ONLINE THEME LANDSCAPING DECISION SUPPORT SYSTEM

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ABSTRACT

The landscape theme has become an important feature for home exterior design. However, selecting a landscape theme based on client preference is difficult due to multiple criteria and budget constraint during the selection process. This paper proposed online decision support systems for selecting landscape theme design that can be use by exterior designer consultant in assisting home owner to make decision within their own budget range. This prototype is constructed using a decision tree as an analysis tool. This online application was developed using PHP as programming language and mySQL as the database platform. This system may not provide the best theme but it will assist the home owner in deciding which one of the design concepts is most suitable according to their needs and preferences.

KEYWORDS*: decision support systems, decision making, web-based system, landscape design.*

1.0 INTRODUCTION

The landscape theme has becoming an important feature for home exterior design. Landscape is defined as the modification of any visible features on a space of land (Rauscher, 1999). Selecting a theme for a landscape is essentially a process of adding a personalized touch on the basic plant or flower landscape. There are many types of theme for designing a landscape which include English style, Bali style, Tropical style, Japanese gardens, Bali gardens, European gardens and so on. However, selecting a landscape theme based on home owner preference is difficult due to multiple criteria and budget constraint during the decision making process.

Online Theme Landscaping Decision Support System is a system that assists an exterior designer or end users to select the best theme that they need but in a certain budget range. This system developed using decision support system model.

2.0 RELATED WORKS

There are various definitions that have been suggested (Alter, 1980), (Bonczek *et.al*, 1981), (Keen & Morton, 1978), (Sprague & Carlson, 1980) a DSS can be described as a computer-based interactive human–computer decision-making system that:

i. supports decision makers rather than replaces them;
ii. utilizes data and models;
iii. solves problems with varying degrees of structure: (a) non-structured (unstructured or ill-structured) (Bonczek *et.al*, 1981); (b) semi-structured (Keen & Morton, 1978); (c) semi-structured and unstructured (Sprague & Carlson, 1980);
iv. focuses on effectiveness rather than efficiency in decision processes (facilitating decision processes).

Rauscher (1999), presented an excellent overview of the state of decision support for ecosystem management. The three systems are relatively mature in their development, relatively advanced in integrated decision support features, and representative of the state of the art in the U.S. The first two systems, the Landscape Management System (McCarter *et.al*, 1998) and NED1 (Nute *et.al*, 2003), (Nute *et.al*, 2000), (Twery *et.al*, 2000), (Twery *et.al*, 2003), primarily provide decision support at the project level; that is, at the level management areas encompassing 10 s to 100 s of stands. LMS and NED are similar in that both use vegetation simulation components to project future landscape conditions. The third system, the Ecosystem Management Decision Support System (Reynolds, 2003), is a decision support framework for environmental evaluation and planning at any spatial scale.

Decision support systems (DSS) are computer technology solutions that can be used to support complex decision making and problem solving (Shim *et.al*, 2002).

Control / Decision	Operational Control	Managerial Control	Strategic Planning	Technology Support Needed
Structured	e.g. accounts receivable, order entry	e.g. short-term forecasting	e.g. financial management	MIS, mathematical models, transaction processing
Semi-structured	e.g. production scheduling	e.g. credit evaluation	e.g. mergers and acquisitions	DSS
Unstructured	e.g. approving loans	e.g. recruiting an executive	e.g. new technology development	DSS, ES, Neural Networks
Technology Support Needed	MIS, Management Science	Management Science, DSS, ES, EIS	EIS, ES, neural networks	

Figure 1 Gorry and Scott Morton's framework for Decision Support (Gorry & Morton 1971)

Online Theme Landscaping Decision Support System is a structured decision since the procedures for obtaining the best solution are known. In addition this system also designed as web-based to deliver the decision support information to their respective online user.

3.0 DESIGN AND IMPLEMENTATION

A DSS consists of two major sub-systems; human decision makers and computer systems. Online Theme Landscaping Decision Support System consists of two entities and its functionalities presented in context diagram shows in Figure 2.

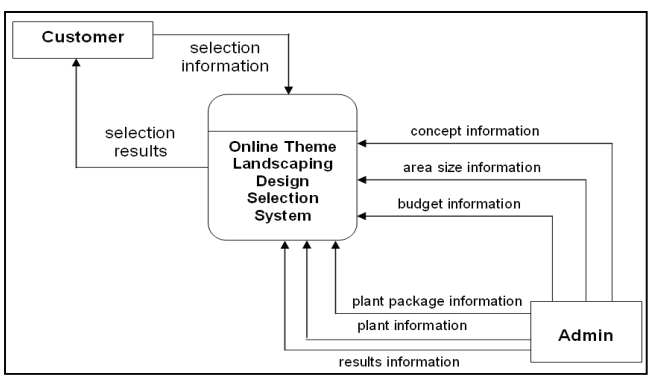

Figure 2 Online Theme Landscaping Decision Support System context diagram

This prototype developed using PHP as programming language and SQL as database platform. The architecture design of Online Theme

Landscaping Decision Support System consists of database, server host, and client.

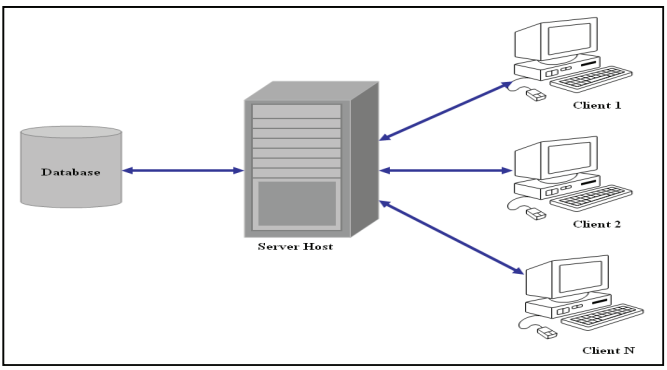

Figure 3 Architecture design for Online Theme Landscaping Decision Support System

The decision analysis for Online Theme Landscaping Decision Support System was constructed using decision tree. A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences. Decision Trees are useful tools for helping you to choose between several courses of action. A decision tree consists of three types of nodes; decision nodes, chance nodes, and end nodes. In this prototype, there have five chance nodes; concept node, size node, budget node, service node, and decision node. For each chance node, there have at least two to three sub-chance nodes. User need to choose one only until to the end nodes to proceed to the result.

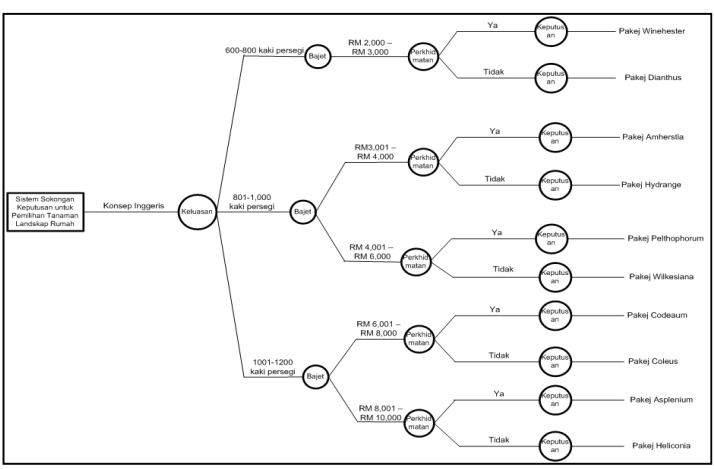

Figure 4 Decision tree of English Theme Landscape

Figure 4 shows a sample of decision tree analysis diagram for theme landscaping. Based on figure 4, the decision tree shows budget range for English style or concept. System will gives three different range of budget then leads to the package that will be suggested by the system within the budget range.

Figure 5 Main page of Online Theme Landscaping Decision Support System

Figure 5 shows the main page of Online Theme Landscaping Decision Support System. In this prototype, there are two main modules; theme landscape module, and administration module.

Firstly, theme landscape module, that provides an analysis of decision making process. This module constructed based on decision tree then generate output to the user. In this prototype, there have five chance nodes; concept node, size node, budget node, service node, and decision node. For each chance node, there have at least two to three sub-chance nodes. User need to choose one only until to the end nodes to proceed to the result.

Secondly, administrator module; that only permits the system administrator to manipulate data in the system. These activities include the updating current or new result of the consultation in the decision tree structure such as add, delete, and update any chance nodes to the end nodes.

Figure 6 Theme Landscaping Decision Making with multiple choice answers

Figure 6 show an example page during the consultation. User is given at least two choices of answers and has to choose one only. The answer will be sent to database and user will lead to the next page of a series of questions until the system generates the results. The example of result page is shown in Figure 7.

Figure 7 Theme landscaping result after consultation.

4.0 CONCLUSIONS

In summary, this paper presented recent developments related to the Decision Support System (DSS) of Online Theme Landscaping prototype. With the assistance of DSS, decision making process would be more organized, reducing the exterior designer's workload and also generate new ideas in facilitating of home owner's decision. The system also provides details information of accessories for themes

which have been selected by users. The online system enable easier access and helpful in decision making. The system assists the decision maker to decide the suitable landscape accessories in different type of landscape themes within the home owner's budget range. Hence this system is one of the potential techniques in enhancing communication and interaction between exterior designer and home owner.

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