chemical management 4) waste management 5) transportation management 6) procurement 7) water management 8) building

5.1.4 Application methods or key strategies of Green Hospitals Concepts that changed them to be better living.

The key strategies that hospitals use to drive the concept of the Green Hospital to be successful as follows: 1) establishing a responsible team, 2) planning and knowledge sharing, 3) improve work, 4) leader clearly announced policies, and 5) communicate throughout the organization.

5.2 Recommendations

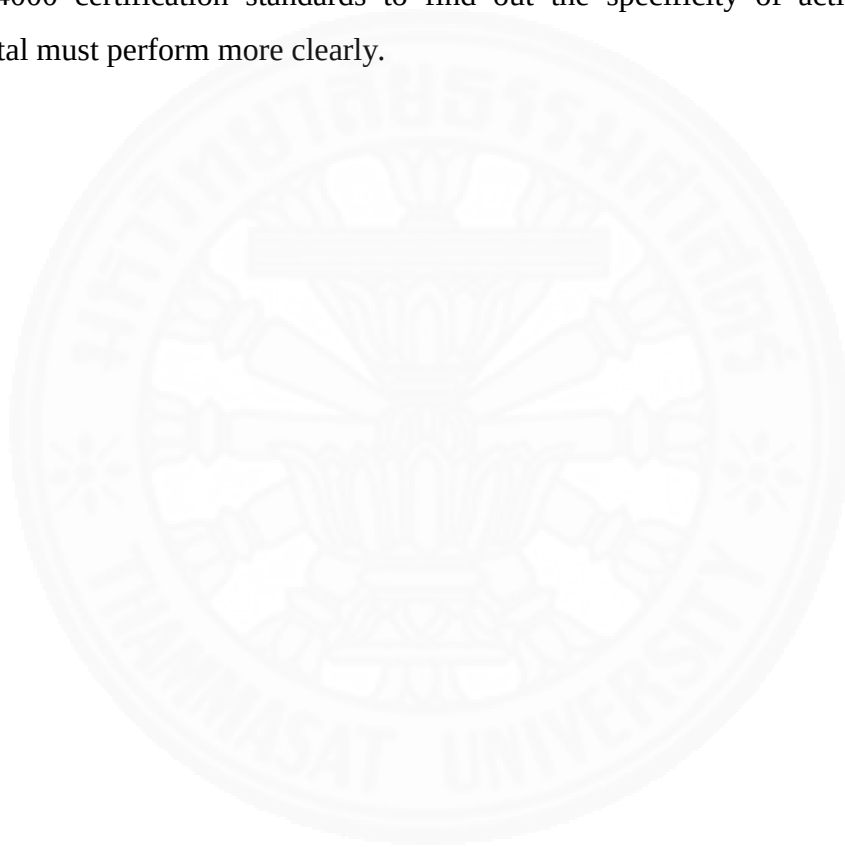
The researcher recommends on two issues as follows:

5.2.1 Applying research results

The results show essential activities that hospitals should practice to show the status of a green hospital as well as valuable strategies. Therefore, hospitals that want to use this research result should study the details and guidelines for the implementation of each additional activity so that it can be easily implemented. Besides, the research also found that leaders have an essential part in driving the concept to succeed. Hospitals should consider preparing strategies clearly before proceeding.

5.2.1 Further study

The results of the study are still limited in terms of sample size. Therefore, the researcher chose the sample group that will best represent the population. This research is only a basis for understanding the green hospital concept, offering activities that hospitals should follow. Therefore, those interested in studying can apply this research to develop as a green hospital evaluation form. Besides, those who are interested can also study further to compare the green hospital concept with ISO14000 certification standards to find out the specificity of activities that the hospital must perform more clearly.



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APPENDICES



APPENDIX A

Example of the interview questionnaire

This interview form is part of the research on The Evolution of Green Hospital Concept for Thailand's Hospital. This research aims to study the evolution of green hospital concepts and to study applying this concept for success and sustainability.

Part 1 General Data

- (1) Name of key informant and responsibility
- (2) Name of Hospital
- (3) Address & Location of hospital
- (4) Number of inpatient beds and outpatient visit/day
- (5) Award and accreditation-related green hospital concept

Part 2 Concepts of the green hospital (Please give some detail)

- (1) What is the beginning of green hospitals?
- (2) What activities did the hospital start during the first two years?
- (3) What are the activities that reflect on being Green Hospitals, and what are the performances?
- (4) What is the green hospitals' concept?
- (5) How do the hospitals apply this concept?
- (6) Since the day that the hospital has received an environmental award, what activities are the hospitals currently doing continuously?

BIOGRAPHY

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