DEVELOPMENT OF WEB-BASED TOURISM DECISION SUPPORT SYSTEM IN TALAUD ISLAND REGENCY

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ABSTRACT

Some factors that cause tourism growth in Talaud island regency is not optimal were the promotion pattern still use traditional method and there is no decision support system to determine tourism destination. However, there is a need to design a web-based tourism decision support system in Talaud island regency using analytic hierarchy process method (AHP). System was designed by adapted four step of system development life cycle (SDLC) model waterfall. The system using survey data from 11 experts and tourism document data was modeled by unified modeling language (UML). The result shows that five criterias and 29 sub criterias which determine 14 tourism destinations in Talaud island regency, design system contains function that showing tourism information and decision supporting function, and data processing function for the operator and expert. Decision supporting function with its support function were successfully used to be implemented on its programming language of hypertext preprocessor (PHP) and structured query language (SQL). The system can be used to wed-based decision support system in Talaud island regency to provide supporting decisions, promoting tourism product, delivery information, facilitate communication between tourist, and tourist with tourism administrator.

Key Words: AHP, Destination, SDLC, UML

INTRODUCTION

Talaud Islands tourism growth is not optimal. It can be seen from the number of tourists is still relatively low. In 2011 there were only 65 foreign tourists and 935 tourists (BPS 2012). One of the factors that led to the growth of tourism Talaud Islands are not optimal promotion model that still adopt the traditional model, namely the exchange of information by word of mouth that resulted largely unknown attraction tourism actors. To help optimize the growth of tourism, the strategy required the introduction of more efficient products. A strategy which is considered as an efficient strategy is to provide a web-based tourism Decision Support System (DSS).

DSS web-based tourism can help to optimize the growth of tourism because it involves information technology (IT) and decision-making. IT can provide accurate information (Mavri and Angelis 2009), speeding up the exchange of information, reduce uncertainty, improve service quality and contribute more to tourists and drive the changes in the tourism industry (Buhalis and Law 2008). As well as IT, it also influence the decision making of the tourism industry. Inappropriate decisions can lead to dissatisfaction or discomfort tourists to visit tourist destinations. Moreover, tourism is an industry that involves the most information, interact directly with the user and customer satisfaction (Dargah and Golrokharsi 2012). Decision-making becomes important and unavoidable (Ying and Peters, 2011), especially by tourists at the time of determining the travel destination (Baggio and Caporarello 2005).

Tourism promotion as well as decision support models determine travel destinations using AHP. DSS web-based tourism has not been found in the Talaud Islands. Thus, the research question needs to be answered is how to design DSS Talaud Islands tourism web based method for modeling decision support AHP determines a tourist destination in order to help optimize the growth of tourism. The research aims to design a tourism DSS district. Kepl. Talaud
web-based using AHP. According to Saaty (2008), AHP is an effective approach and is widely used in decision making. Through AHP, complex problems can be simplified and accelerated decision-making process (Marimin and Maghfiroh 2010).

Research on the DSS in the field of tourism is already done to some researchers, including Petropoulos et al. (2003), Baggio and Caporarello (2005), and Asafe et al. (2013). Petropoulos et al. (2003) presents the design and implementation of the DSS for forecasting and analysis of tourism demand. Baggio and Caporarello (2005) describe the design of the development and use of DSS in the tourism industry. Asafe et al. (2013), proposed the use of artificial intelligence techniques to develop a web-based decision support system to help manage tourist destinations.

The use of AHP based on several studies, including Oddershede et al. (2007) in prioritizing activities that support the development of rural areas in Chile. Results showed that the tourism activity is far more important than other activities. Qiao et al. (2009) in the estimation of the potential for tourism development in the region Xinxian red zone, using AHP to determine the weight criteria for the classification of tourist development potential of the red zone. Results showed that class differences are very noticeable in both classes. El-Gayar and Fritz (2010) in developing a web-based CMS using AHP for decision support and planning system security. Abed et al. (2011) in evaluating seventeen coastal tourist locations by thirty criteria. Results of the evaluation showed three coastal tourist sites are a top priority.

METHODOLOGY

Field research was conducted in the Talaud Islands in North Sulawesi province for two months, in May and June 2014. The materials used are primary data and secondary data. The primary data of 11 expert opinion regarding the level of importance criteria 5 elements, 29 elements and 14 sub-criteria alternative elements at each level of hierarchy determines Talaud islands districts tourist destinations, while secondary data in the form of tourism documentation.

The tools used are: (1) Questionnaire; to take the primary data in the form of expert opinion, (2) application Expert Choice 2000; to test the expert opinion if it is consistent or not, (3) Microsoft Office Excel application; for the processing of survey data, (4) application StarUML; to describe the analysis and design of systems using UML diagrams, (5) the application Microsoft Office Visio; to design the system architecture and interface design, (7) the application Notpadd ++; to implements system design into a programming language PHP and SQL, (8) Xampp application and Google Chrome; to display the results of the implementation.

Research Stage

Adapting the research stage stage 4 stage waterfall SDLC models. Research activities at the planning stage is a search and learning relevant literature, preparation of schedule of research, and the preparation of hierarchical structure involving 11 experts. Activities at the stage of the analysis is the analysis of data requirements, user needs analysis and the analysis of the functional requirements of the system. Design data management, system architecture, the model of decision-making, and the user interface is an activity undertaken at the design stage that the results are implemented in the programming language PHP and SQL in the implementation phase.

Analysis of data requirements aimed at getting primary data and secondary data. Primary data taken through survey techniques and analyzed by the method of AHP. Primary data is used to generate models of decision determining travel destination in Talaud islands districts. Secondary data was taken through non behavioral observation techniques and intended results of the implementation system completes the look. Phase analysis of data needs, the needs of users and system functional requirements as shown in Figure 1.

RESULTS AND DISCUSSION

Determining the hierarchy structure of Talaud Islands Travel Destinations

Hierarchical structure determines Talaud Islands tourist destinations as shown in Figure 2. Elements of criteria which has the highest rate of interest is the appeal. Furthermore, tourism activities, facilities, accessibility, infrastructure. The level of interest sorted by eigenvalues. Eigenvalues greatest element signifies a higher level of importance than other elements. At element attractiveness criteria, sub-criteria elements that have the highest rate of interest is the unique natural resources. The next regional security, the amount of travel activity, the diversity of
natural resources, flora and fauna, cleanliness locations, and natural beauty. The level of interest of the elements of criteria, sub-criteria and alternatives, can be seen in Figure 2. For alternative elements are indicated by the letters that follow the numbers 1-7. Closest letters with numbers indicates the alternative element that represents more important than the other alternative elements.

**System Design**

DSS tourism Talaud Islands consists of 11 web-based data processing functions, one function and one function determines validation tourist destinations. Functions that generate decision support models determine travel destinations, one of which is a specialization of data processing functions to manage value, the input value that interact with experts and officials. The other function is to determine the travel destination that interact with the user. The functions in the system as well as the interaction between systems with actors (officers, experts, user) is shown through the use case diagram as shown in Figure 3. All functions on the use case that interact with an expert is always calling the function generalization login status check function when there is interaction.

Officers are divided into three categories, namely super admin, admin, and user admin. Super admin has privileges to perform all data management processes, while officers admin category and
Category admin user has limited privileges. Admin access rights officer category only includes data processing models, the data value, respondent data, user data. Likewise, user categories attendant privileges, admin only includes news data processing, image data, video data, the data information and data comment. Category admin access rights officers and admin user category is also limited in terms of the process of change and delete data. The process of change and delete data can only be performed on data inputted by the officers themselves. Process does not apply to data inputted another officer. Officers admin user categories are those that manage tourism. Specialists are those who are considered to have extensive knowledge of the tourism Talaud Islands Regency and was given permission to carry out the assessment of significance criteria, sub-criteria, and determine alternative tourist destinations. In this study, the term user is intended for tourists. Users not

<table>
<thead>
<tr>
<th>Sub-Criteria</th>
<th>Alternatives</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural tours</td>
<td>1</td>
<td>N. M, E, B, L, K, I, G, F, D, J, H, A, C</td>
</tr>
<tr>
<td>Adventure tours</td>
<td>1</td>
<td>N. M, B, E, I, H, J, L, K, G, F, A, C, D</td>
</tr>
<tr>
<td>Rambie tours</td>
<td>1</td>
<td>M, N, H, K, B, E, J, G, I, F, L, A, D, C</td>
</tr>
<tr>
<td>Works tours</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Pilgrimage tours</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>挑</td>
<td>5</td>
<td>M, N, E, B, K, H, I, J, L, G, D, A, C</td>
</tr>
<tr>
<td>挑</td>
<td>7</td>
<td>N, I, E, K, G, B, K, C, J, L, D, C, A</td>
</tr>
</tbody>
</table>

Keterangan:
A = Ampapuu and Gaduran Waterfall
B = Apan village
C = Awawangan Waterfall
D = Biak Mountain
E = Armit village
F = The islands of nusa dolong and nusa topor
G = The islands of Seria Besar and Seria Kecil
H = Angara beach
I = Intara island
J = Tawudul Bintan Beach
K = Tontomitu Cave
L = Statue of Lurenggam
M = Beso village
N = Musi village

Figures 2 Hierarchical structure relations objectives, criteria, sub-criteria, and determine alternative tourist destinations Talaud Islands
only interact with the function of determining tourist destinations, but also interact degan message input function, input comments, as well as the login and logout which is the specialization of function validation.

DSS tourism web based Talaud Islands consist also of several classes as shown in Figure 4. Classes shown is taken from the definition of data and function wraps the data collected or stored on databases into a single unit. Class generation decision support models determine travel destinations are models, criteria, sub-criteria, alternatives, values, respondents, news, information, pictures, and video. Class names and class names of the attributes mentioned as well as the class name and attributes of the user class, comments, messages, officers who support the generation of the model is also used to name the tables and attributes in the database.

Many to many relationship between the model class class class respondents generate value. Class value function wraps the data values entered experts through the system interface. Attributes result relation that should exist in the class attribute value is the number of respondents, the results of the weighting, and eigenvalues. In addition to the attributes of the resulting relation, other attributes that need to be there is a model id, id criteria, sub-criteria id, and id alternatives. These attributes are presented in order to process data processing with AHP method can work well.

System activity when entering data values in the database as shown in Figure 5. Activities run by the settlement matrix manipulation has a series of processes: (1) calculate the length of rows of data, (2) create a matrix A and matrix At, (3) fill in random index value (IR), (4) summing each row of the

Figure 3 Diagram use case DSS Talaud Islands tourism
matrix, (5) to calculate the total amount of each row of the matrix, and (6) comparing the eigenvalues. The

Figure 4 Class diagram of DSS tourism Talaud island regency
process of calculating the length of rows of data aims to establish order matrix so that the matrix A and matrix At can be made. Processes applied to the data in the table models, criteria, sub-criteria, and alternatives. The process that determines the sustainability of the system on the activity of calculating the value of consistency ratio (CR) is comparing the eigenvalues. If the eigenvalues are equal to 4 decimal places, the activity of calculating the value of CR is executed.

The series of processes that run on this activity is calculating the weighted sum of vectors, calculating the average weighted sum of vectors, calculating the average consistency vectors, and calculates consistency ratio. If a series of processes to produce value CR <10%, system activity continued at a data inspection dibasis value data. Examination done so that the system can determine the next activity. If the results of the examination stated the data value is equal to 0 (not found the data values in the database), the system runs the activity of storing data values in the database, followed by the activity displays a successful message. If the opposite applies, the system runs the activity of combining the data values using geometric equations.

Determining system activity tourist destinations as shown in Figure 6. Activity begins by displaying the menu determining tourist destinations, followed by checking the user preference data. User preference data in the form of identifier (ID) of the data in the table models, criteria and sub-criteria. If the user preference data is available, the system runs the query count the number of rows of data in the model table, a table of criteria, sub-criteria tables and table alternatives. Results of query function to sort data based on user preferences to obtain a tourist destination recommendation and supporting information according to preference.

CONCLUSIONS AND SUGGESTIONS

Conclusions
Decision support models determine travel destinations Talaud Islands successfully raised through the input function and the function of determining the value of a tourist destination. The generation of the model requires 10 classes of data defining outcomes, ie models, criteria, sub-criteria, alternatives, values, respondents, news, information, pictures, and video. Models generated by AHP using 5 criteria elements, 29 elements of sub-criteria, and
14 alternative elements. The model successfully implemented in the programming language PHP and SQL.

DSS Talaud Islands tourism successfully designed a web-based, involving 14 tables whose names and attributes such as name and class attributes in Figure 4. Also successfully designed with 2 generating function of decision support models and some other functions, namely input clerk, view clerk, input models, view models, input news, information input, image input, video input, the input of respondents, the input value, the input message, input comments, and user input. Results can be accessed through the implementation of the uniform resource locator (URL) http://taluay.com. Finally it can be concluded also, that the system can be used to encourage tourism growth Talaud Islands.

Suggestions

The functions that run the process edit, delete and view some of the processes in the Talaud Islands tourism DSS web based has not been implemented. It is expected to further research in order to complement, add or develop existing functions, as well as complete, add or develop the elements of criteria, sub-criteria and alternatives used in decision support models determine travel destination. Decision support models generated in this study is reserved determine Talaud Islands tourist destinations. For that reason, further research is expected to generate other decision support models, such as determining the attractions at tourist destinations suggested system, determine tourists attractions by age, or determine the appropriate amount of charge tourist destinations owned by tourists.

Because DSS Talaud Islands tourism can be used to encourage the growth of tourism, it is recommended its use to the manager of tourism and Talaud Islands to the tourism operators elsewhere who want to encourage the growth of tourism.

REFERENCES


