INTERACTIVE SPATIAL WEB-BASED SYSTEM FOR ECO-TOURISM IN ROYAL BELUM STATE PARK, PERAK

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DEDICATION

To my soul mate and my lovely son

Mohd Khairool Bin Norezan & Mohd Seif Afiq

To my mother and father

Rohah Binti A. Rahman & Mohd Shah Bin Ibrahim

My siblings

Sharina, Mohd Razmi & Shazwana

Thank you for your love and supporting me in my study

Thanks to all my colleagues

Especially

Nordhalia Binti Mustafa

Nor Liyana Binti Mansor

Siti Syukriah Binti Khamdan

Suhaila Binti Salihin

that always helps me in everything I do

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In the Name of Allah, the Most Gracious and Most Merciful

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ABSTRACT

Royal Belum State Park (RBSP) is one of the main global destinations for nature-based tourism activities and locations of eco-tourism in national eco-tourism plan. However, due to the limitations of outdated promotion, lack of visible infrastructure and unavailability of an interactive web-based map provided for tourists, RBSP is yet to be recognized as one of the attractions for tourism activities. To address these problems, the research developed an interactive web-based system of eco-tourism for RBSP. In this research, geographic information system (GIS), an auxiliary tool in developing eco-tourism system was distributed across a network computer to integrate, disseminate, and communicate geographic information visually on the existing World Wide Web. Several phases were involved in this research, namely User Requirement Analysis (URA), design database system, data collection, web-based development and system validation. The URA was distributed online via Google document to 46 respondents and manually distributed to 4 staffs of Perak State Park Corporation (PSPC). Feedbacks from the respondents were included in the interactive web-based system. Next, a database system was created using ArcGIS 10 software to produce geospatial data and digital maps, while data of the attractive places were collected in RBSP to be input in the web-based system. Following that, a web-based system was developed using HTML, CSS, PHP, MySQL Workbench and JavaScript. Complete information such as facilities, price, activities and an interactive map with functioning tools such as database system, network analysis and cross section were included to help tourists pre-plan their vacations. Finally, the web-based system was validated by distributing another questionnaire to fifty respondents. The results revealed that 60% (n=30) respondents stated that the web–based was an excellent interactive system followed by 38% (n=19) saying it was good and 2% (n=1) gave moderate results. As a conclusion, this interactive tourism web-based system for RBSP provide users easy access of the characteristics of the earth surface, accessibility of the infrastructure and activity-based information.

ABSTRAK

Royal Belum State Park (RBSP) merupakan salah satu destinasi dunia bagi aktiviti pelancongan berasaskan alam semulajadi dan lokasi eko-pelancongan dalam pelan eko-pelancongan negara. Namun, disebabkan keterbatasan promosi, kekurangan infrastruktur yang jelas dan tiada peta berasaskan web interaktif yang disediakan bagi rujukan pelancong, RBSP masih belum diketahui sebagai salah satu tarikan untuk kegiatan pelancongan. Untuk menangani masalah ini, kajian ini membangunkan sistem eko-pelancongan berasaskan web interaktif untuk RBSP. Dalam kajian ini, sistem maklumat geografi (GIS), iaitu peranti bantu dalam membangunkan sistem eko-pelancongan telah digunakan di seluruh rangkaian komputer untuk mengintegrasikan, menyebarkan, dan menyampaikan maklumat geografi secara visual pada *World Wide Web* yang sedia ada. Beberapa fasa terlibat dalam kajian ini iaitu *Analisis Keperluan Pengguna* (AKP), sistem reka bentuk pangkalan data, pengumpulan maklumat, pembangunan web dan pengesahan sistem. AKP diedarkan secara dalam talian melalui dokumen Google kepada 46 responden dan diedarkan secara manual kepada 4 orang kakitangan dari Perbadanan Taman Negeri Perak (PTNP). Maklum balas dari responden dimasukkan dalam sistem berasaskan web interaktif. Seterusnya, sistem pangkalan data telah dibuat dengan menggunakan perisian ArcGIS 10 bagi menghasilkan data geospatial dan peta berdigit, manakala data bagi tempat-tempat menarik di RBSP dikumpulkan untuk di masukkan ke dalam sistem berasaskan web. Berikutan itu, sistem berasaskan web telah dibangunkan menggunakan HTML, CSS, PHP, MySQL Workbench dan JavaScript. Maklumat lengkap seperti kemudahan, harga, aktiviti dan peta interaktif serta alat berfungsi seperti sistem pangkalan data, analisis rangkaian dan seksyen rentetan dimasukkan untuk membantu pelancong bagi membuat pra-rancangan percutian mereka. Akhirnya, sistem berasaskan web telah disahkan dengan mengedarkan borang soal selidik yang lain kepada 50 responden. Hasil kajian mendapati 60% (n=30) responden menyatakan bahawa sistem berasaskan web adalah sistem interaktif yang cemerlang diikuti oleh 38% (n=19) dengan baik dan 2% (n=1) memberikan hasil yang sederhana. Kesimpulannya, sistem berasaskan web pelancongan interaktif untuk RBSP ini memberi pengguna akses mudah terhadap ciri-ciri permukaan bumi, kemudahan infrastruktur dan maklumat berasaskan aktiviti.

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LIST OF ABBREVIATIONS

CSS	-	Cascading Style Sheets
GIS	-	Geographic Information System
HTML	-	HyperText Markup Language
PHP	-	Hypertext Preprocessor
PSPC	-	Perak State Park Corporation
RBSP	-	Royal Belum State Park
URA	-	User Requirement Analysis

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CHAPTER 1

INTRODUCTION

1.1 Background Study

Nowadays, tourism has been recognized as one of the major sources in social, cultural, environmental, heritage value and economic sector around the world. Tourism also plays a vital role in the export industry and foreign exchange in many countries. World travel and tourism council (2017) states that tourism is contributing direct global Gross Domestic Product (GDP) of 3.1% and supporting 6 million net of the world employment in 2016. In 2007, Ministry of Tourism Malaysia proposed the new theme which is 'Malaysia Truly Asia' to promote Malaysia to the international or foreign tourist to come and visit Malaysia. A total of 25.9 million international tourist with RM82.2 billion profit were recorded, making Malaysia the second most visited countries in South East Asian to visit by the tourists from around the world in 2017 (Tourism Malaysia, 2018).

Royal Belum State Park (RBSP) is one of the world-class protected areas with valuable ingredients in term of conservation, research, watershed, tourism, education and indigenous culture. Therefore, it is expected to be as a main global destination for the nature-based tourism activities. Eco-tourism is a branch of tourism where it allows the tourist to enjoy the preserved environment. This type of tourism will improve the species of flora and fauna, and some cultural heritage for future. On the other hand, RBSP is among the oldest rainforest of 130 million year old that has more biodiversity than other places in the world. This placed is located in Gerik, Perak and managed by the Perak State Park Corporation (PSPC). These natural areas are one of the predominant attractions besides giving benefits to the local residents as it increases the income for community development. It is also one of the contributors in the economic sector. Moreover, this rainforest preservation was one of the top tourism products of Perak among the international repute (Nolee, 2013).

Recent years, web-based mapping system is one of the enormous improvement applications that is derived from the Geographic Information System (GIS). GIS is a tool that integrates with hardware, software and data collection for managing, analysing, capturing of spatial data and displaying various form of geographically referenced information. Mohan *et al* (2008) state that the power of GIS lies in organising and manipulating spatial information by using both of Database Management System (DBMS) and an automated cartographic system for rationally linking map features to attribute data. Simply put, the result of the data will be displayed in the form of maps, tables and chart where the user can organize and update the data easily. The application of GIS is not limited in tourism but recently it has been used for park management, facility monitoring, visual resource assessment, and identifying suitable areas for developing tourism activities (Md. Azizur, 2010). Besides that, there are many benefits of using the GIS application in the tourism sector. It helps to portray characteristic of the earth surface, the accessibility of the infrastructure-based and activity-based information where it can be finalized by display in the interface of the application. On the other hand, user can modify the database system in mean time by using the functioning tool that was provided in the GIS itself.

Web-based with GIS is one of the techniques to promote the tourism in the most countries and also receiving more interest within the tourism industry. The user can access the web-based system and explore the information of the attractive places that are provided in the RBSP. Besides that, there is no additional pay needed to search for the attractive places in RBSP using the web-based. The GIS are distributed across a networked computer to integrate, disseminate, and communicate geographic information visually on the existing World Wide Web (WWW). As web technologies and GIS advanced considerably and practiced widely (Tan, 2006), the web-based GIS had become interesting for information sharing and visualization (Markos, 2012).

Other than that, Zhilin *et al* (2011) state that the development of map from paper to web has been upgraded which is from ‘display and storage’ to ‘display and exploration’ and ‘storage and linking’. By using the web-based mapping system, the

accessibility to the attraction places can be shown immediately and more specific as the general information about the places can be obtained. Besides that, the increasing industries of this technology make it easy for searching any places immediately without any issue. This method also attracted tourist to learn more about the different environment through the understanding of the culture and natural resources.

1.2 Problem Statement

Tourism industry is one of the industries that have been actively progressing. It becomes even more significant in the economic development, sharing cultures, generate peace and establish mutual understanding over the years. As a result, the increase of the tourist arrival boosts the economic development whether for government or private sector, in terms of the foreign exchange earnings, business and tourism spots. To maintain this industry as the major source of revenue for the country, the enhancement of the promoting of tourism activities in Malaysia could be transformed by advanced technology. Nowadays, these promotions can be delivered through social media, tele-advertisement, and others in just a split of second. One of the medium that have better way to promote is web-based system as people around the world widely used the internet. The complete information of the attractive places in the web-based system will make the tourist become excited to explore more places in Malaysia. Yee and Chan (2006) say that, tourist only stay in that area in a short time and do not know of the attractions because of the lack of information about the area.

The other main issues in the tourism industry are inadequacy and insufficiency of information about the attractive places that can lead to decreasing number of tourist to Malaysia (Kiran *et al*, 2010). Tourists always want to know about information of the location, position of the place, distance between one destination to other attractive places, accommodation, facilities provided, and transportation before traveling to the other places. This is to ensure the travel plan run smoothly without any constrains. Therefore, by establishing the interface of the interactive web-based system with the combination of the descriptive information

and the spatial location can help the tourist in preparation of the budget and time management in planning for traveling.

The interactive web-based system can provide reliable information that may assist travel agency to identify the potentials tourist attraction. Additionally, this technology system also can help the tourist by facilitating them to the destination easily and more conveniently. Thus, the establishment of web-based system for the tourist can give many advantages to the other sectors related to tourism. GIS is a valuable tool to investigate specific questions pertaining to tourism development including location, condition of the area, trends and changes, routing to and through the site, and patterns associated with resource use (Md. Azizur, 2010).

The tourism system in RBSP is not equipped with a complete web-based reference as there is no interactive map provided for the tourist to refer. On the other hand, the infrastructures in the RBSP were not updated and are not clearly seen through google earth. This research proposed to develop a web-based mapping system for RBSP that displayed the map, facilities, price and also activities in order to help the tourist in pre-planning. Besides that, there are some functioning tool added in the web-based mapping system for the tourist to use for pre-planning before traveling to the RBSP which is the network analysis and cross section.

Web-based GIS has become trend method in promoting tourism in many countries as it is capable to analyse and visualize the spatial and non-spatial data in the form of digital map. However, the establishment of the interactive RBSP web-based GIS are still lacking in presenting the digital maps on the internet. The map that has been published by PSPC in the website only shown in the form of image. Image format was limited in searching for information and query. This cause of the lack of information about attractive places; making it difficult for tourist to search the spatial travel information. Thus the development of the web-based GIS will help the tourist to prepare for the budget and guide the tourist to travel with a proper planning.

1.3 Research Objectives

The main purpose of this study is to develop an interactive web-based system for eco-tourism in the RBSP. Therefore, the study is guided by the following three (3) objectives:

a) To conduct a user requirement analyses (URA) for interactive web-based system for Royal Belum State Park.

b) To design and develop an interactive web-based system for Royal Belum State Park.

c) To analyze and evaluate the information of tourism application performance.

1.4 Research Question

The following are the research questions in order to achieve the above mentioned objectives:

Objectives	Research question
I) To conduct a user requirement analyses (URA) for interactive web-based system Royal Belum State Park.	• What are the user requirements for developing the web-based system? • What are the most attractive places that tourist always visit in Royal Belum State Park? • What are the facilities provided for the tourist in the Royal Belum State Park?
II) To design and develop an interactive web-based system for Royal Belum State Park.	• How to enhance the tourism industry in Royal Belum State Park? • How to attract tourist to visit the Royal Belum as one of the attractive destination? • How can the interactive web-based system functionally used to attract the tourist?
III) To analyze and evaluate the information of tourism application performance	• How to evaluate the user friendly of the system?

1.5 Scope of Study

There are four scopes of work that have been identified to develop an interactive web-based system of tourism spot which are respondents, study area, hardware and software. These scopes of work will are used in this research for collecting data, processing and produce the final output of this research.

1.5.1 Respondents

In this research, about fifty (50) local respondents were chosen from various backgrounds such as occupation, gender, religion and age, to answer the questionnaire provided during the process of user requirement analysis and validation of the web-based system. Besides, the respondents involved in this process which is government officer, private workers, students and tourist. Due to the time constraints, only local respondents get selected in this research.

1.5.2 Study Area

The area for this study is RBSP that is located in Hulu Perak, Malaysia with 117, 500 hectare of pristine mountainous forest and divided into two (2) sections which is Belum-Temenggor (WWF Malaysia, 2007). Belum is located north right by the Malaysia-Thailand border, while Temenggor is located south of Belum. The forest consists of Dipterocarp, Ridge, Edaphic and Montane Forests which is spread right up to the Kelantan and Thailand border (UNESCO, 2017). Figure 1.1 shows the location of RBSP in Perak. There are many attraction places found in this rainforest that can attract tourist attention either from Malaysia or international. Therefore, the tourist whom interested on nature can visit RBSP to do some activities and learn more about the culture of the local communities that live in that area.

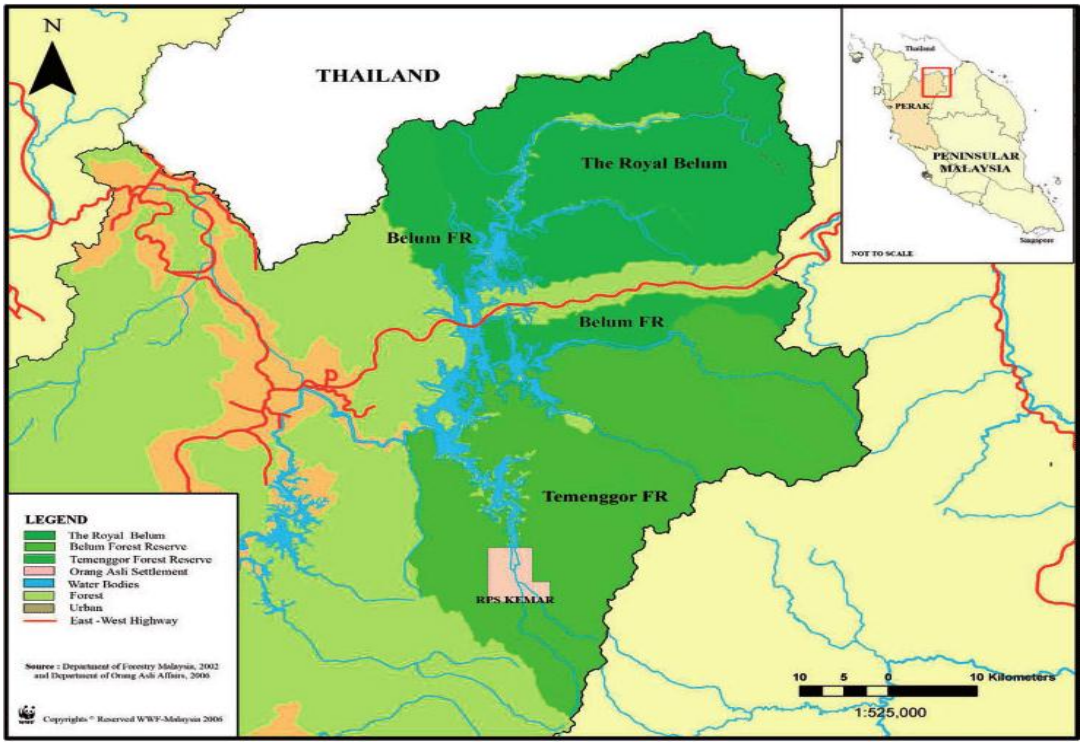

Figure 1.1 Royal Belum State Park (WWF, 2007)

1.5.3 Hardware

There are several equipment used to collect the data of attractive places in the RBSP. In this research, Garmin Oregon 450 is used to track the way of the attractive place from one point to other point to obtain the location of the attractive places. Besides that, GPS points were established for each site of the attractive places to know the coordinate before doing detailing survey of the site area by using the GPS receiver Topcon GPS GR5. Detail survey for the location of the places is collected by using the total station (reflector less) to produce the map before export into the ArcGIS software to be included in the database system.

1.5.4 Software

Software used in this research is Civil Design and Survey (CDS) software to process the raw data of the detailing observation before export into the AutoCAD software to produce the location mapping. Besides that, GPS data was processed by using the Total Trimble Control (TTC), and ArcGIS 10 software is used to create the

database system of the attractive places to facilitate the tourist to get more specific information of the places. Furthermore, HTML, CSS and PHP are used to develop the interface of the interactive web-based system with mapping engine by using the ArcGIS, MySQL Workbench and JavaScript to guide the tourist along the travel in RBSP.

1.5.5 Royal Belum Based Map

Spatial data which is the maps that covered the area of Royal Belum in 1986 are collected from JUPEM. There are four (4) maps involved in this research which are; (i) Belum 1986, (ii) Kampung Batu Melintang 1986, (iii) Temenggor 1986 and (iv) Kampung Ipoh 1986. These scanned maps are to ease the process of digitizing by using ArcGIS software to differentiate each layer of the abstraction of real world. Besides that, the other information about the attractive places has also being collected from the PSPC to include in the web-based system.

1.6 Significance of Study

Internet is one of the greatest creations that provide an endless contributes of information and knowledge which allow people to query any topic or questions. The introduction of web-based system as one of the applications can give big impact on the tourism industry. The benefits of this research to many sectors either in government or private to improve tourism industry in Malaysia are as follow:

i. The government sector or PSPC can use this research to attract the tourist to visit the RBSP by organizing some activities or others programs such as culture and art program, teambuilding and others for the purpose of promoting the beauty and uniqueness of RBSP as being one of the popular tourism icon in Perak state in conjunction with the Visit Malaysia Year 2014.

ii. The other sector such as tourism centre or the private sector can use this research to enhance the development of RBSP in term of marketing services, the development planning or improvement the main attraction places for the convenience of tourists visiting the RBSP.

iii. This research can be used by other researcher to know the development in RBSP such as facilities, diversity of flora and fauna species, and many more as this RBSP is one of the eco - tourism that is preserving the habitat and suitable for researcher to do scientific research.

iv. The attraction provided in the RBSP able to attract tourist to visit and stay in the rainforest that can increase economic system in Perak State.

v. This research also can be used by other sectors to know the activities that are provided in RBSP in order to attract more tourists to travel in RBSP by giving a proper planning and budget during travel.

1.7 Methodology

There are several elements and components need to be completed in the methodology phase to achieve overall objectives and answered the research questions. The eco-tourism destination in the RBSP was selected as a study area of this research. Figure 1.2 shows the flowchart of the research methodology.

Phase one (1) was reviewing the journal, thesis and other researches about the eco-tourism in RBSP to gain more literature and find the gaps for this research. User Requirement Analysis (URA) was conducted to gain the response from the tourists about the information that are needed to be included in the interactive web-based

system in phase two (2). This phase was conducted to achieve the first objectives of the research.

The next phase explained in details about the designation of the database system of the attractive places in the RBSP before developing the web-based mapping system. There are three elements involved in this phase which are conceptual design, logical design and lastly physical design. This phase has to be completed first before proceed to the next phase. The purpose of this phase was to make the collection of data run smoothly without any problems.

Phase four (4) was proceeded with data collection in the RBSP. This phase discussed about the data that are needed to be collected to be showed as an input in the website. There are three elements in this phase which are the spatial data, attribute data and fieldwork. These three elements were used in this research to achieve the second objective which is to identify the attractive places in RBSP.

Phase five (5) was the development of the database system and web-based mapping system about the attraction places in RBSP. In this phase, the map of RBSP was digitized by using the ArcGIS software. The information of non-spatial data was included in the database system. After that, the web-based system was developed where it involved two elements to be considered with the concept of the interface and web-based system design.

Web-based system was tested after development as it was compulsory to validate the information and the data exists. The validation of the website was conducted to make sure that the interface of the web-based is user friendly and achieved the satisfaction of the end user. This phase comprised of two parts to look out which are the needs for user to test the website first, then answering few questions about their opinion on the purpose of the website itself.

There are several equipment and software that were used in this research which are the total station (reflector less) for mapping of the indigenous community village and campsites, GPS receiver to get the coordinate of the location while

Garmin Oregon was used to track the route along the travel. AutoCAD and ArcGIS software were used in this research to process the data which are mapping and the database system before creating the website. Besides that, HTML, CSS and PHP coding were used to develop the interface of the web-based system for RBSP while mapping engine used the ArcGIS and JavaScript.

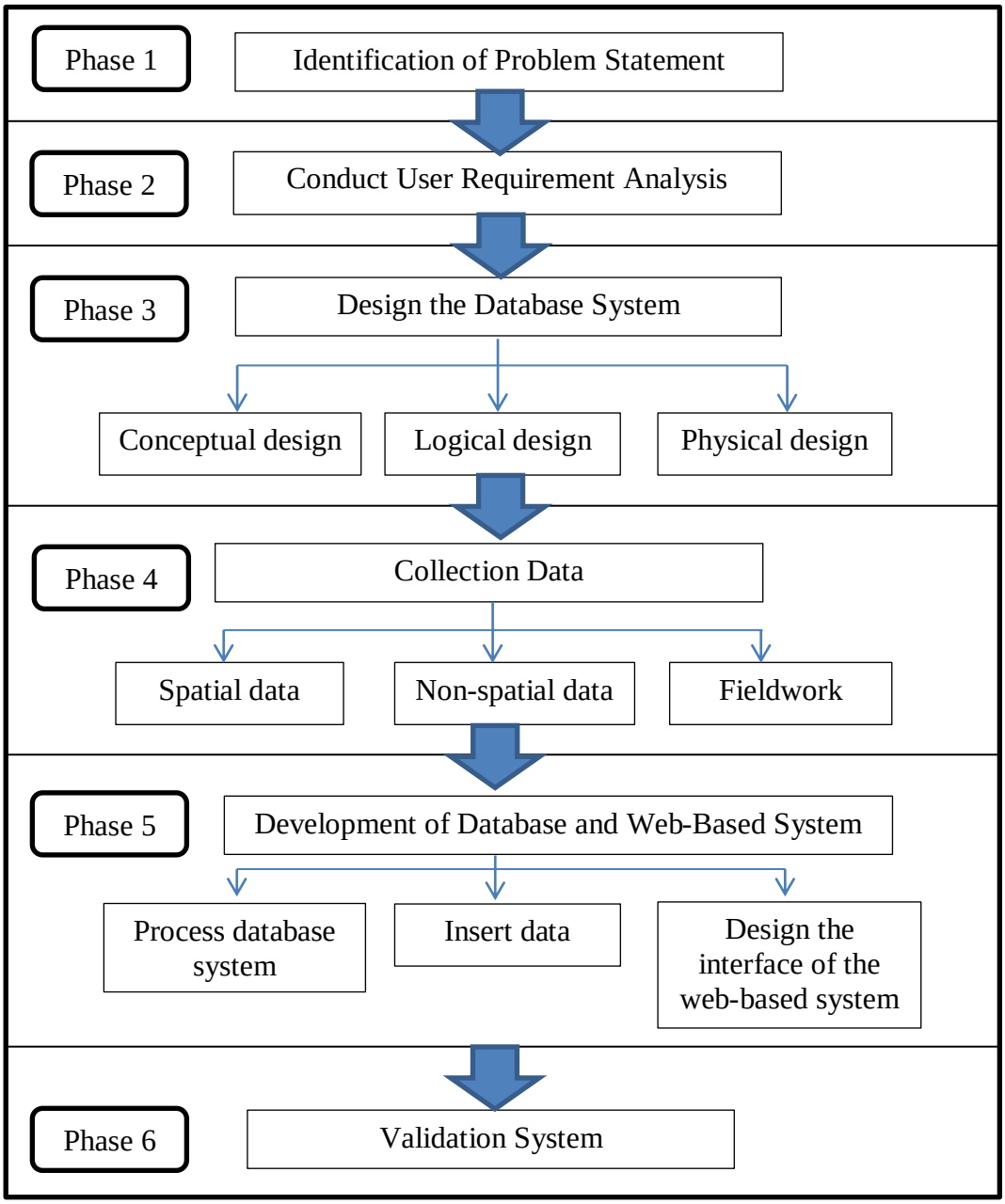

Figure 1.1 Flowchart of the research methodology

1.8 Chapter Outline

This thesis consists of five chapters that provide an understanding of the objectives to be achieved. Chapter one (1) discussed the benefits of tourism industry, the attractions of RBSP as one of the eco- tourism and also the application of GIS in tourism industry. Other than that, the issues of the interactive web-based system in tourism were also focused. This chapter clarified the aim of the research, objectives, problem statement, research question, scope of research and the significant of the research. Basically, these chapters described the whole structure of the research.

Next, chapter two (2) focused on the literature review of the topic related with this research. This chapter briefed about the tourism industry definition, clarification of eco-tourism and attraction of the RBSP as one of the nature-based tourism in Malaysia. Besides that, this chapter also described the Geographic information system (GIS), the functionalities of GIS in eco-tourism, the application of the web-based system in eco-tourism and the previous related research about the web-based system in tourism industry. The general understanding about HTML, CSS, PHP, JavaScript and ArcGIS system in development of web-based system was also described in this chapter.

Chapter three (3) presented the methodology of developing the interactive web-based system of ecotourism in RBSP. In order to develop the web-based mapping system, there are several phases that were involved in order to achieve the objective of this research. The information about spatial data and non-spatial data were collected, organized and stored in the designing database system by using the ArcGIS software. The processing of development the web-based system integrating with mapping system by using the programming language, was created using the references from user requirement analysis (URA) to make it effectively functioning without any problems. The validation system was made in order to ensure that the system meets the needs of user view by distribution of URA and testing the web-based system.

The result and analysis of the interactive web-based system of eco-tourism in RBSP were analysed in the chapter four (4). This chapter are more focused on the URA that divided into four (4) sections which are knowledge about RBSP via respondents, database system and web-based system. The development of interface web-based system with the functionalities provided in the mapping system of RBSP such as network analysis and cross section was also discussed. Finally, the analysis about validation of web-based system through distribution of questionnaire which is URA was also presented in this chapter.

Lastly, chapter five (5) discussed about the conclusion and recommendation of this research. This chapter also described about the advantages and disadvantages as well as limitation during development the interactive web-based system of eco-tourism in RBSP.

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