TOURIST DECISION SUPPORT SYSTEM FOR HOT SPRINGS, THAILAND

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Abstract: This research aimed to: 1) gather the needs of Thai and foreign tourists in using the Decision Support System for Hot Springs Tourism in Surat Thani; 2) Design and develop the Decision Support System using the concept of an agile method; and 3) Evaluate the effectiveness of the Decision Support System implementation. The agile method enabled the System to be developed to support both the Android and IOS in Thai and English. The users' requirement was collected by using questionnaires with 30 Thai and 30 foreign tourists. The users' evaluation data was collected by using questionnaires with 400 Thai and 400 foreign tourists. The results found that: 1) Thai and foreign tourists need information in seven aspects. Most tourists use iPhones and need similar information. 2) The design of the Decision Support System consists of searching travel routes, distance calculation, nearby attractions, and evaluation assessment function. 3) Foreign tourists had a slightly higher average score of overall opinions than Thai tourists which is at the highest level in all aspects. The Thai and foreign tourists found no significant difference with the overall opinions in using the Decision Support System (p> .05). In conclusion, the DSS for Hot Springs Tourism in Surat Thani was successfully developed for both Thai and foreign tourists. The findings indicate the system's effectiveness in supporting tourists and its potential to enhance tourism experiences in Surat Thani.

Keywords: decision support system, mobile application, hot spring, tourism, Thailand

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INTRODUCTION

The tourism industry plays an important role in Thailand (Figueredo et al., 2017) for transportation infrastructure system, trade, and investment (Ministry of Tourism and Sports, 2011). Most high-end tourists focus on traveling together with medical purposes. This is consumer behavior that has changed completely, contrary to past behavior trends. During 2019, it can generate up to 2 trillion baht for Thailand (SME social planet, 2023). Community tourist attractions can have unclean places, bad atmosphere, insufficient tourist information, and inconvenient transportation (Harl and Nguanphan, 2014). Thailand is the second destination country for tourism travelers in Asia Pacific (Global Wellness Institute, 2020) and the Tourism Authority of Thailand (2020) focused on developing quality tourism and sustainability (Prachachat Business, 2022). Natural hot spring tourism is one of the most popular activities (Department of Mineral Resources, 2019) using hot, cold water, sea, and mineral water to cure disease or stay healthy (Hongkajorn, 2017). Most people believe that hot springs can reduce stress (Tourism Authority of Thailand, 2012). Seven out of ten hot springs (MGR Online News, 2007) have the potential to be developed into tourism destinations: 1) Chaiya Pak Dan Hot Spring; 2) Chaiya International Hot Spring; 3) Tha Chang Hot Spring; 4) Tham Singkhon Hot Spring; 5) Scout camp (Nasan) Hot Spring; 6) Khao Tok (Khian Sa) Hot Spring; and 7) Tha Sathon Hot Spring. Therefore, it is important to help tourists to find such information, plan their tourism, and help making decisions for travelling to the Hot Springs Tourism in Surat Thani, Thailand.

However, information needs and channels for receiving information of Thai and foreign tourists may differ in terms of tourism experience and technology experience (Tussyadiah and Fesenmaier, 2009; Chang and Hsu, 2010). These may affect information needs, technology functions, and type of media for receiving information (Mak et al., 2012). Tourist information may consist of accommodation, food, interesting points, reviews, ratings, and tourist suggestions (Figueredo et al., 2018). Tourists' requirements and behavior are important for offering the appropriate service to the right user at the

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right time (Kontogianni and Alepis, 2020). Mobile application services meet the needs to access information without limitations of format, time and place (Angkananon et al., 2019; Chormuan et al., 2014; Kumkrua et al., 2020; Sibunruang, 2016). Consumer Behavior Tracking System and reporting the location of consumers for advertising purposes (Chotklang et al., 2015; Chowkoksung and Snae, 2011) utilizes sensors to help tourists explore the city in a limitation of time (Nitti et al., 2017). A DSS can assist analyzing a tourist's perspective, travel plan, accommodation, the best travel routes, and predicting travel expenses etc. (Chen, 2004; Smirnov et al., 2016).

The DSS was developed based on important theories to assist in analyzing a tourist's perspective, travel plan, accommodation, the best travel routes, and predicting travel expenses etc. (Chen, 2004; Smirnov et al., 2016). This paper will investigate the following research gaps: 1) What are tourist information, technology, functionality that Thai and foreign tourists' need in the use of the DSS for Hot Springs Tourism in Surat Thani? ; 2) How to design and develop the DSS for Thai and foreign tourists; and 3) What are Thai and foreign tourists' opinions in evaluating the effectiveness of the DSS implementation? This research therefore provides a contribution to both knowledge and implementation.

LITERATURE REVIEW
1. Software Development
Many models are developed for software and functional design with advantages and disadvantages depending on use: Spiral Model, Structured System Analysis and Design Methodology (SSAM), Rapid Application Development Based Methodology (RAD), and Unified Modeling Language (UML). Systems analysts determine which models are suitable for their own software development. Pereira and Russo (2018) used an integrated model with Agile Methodology in software development. The research found that this model had a beneficial effect on system users, developing teams to strengthen and improve the quality and efficiency of software applications. This research uses the Agile software design model for design as it is suitable for working as a team with continuous communication and flexibility in use, can work fast and learn from mistakes, and continually make corrections. Shneiderman (2005) suggested eight rules for screen design:

1) In menu design, icons, colors, styles, font sizes should be consistent with the same pattern.
2) The design should cover all users and make most satisfied.
3) Design should allow users to interact with computers and have feedback to make the user feel in control when interacting with the system.
4) The design should have a beginning, middle, and end point.
5) The design should be protected from user error.
6) The exit button should be easily reversible to correct the error.
7) The system design should have internal control management to respond to the screen.
8) System design should reduce the length of time to present content for easy memorization.

Nielsen (1994) proposed 10 principles for user interface design called "heuristics". The Ten Usability Heuristics were : 1) visibility of system status; 2) match between system and the real world; 3) user control and freedom; 4) consistency and standards; 5) error prevention; 6) recognition rather than recall; 7) flexibility and efficiency of use; 8) aesthetic and minimalist design; 9) help users recognize, diagnose, and recover from errors; and 10) help and documentation. This research uses both Shneiderman's rules and Nielsen's heuristics in designing the DSS.

Table 1. Decision Support System in Tourism

Authors	System	System's goal	Method used
Lopes and Rodríguez-López (2022)	Decision-Making Tool for Ranking Wellness Tourism Destinations	The PROMETHEE-GAIA method considers various factors travelers care about, helping identify the most appealing options. Facilities are a big deal for travelers, and this analysis takes them into account. Plus, the wealth of data examined helps pinpoint the truly top-notch spas.	PROMETHEE-GAIA
Singthongchai, Manisri, and Anuvareepong (2020)	Decision Support System of Logistics Service Users	A DSS developed in form of web application for Logistics Service Users using the decision tree model with the J48 technique.	J48 technique, efficiency, assessment
Phorncharoen and Phorncharoen (2018)	Decision Support System for Generating Tourism Plan with Flexible Cost of Travelers	A system divided into 3 parts: 1) input: this part assigns tourism conditions e.g., budget, number of attractions, hotels, and destination; 2) process: this part involves functions and data matching with tourist requirements, and 3) output : displays lists of the tourism plan via the website.	System Usability Test
Rakphakdi et al. (2017)	Decision Support Systems for Travel Ubon Ratchathani Tourism	The DSS developed through the coordinated satellite system using the nearest neighbor technique in the grouping of tourist attractions and services e.g., accommodation, restaurants, and souvenir shops nearby via the marker point on the Google map.	Google Map API, Black Box, Testing
Kakoty and Deka (2014)	ICT as decision support for Tourism Industry	DSS functions for tourism industry are track current situation, measure travel motivators, gather competitive intelligence, recognize new opportunities, evaluate marketing activities, monitor industry satisfaction, measure return on investment, and monitor the resources and the impact of tourism activities.	-

2. Decision Support System in Tourism
Decision support systems are interactive computer systems helping users make choices and decisions. They use storage and retrieval with added functionality to receive and access information by using a knowledge-based model that supports reasoning for frame modeling and problem solving (Druzdzel and Flynn, 2002). Table 1 shows related works

studying DSS in tourism. The main difference between a DSS and a Mobile Application depends on use purpose. The DSS focuses on helping the decision-making process while mobile applications are designed to provide different functions on mobile devices. Table 2 shows related works focusing on studying tourism applications.

Table 2. Travel Application

Authors	System	System's goal	Method used
Trakulmaykee et al. (2023)	Mata Lumnam Application	The "Mata Lumnam" application was developed based on the logistical tourism for tourists. The app consisted of three logistical parts: 1) physical flow; 2) financial flow and; 3) information flow.	Google Maps API Efficiency assessment
Phuthong et al. (2023)	Mobile Application for Wellness Tourism Destination	The innovation mobile application was developed using a waterfall method with five clear stages: figuring out what it needed to do, designing it, building it, making sure it worked right, and keeping it running smoothly.	K-means cluster analysis, DEMATEL method
Wongamonwit and Chinavaro (2021)	Tourism Applications in Sikhiu District Nakonratchasima	The tourist application for Sikhio District Nakhon Ratchasima displays the recommended tourist information from the system, including travel category, and navigate to various tourist routes. It will show the travel route. The system can link to a map and navigation system for travel.	Google Maps API, JAVA, IDE Tool
Palos-Sanchez et al. (2021)	Tourism Innovation by using a Uses and Gratification Theory model	Palos-Sanchez et al. (2021) studied travel applications and found that factors affecting Behavioral Intention were Performance Expectancy, Effort Expectancy, Social Influence, App User Experience. Besides, App Quality Influences Use Behavior.	Gratification theory, Tourism Innovation
Angkananon et al. (2019)	Mobile applications of Wat Phra Mahathat Woramahawihan Nakhon Si Thammarat	The mobile applications of Wat Phra Mahathat Woramahawihan Nakhon Si Thammarat consisted of text, pictures and voice which informed tourists of important points, starting point, and rituals point with information of each point. The app is provided both in Thai and English.	TAM Model, Usability design
Sibunruang (2016)	Sukhothai Historical Park Mobile Application	A Sukhothai Historical Park Mobile Application developed on the iOS operating system. The application divides the presentation of 19 data sets into 2 languages: Thai and English. The information in the app consists of 1) historical information and history of various ancient sites; 2) 3D model of important ancient sites; 3) Important cultural information and identity of the Sukhothai Kingdom, and 4) Electronic Map System.	3D model
Chormuan et al. (2014)	Android Application for tourist Case study in Kanchanaburi Province	An android application was developed to help tourists who want to travel in Kanchanaburi. They could check information and videos of tourist attractions through YouTube before making a travel decision. Tourists can plan their trips and reduce both cost and time.	Plug-in of eclipse, Java, Google Maps API
Chowkoksung and Snae (2011)	Web map services for community-based tourism in east coastal areas using Google Maps API	A Web map services for community-based tourism in east coastal areas using Google Maps API to render maps on web pages by working with the website database system. The system can find travel routes and pin to display the coordinates of the desired location.	Google Maps API

3. Software Assessment

DeLone and McLean (2003) proposed a model for measuring the success of popular information systems by analyzing the factors of; 1) information quality, 2) system quality, and 3) service quality. These factors affect user satisfactions and intents when users reuse the system. Usability evaluation is based on the Technology Acceptance Model (TAM) (Davis, 1989), consisting of two factors: 1) Perceived Usefulness e.g., information helps get the job done, speed of work, and ease of work; and 2) Perceived Ease of Use e.g., ease of learning, ease of understanding, and ease of use. Both models were synthesized by the researcher and applied in the assessment questionnaire of this research.

RESEARCH METHODOLOGY
1. Research Design

There was no record of the number of tourists who have visited the hot springs in Surat Thani, Thailand. The 30 Thai participants and 30 foreign participants were chosen for objective 1 for a questionnaire. User requirements were collected by questioning 30 Thai and 30 foreign tourists. The sample was selected by purposive sampling from Thai and foreign tourists who have used a travel application. There are three parts to the questionnaire: 1) personal information, 2) requirements about hot spring tourism, and 3) obstacles in visiting the hot springs in Surat Thani. Three English and three Thai experts with at least five years of experience in software development reviewed the questions.

For objective 2, agile software functionality design principles were used over the processes and tools in various parts of the work. They are users' collaboration in all groups and users' integrations over processes and tools. The navigation design and system design used Thai language sector to support the use by Thai tourists, and the English language design to accommodate foreign tourists. Black-box testing was used to test the DSS with a test case technique (Assawamekin, 2018). Three Thai experts and three foreign experts with at least five years of experience in software development evaluated the system based on the Agile Methodology.

For objective 3, Roscoe (1975) suggested 384 participants would be the appropriate number for user evaluation. This research had 400 Thai and 400 foreign tourists complete the evaluation of the DSS using questions with five-point scales (Likert, 1932). Three English and three Thai experts with at least five years of experience in software development reviewed the questions. The samples were collected using the purposive sampling method by selecting those experienced in using an application for at least one year and the call for participants was made via facebook and

facebook groups of Thai and foreign tourists who are interested in doing Yoga on Koh Phangan. Before answering the questionnaire, all participants read the participants' information sheet and signed a consent form. The experiment then started by explaining the features available in the application and demonstrating how to use it face-to-face. Then, the sample group downloaded the application "Surat Hot Spring" from the Google Play Store for Android users or the App Store for IOS users and tried it for about 5-10 minutes. If there was a problem, the participants could ask the researchers. At the end of the experiment, participants completed a secure and confidential online Google form providing personal details and their opinions on the design and usability of the DSS. The results of this paper can provide a benchmark with which any future research involving technological developments in decision support systems/AI techniques can be compared. The original data was collected before the covid pandemic and while tourist behaviour clearly changed during the pandemic tourist behaviour has now returned back to normal throughout the world in 2024.

2. Data Collection and Data Analysis

Data were collected between April and September 2019. There are three parts of the assessment questionnaire: 1) Personal information includes gender, age, nationality, mobile phone platform, and experience to hot springs; 2) Users' evaluation includes designing of the DSS and usability test of the DSS; and 3) Additional suggestions in an open-ended questionnaire. The Cronbach's reliability (Cronbach, 1951) of the questionnaires for 30 Thai tourists was at 0.973 and 30 foreign tourists was at 0.786, with a confidence value of 0.7 or higher and so could be used to collect the data.

The SPSS program version 26 was used to analyze data. The descriptive analysis used frequency, mean, standard deviation. A t-test was also used to compare the opinions on the DSS of two group of the tourists and One Sample t-test used to compare participants opinions' scores on the DSS.

3. Process in Developing the DSS

The process of developing the DSS begins with studying the concept, theory, and relevant research. Then, collecting users' requirements which include travel information, cost information, and technology information. Next, designing the system to save time and budget, three Thai and three foreign experts were asked to validate and review the DSS in various aspects. Software used was Visual Studio Code, Sublime Text, Xcode, Android Studio, Bitbucket, Command Line Interface, Lonic framework, Angular, SASS, MySQLite, JavaScript and CSS. The process in developing the DSS as can be seen in Figure 1.
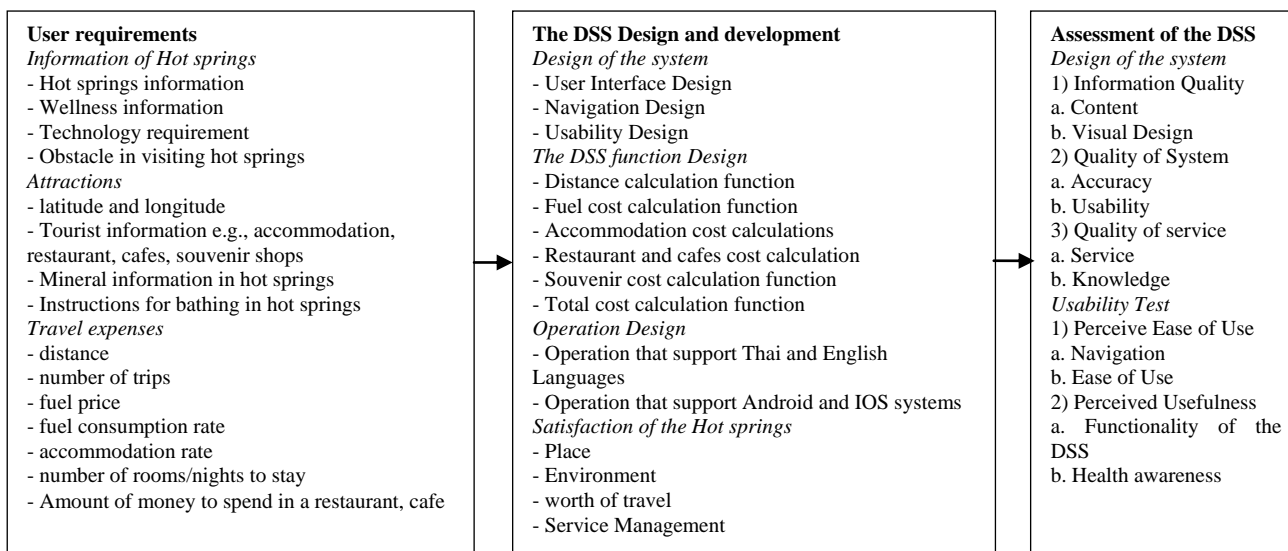
User requirements	The DSS Design and development	Assessment of the DSS
Information of Hot springs - Hot springs information - Wellness information - Technology requirement - Obstacle in visiting hot springs *Attractions* - latitude and longitude - Tourist information e.g., accommodation, restaurant, cafes, souvenir shops - Mineral information in hot springs - Instructions for bathing in hot springs *Travel expenses* - distance - number of trips - fuel price - fuel consumption rate - accommodation rate - number of rooms/nights to stay - Amount of money to spend in a restaurant, cafe	*Design of the system* - User Interface Design - Navigation Design - Usability Design *The DSS function Design* - Distance calculation function - Fuel cost calculation function - Accommodation cost calculations - Restaurant and cafes cost calculation - Souvenir cost calculation function - Total cost calculation function *Operation Design* - Operation that support Thai and English Languages - Operation that support Android and IOS systems *Satisfaction of the Hot springs* - Place - Environment - worth of travel - Service Management	*Design of the system* 1) Information Quality a. Content b. Visual Design 2) Quality of System a. Accuracy b. Usability 3) Quality of service a. Service b. Knowledge *Usability Test* 1) Perceive Ease of Use a. Navigation b. Ease of Use 2) Perceived Usefulness a. Functionality of the DSS b. Health awareness

Figure 1. Process in developing the DSS for Hot Springs Wellness Tourism in Surat Thani

RESULTS
1. Research Question 1

The results of interviews of 30 Thai tourists and 30 foreigners found that most Thai (60%) and foreign tourists (56.66%) are female and both groups used iPhone the most (Thai tourist 50%, foreign tourists 70%). Most Thai tourists (60%) would like to travel for recreation just like foreign tourists (66.67%). Both groups of tourists agree that tourism is a family activity. They also agree that hot spring tourism is therapeutic tourism. From the users' requirements, the researchers analyzed data into categories and took it into account to design and develop the DSS in the next step.

2. Research Question 2

The development of the DSS was based on an agile methodology in designing system, functionality, content, user interfaces, hot springs' satisfaction, and testing software. The DSS consists of 34 entities in database. The tourists could download the DSS namely "Surat Thani Hot spring" onto their mobile phones on Android and IOS platforms. There are twelve menus of the DSS: 1) home, 2) menus, 3) search functions, 4) hot springs information, 5) travel program, 6) type and benefits of hot spring, 7) recommendation and caution, 8) about us, setting, 9) timer setting, 10) hot springs satisfaction assessment, 11) user manual, and 12) project team (Figure 3). The system provides essential tourism

information for Thai and foreign tourists who understand English. Important functions and information are budget calculations, travel time calculations, distance calculations, tourist information, physical data of hot springs, chemical information of hot springs and information on behavior in hot springs. It also includes the hot spring site satisfaction assessment function, tourism program information, timer setting, and user manual. This is to reduce problems in accessing information of such tourists. It also assists tourists in making decision in various aspects to plan their hot springs routes.

There are two main search functions: Basic Search and Advanced Search.

a. Basic Search

Basic search functions (Figure 2) include specify current location, selecting hot spring to visit, fuel price in baht per liter, fuel burned value (MPG), one-way / round-trip, calculating routes, distances, and fuel costs, and link navigation to Google Maps. The basic search fuel price calculation function has the following formula:

• One-way fuel cost = (total distance / MPG) x fuel price
• Round-trip fuel cost = (total distance x 2) / MPG) x fuel price

The initial calculation function (Figure 2) is based on obtaining the user's current location information, destination information, fuel prices, MPG values (Figure 3), and one-way or round-trip. Then the obtained information calculates the distance based on user current location as a starting point. Destination locations are selected and distance is calculated by selecting the fastest route using Google Map API. Once the total distance has been obtained, all available data can be substituted in the formula. Once, the formula calculations are obtained, this result will be displayed (Figure 4) and show the navigation of the trip in Figure 5.
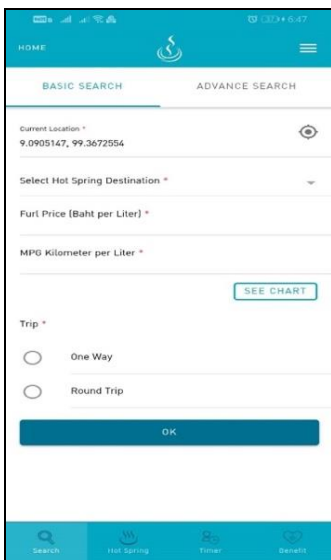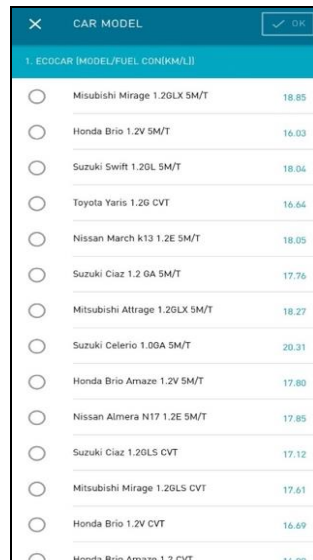

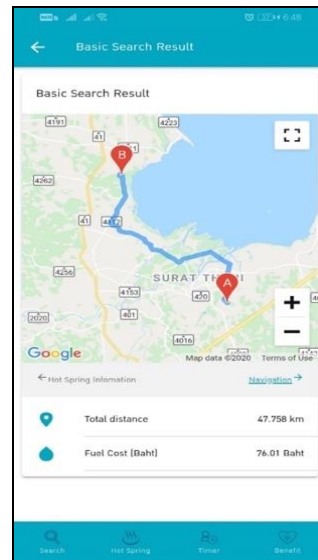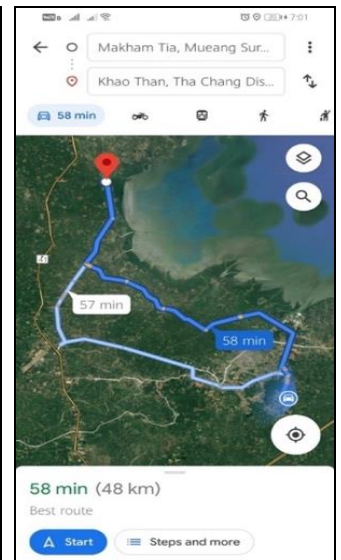| Figure 2. Basic Search | Figure 3. Car Model | Figure 4. Basic Search result | Figure 5. Navigation |

b. Advanced Search

The Advanced search (Figure 6) differs from basic search in select nearby attractions and choose more than one place (Figure 7). Users can select a hotel, specify the room rate, and number of nights to stay (Figure 8).
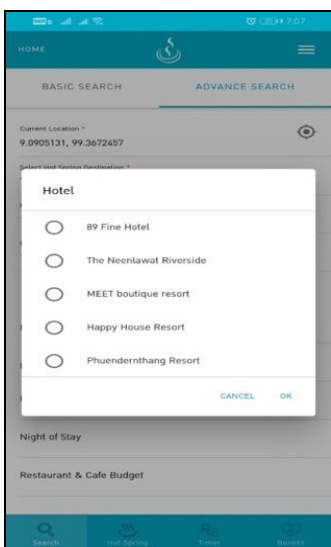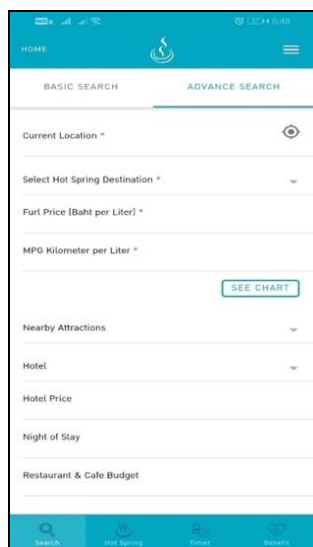

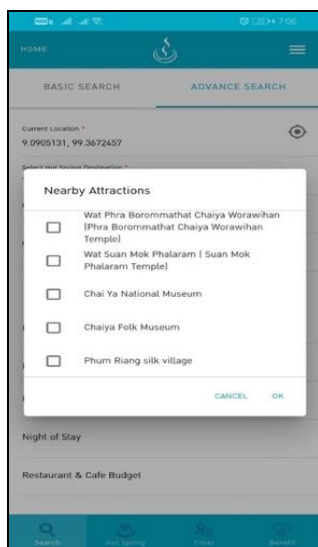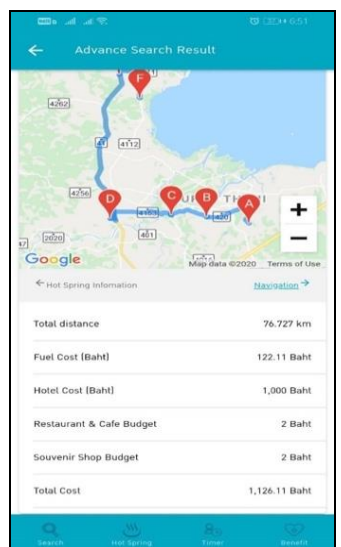| Figure 6. Advanced Search | Figure 7. Nearby Attraction | Figure 8. Hotel selection | Figure 9. Advance Search |

They can choose a restaurant and café and specify the budget to spend in restaurants and cafes. They can also choose a souvenir shop and specify the budget to spend there. Total budget calculation functions in advanced search have these formulas:

• One-way total cost = (total distance / MPG) x fuel cost + (accommodation cost x number of nights) + restaurant and cafe budget + souvenir shop budget

• Total round-trip expenses = (total distance x 2) / MPG) x fuel price + (accommodation x number of nights) + restaurant and cafe budget + souvenir shop budget

Total budget calculation functions in advanced search start by getting the user's current location, destination, fuel price, MPG cost, accommodation cost, number of nights, restaurant and cafe budget, souvenir budget, and the travel style is one-way or round-trip. Then the information is used to calculate distance from the user's current location and the user's destination location using the fastest route from the Google Map API. The result of the calculation formula is displayed on the DSS screen (Figure 9).

c. Hot Springs Information

"Choose a Hot Spring" Menu shows the seven hot springs in Surat Thani with relevant information. The sub menu "General information" explains the history and detailed information of each hot springs, its location and its facilities. The sub-menu "Bathing Pool Information" shows information of each pond for soaking or bathing, photos of hot springs, physical, and health information (water temperature in the pond, PH value, radon gas concentration, health effects and BG Values). In each hot spring, there is a main source of hot spring which produces main hot water called "Main Source" and the Menu shows the temperature of the water, PH value, Conductivity, Turbidity, Total amount of dissolved substances, total hardness, bicarbonate, chloride, fluoride, nitrates, sulfates, silica, sodium, potassium, calcium, magnesium, iron, copper, zinc, manganese, the background radiation dose or the amount of radiation in the air around the study area, and radon gas concentration and health effects.

d. Travel Program

There are four tourist routes: Route 1: "See the garden, eat, enjoy the hot springs at Sriwichai City"; Route 2: "See the garden, eat, enjoy the hot spring in the mountain town"; Route 3: "See the garden, eat, enjoy the hot springs at the city of river" and; Route 4: "See the garden, eat, enjoy the hot springs at the mining town". Other important menus are 1) Types and benefits of Hot Springs, 2) Instructions and Precautions, 3) About Us, 4) System Settings, 5) Timer Setting, 6) Hot Spring Satisfaction Assessment Function, 7) User Manual Menu, and 8) Project team information. The test results of all 15 functions of the DSS using the black box testing method by a group of 30 Thai people (100%) and 30 foreigners (100%) found that the DSS can work properly in all functions.

3. Research Question 3

Evaluation of the effectiveness of the decision support system is divided into two main measures: efficiency of the DSS and benefits and ease of use of the DSS. The evaluation of the DSS asked 400 Thai tourists and 400 foreign tourists to answer the questions. The sample of 400 Thai tourists was 59.75% female and 40.25% male (Figure 14), whereas the sample of 400 foreign tourists were 67.25% male and 60% females (Figure 15). Most Thai tourists were aged between 20 - 30 years (80.0%), followed by aged 31- 40 years (12.5%), with 0.75% over 60 years. Most foreign tourists are aged between 31-40 years (56.75%), followed by aged 20-30 years (23.75%), with 0.75% over 60 years. Most Thai tourists used Android smartphones (61.75%) and used iOS smartphones at (38.25%) (Figure 17). Most foreign tourists used iOS smartphones at 74.00% and used Android smartphones at 26.00% (Figure 18).

4. Comparison between Thai and foreign tourists

Figure 10 foreign tourists had a slightly higher average score of overall opinions than Thai tourists which is at the highest level in all aspects. The Thai and foreign tourists found no significant difference with the overall opinions in using the DSS (p>.05). The assessment results on Information Quality is the highest score among the other three aspects. It is interesting that foreign tourists rated score (x = 4.83) much higher score than Thai tourist score ($\overline{x}$ = 4.31) in the aspect of Information quality.
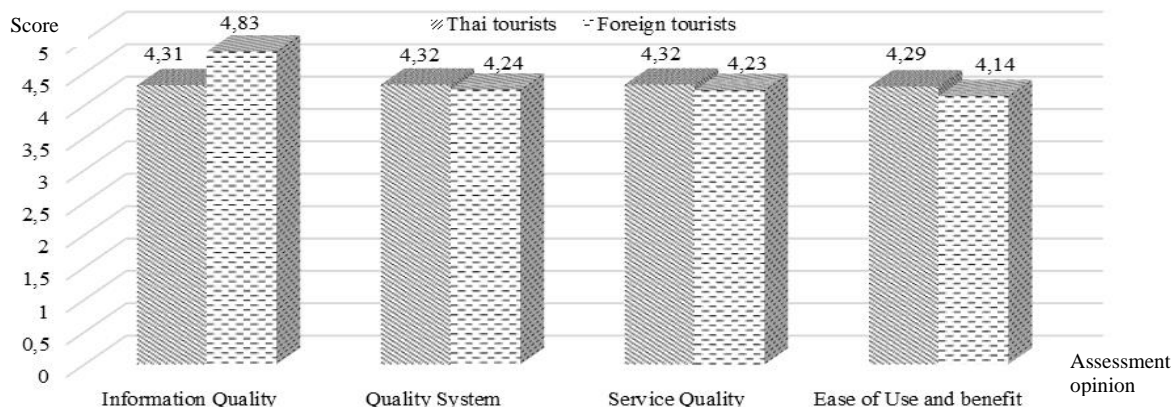

Figure 10. Overall Assessment Opinions on the DSS

The comparison in using the DSS found satisfaction scores for all items of Thai tourists using One-Sample Test (2-tails) for foreigners were significantly higher than 4 points at the .001 level. The results calculated using independent sample t-test found for most items that Thai and foreign tourists had no different satisfaction (p < .001) with statistical significance at the .001 level. The efficiency and benefits and ease of use results of the DSS are as follows.

1. E.fficiency of the DSS
1.1. Information Quality

From Table 3, the results found that foreign tourists ($\overline{x}$ = 4.62) had a slightly higher mean overall content evaluation score than Thai tourists ($\overline{x}$ = 4.29), at the highest level. Thai and foreign tourists had the highest level of content satisfaction in all items. The comparison of content evaluation in using the DSS using t-test found that the content evaluation between Thai and foreign tourists was statistically significant at the .001 level.

Table 3. Content

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	The content presented is easy to understand and up to date.	4.32	.617	4.54	.436
2	The illustrations are clear and related to the content presented.	4.30	.681	4.61	.436
3	The videos are clear in both of picture and sound and related to the content presented.	4.26	.743	4.70	.472
	Total	**4.29**	**.60**	**4.62**	**.347**

1.2. Quality of System

From Table 4, the results found that foreign tourists ($\overline{x}$ = 4.60) had a slightly higher mean overall visual design evaluation score than Thai tourists ($\overline{x}$ = 4.37), at the highest level. Thai and foreign tourists had the highest level of visual design satisfaction in all items. Table 5 shows the results found that Thai tourists ($\overline{x}$ = 4.30) had a slightly higher mean overall quality system evaluation score than foreign tourists ($\overline{x}$ = 4.15). Table 6 shows the results found that Thai tourists ($\overline{x}$ = 4.29) had a slightly higher mean overall usability test evaluation score than foreign tourists ($\overline{x}$ = 4.26), at the highest level.

Table 4. Visual Design

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	The size, type and color of the text are easy to read on mobile phones.	4.31	.678	4.48	.482
2	The application can display information in a variety of appropriate formats.	4.40	.680	4.67	.438
3	The technology used in application development is suitable.	4.39	.668	4.67	.463
	Total	**4.37**	**.586**	**4.60**	**.398**

Table 5. Accuracy of the DSS

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	The DSS can navigate to various locations accurately and precisely.	4.29	.667	4.09	.303
2	The DSS can display various information accurately and reduce searching time.	4.32	.656	4.14	.410
3	The DSS can work according to various functions accurately and precisely.	4.31	.656	4.24	.484
	Total	**4.30**	**.596**	**4.15**	**.300**

Table 6. Usability of the DSS

No	Topics	Thai		Foreign	
		Average	S.D.	Average	S.D.
1	Using the DSS is easy and fast.	4.30	.539	4.26	.494
2	There are enough buttons and menus for navigation.	4.33	.525	4.28	.561
3	The results from the DSS are accurate and complete as required.	4.24	.545	4.25	.539
	Total	**4.29**	**.536**	**4.26**	**.531**

1.3. Quality of service

Table 7 shows the results found that Thai tourists ($\overline{x}$ = 4.26) had a slightly higher mean overall quality of service evaluation score than foreign tourists ($\overline{x}$ = 4.21), at the highest level. In addition, Thai and foreign tourists had a statistically significant difference in their opinions with the quality of service at the .001 level.

Table 7. Quality of service

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	Accessing information in the DSS is accurate and fast.	4.18	.691	4.03	.380
2	The use of the DSS can be accessed at any time.	4.27	.704	4.22	.397
3	Accessing the DSS is error-free.	4.31	.691	4.37	.467
	Total	**4.24**	**4.26**	**.612**	**4.21**

Table 8 shows the results found that foreign tourists ($\bar{x}$ = 4.53) had a higher mean overall knowledge evaluation score than Thai tourists ($\bar{x}$ = 4.24), at the highest level. In addition, Thai and foreign tourists had a statistically significant difference in their opinions with the quality of service at the .001 level.

Table 8. Knowledge for soaking in hot springs

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	The DSS contains a variety of useful measurement data to make it reliable.	4.25	.494	4.68	.489
2	The DSS provides clear bathing practice information, which makes you feel safe and confident in hot bathing.	4.26	.473	4.68	.533
3	The DSS has health information about the treatment of diseases that make you want to revisit.	4.22	.433	4.23	.486
	Total	**4.24**	**.467**	**4.53**	**.503**

2. Ease of Use and Benefit of the DSS
2.1. Perceive Ease of Use

Table 9 shows the results found that foreign tourists ($\bar{x}$ = 4.36) had a slightly higher mean overall knowledge evaluation score than Thai tourists ($\bar{x}$ = 4.35), at the highest level. Table 10 shows the results found that foreign tourists ($\bar{x}$ = 4.32) had a higher mean overall ease of use of the DSS evaluation score than Thai tourists ($\bar{x}$ = 4.22).

Table 9. Navigation

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.I
1	Users know what page they are in the application.	4.33	.652	4.43	.431
2	Users can exit the DSS whenever they want.	4.38	.663	4.27	.443
3	Buttons and menus are designed to be easy for users to understand and operate.	4.35	.673	4.48	.464
	Total	**Total**	**4.35**	**.580**	**4.36**

Table 10. Ease of Use

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	The DSS has no problem with linking.	4.30	.652	4.20	.370
2	The DSS has no problems with various errors	4.32	.672	4.36	.440
3	The DSS has no problem with program code.	4.35	.649	4.48	.465
	Total	**Total**	**4.32**	**.585**	**4.22**

2.2. Perceived Benefits

Table 11 shows the results found that Thai tourists ($\bar{x}$ = 4.32) had a higher mean overall perceived usefulness evaluation score than foreign tourists ($\bar{x}$ = 4.22), at the highest level. In addition, Thai and foreign tourists had a statistically significant difference in their opinions with the quality of service at the .05 level. Table 12 shows the results found that Thai tourists ($\bar{x}$ = 4.34) had a higher mean overall perceived usefulness evaluation score than foreign tourists ($\bar{x}$ = 4.28), at the highest level.

Table 11. Functionality of the DSS

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	The functionality of the DSS helps to raise interest in the awareness of various hot springs.	4.30	.644	4.13	.343
2	The functionality of the DSS helps in persuading the user to travel to different hot springs.	4.31	.665	4.22	.420
3	Diversified information (e.g., content information, video information) in the application increases the attraction of visiting the hot springs.	4.34	.664	4.32	.483
	Total	**4.32**	**.585**	**4.22**	**.327**

Table 12. Functionality of the DSS

No	Topics	Thai		Foreigner	
		Average	S.D.	Average	S.D.
1	Health information on hot spring baths is appropriate.	4.31	.654	4.19	.337
2	Health information on hot spring baths is sufficient.	4.36	.629	4.26	.441
3	You gain more knowledge about health information on hot spring baths after using the DSS.	4.34	.669	4.38	.444
	Total	**4.34**	**.568**	**4.28**	**.323**

Some of the opinions from the open-ended questions of Thai tourists towards the DSS are:
Participant 5: "The color scheme of the application is very attractive to use as it is the same color scheme."
Participant 17: "More graphics should be added to make the DSS look more attractive."

Participant 29: "There should be more pictures and service of the hot springs."
The opinions of foreign tourists towards the DSS are as follows:
Participant 13: "It is a good application suitable for use because it can be easily portable."
Participant 25: "It should also add English subtitles to the video."
Participant 2:   "It should add more tourist attractions in the future."

DISCUSSION
1. Research Question 1
Both Thai and foreigner tourists require information about distance, history/ highlight of hot springs, nearby attractions information, budget to spent, restaurant information, hotel, accommodation information, café information and fuel station information. This supports findings of Rakphakdi et al. (2017) and Phorncharoen and Phorncharoen (2018). The DSS adds more information which is specific and necessary for hot spring tourism than other studies that only bring general information about tourism. Most Thai tourists (56.67%) suggested multimedia narration technology with audio options and read narration on demand, whereas most foreign tourists (53.33%) require text-only narration technology and 46.47% because travelling in outdoor areas might cause noise. Therefore, text narration technology might be more appropriate than audio option. Thai tourists' requirements on travel technology are similar to Angkananon et al. (2019). Problems encountered by Thai tourists and foreigners are similar: no information about the differences of minerals in each pond, unknown appropriate time to soak in each hot spring's pond, and unknown the temperature of the hot water. This is consistent with Pereira and Russo (2018).

2. Research Question 2
Results showed that designing the DSS for Hot Springs using an agile approach improved processes and tools to run faster and more efficiently consistent with Pereira and Russo (2018), which used a thought model to integrate with the Agile Concept in software development. This research is also applying the theory of eight rules of thumb for screen design (Shneiderman, 2005) and Ten Usability Heuristics (Nielsen, 1994). There are main important functions of the DSS : distance calculation function; fuel calculation function; accommodation cost calculation function; restaurants and cafes cost calculation; souvenir shopping cost calculation; total cost calculation; and hot spring potential evaluation functions. This is consistent with the research of Rakphakdi et al. (2017); Trakulmaykee et al. (2023); Wongamonwit and Chinavaro (2021); Chormuan et al. (2014); and Chowkoksung and Snae (2011). Finding the appropriate MPG value for a car model is new research. The researchers also had developed an additional new function to assess the satisfaction of the hot springs visited which appears on the information page of each hot spring.

3. Research Question 3
Users' evaluating the efficiency of the DSS using the two principles (Delone and McLean, 2003; Davis, 1989) can reflect the assessment of design and usability in each aspect well. This can be seen from the overall assessment opinions on the DSS that found that foreign tourists had a slightly higher average score of overall opinions than Thai tourists which is at the highest level in all aspects. The Thai and foreign tourists found no significant difference with the overall opinions in using the DSS ($p > .05$). This was in line with Trakulmaykee et al. (2023) who used similar user evaluation measurements in users' evaluation of the Technology. The results of the satisfaction assessment of the tourists in terms of design and usability were at the highest level. The good application will help increase the number of tourists and affect the income of local communities to increase. In addition, the measure of users' evaluation is consistent with Angkananon et al. (2019), who assessed user satisfaction in the following areas: 1) accessibility of technology for people; 2) user interface design; 3) application navigation; and 4) usability.

In addition, the results on the interest in visiting the Hot springs in Surat Thani after using the DSS found that 95.25% of Thai tourists and 96.75% foreign tourists want to visit the hot springs in Surat Thani. It is because they feel confident after knowing information about the hot springs, budget calculations, hot springs routes, and pictures and videos of attractions. Tourists think that the hot springs in Surat Thani are interesting and beautiful places that can help them to relax. It is a high possibility that the DSS could increase the number of tourists and income for the community nearby in the future. It is associated with Kim et al. (2021) who stated that when customers are satisfied with the technology to receive information quality and service quality, it will affect their behavioral loyalties and attitudinal loyalties.

CONCLUSION
The DSS for Tourism at Hot Springs in Surat Thani was developed for Thai and foreign tourists who know English to travel to the seven Hot Springs in Surat Thani. The DSS was designed and developed based on both Thai and tourists' requirements. The DSS was available on the Android and IOS platform in both Thai and English languages. It could calculate the estimation of distance, fuel cost, MPG value, accommodation cost, restaurants and cafes cost, souvenir shopping cost, and total cost. The calculation of MPG value for a car model is a new contribution that can found in this research. There also is an evaluation function of the potential of the hot springs. The DSS was tested by the software development experts throughout the development period using the agile method. The DSS worked correctly and properly in all functions. Both Thai and foreign tourists have a positive view on the use of the DSS. It confirms that the design and development of the DSS meets the requirements of the users. The DSS provides convenience to travelers by offering features all in one place. In addition, the DSS provides personalized travel recommendations of hot springs' routes and

itineraries based on user preferences. It also plays a vital role in making travel planning easier to enhance travel experience and promote the success of the community tourism business.

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