

The Decision Support System in Selecting The Characteristics of Coffee By Using Analytic Hierarchy Process Method

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Abstract — This study is to determine whether the characteristics of coffee flavor can be implemented into a decision support system. In this study, the problem is the difficulty in finding coffee experts with adequate understanding and knowledge of coffee. The purpose is to implement Analytic Hierarchy Process (AHP) method to determine the characteristics of coffee flavor and to transfer the knowledge about the taste of coffee to coffee lovers.

The expected results are to assist in making a decision support system application in selecting the characteristics of coffee, so that it can provide the advice to the common consumers who want to enjoy and the knowledge about the coffee itself as well.

Keywords: Decision Support System, Coffee Characteristics, AHP

I. INTRODUCTION

There are many coffee shops which the managers do not have the knowledge about the characteristics and the quality of coffee so that the consumers who come only enjoy the coffee without knowing about the quality and the characteristics of coffee itself.

To increase the knowledge about coffee, It is required a system that can make decisions in selecting coffee so that the consumers, especially new coffee lovers, can determine the choice of coffee criteria as they desire.

There are some problems that identify to this study. The problems are there has not been decision support system in selecting the characteristics of coffee, he limited knowledge of consumers about coffee at this time and the process in finding the characteristics of coffee is so complicated.

The decision support system to determine the characteristics of coffee is by using Analytic Hierarchy Process (AHP) method. This method can be used to determine whether the selected characteristics of coffee are appropriate or not with the required qualifications. This is due to AHP method is able to provide an assessment both qualitatively and quantitatively. AHP method also calculates the validity to inconsistency of various criteria and

alternatives that are chosen in decision making. This is used to anticipate inconsistencies that might occur because humans have limitations, especially when comparing many criteria.

While the purposes of this study are to develop a decision support system to choose the characteristics of coffee that are in accordance with the desires of consumers, so that they can choose coffee with the right taste according to the chosen criteria, and to implement AHP method in the calculation to determine the best criteria in selecting the characteristics of coffee that are in accordance with the desires of consumers.

II. LITERATURE REVIEW

2.1 Decision Support Systems (DSS)

Basically DSS is a further development of a computerized management information system that is designed in such a way that it is interactive with the users. Interactive with the aim of facilitating integration between various components in the decision making process such as Procedure, Policy, Analysis, Security and Insight of managers to make better decisions.

DSS is a system which is built to solve various managerial or corporate organization problems that are designed to develop the effectiveness and productivity of managers in solving problems with the help of computer technology. The other thing that needs to be comprehended is that DSS is not to replace the duties of managers but only as the material for managers to determine the final decision.

In determining a decision, there are many factors that influence the decision making of a decision maker, so it is necessary to identify various important factors and to consider the level of influence from one factor to the others before making a final decision. Therefore, specifically the authors will discuss one of the problems in selecting coffee with step by step using DSS method to produce a final decision which is called the solution to a problem. [1][2]

2.1.1 Basic Concepts of Decision Support Systems

DSS concept was first introduced in the 1970s by Scott Morton. Scott Morton defines SPK as "an interactive computer-based system, which helps decision makers to use data and various models to solve unstructured problems". SPK is designed to support all stages of decision making starting from the stage of identifying problems, selecting relevant data, determining the approach that are used in the decision-making process, to evaluating alternative choices. [3]

2.1.2 Components of Decision Support Systems

According to [4] DSS component is:

1. Data Management

It is a component of SPK as a data provider for the system, where data is stored in a Database Management System (DBMS) so that it can be retrieved and extracted quickly.

2. Model Management

It involves the model of financial, statistical, management science, or other various quantitative models so that it can provide the system with the analytical capabilities and software management which are needed.

3. Communication (Dialog Subsystem)

Users can communicate and give commands to SPK through this subsystem. It means providing an interface

4. Knowledge Management

This optional subsystem can support other systems or act as stand-alone components.

2.2 Analytical Hierarchy Process (AHP)

AHP is a functional hierarchy with the main input of human perception. With hierarchy, a complex and unstructured problem is solved into groups and it is arranged into a form of hierarchy. Analytical Hierarchy Process (AHP) which was developed by Thomas L. Saaty was first used in 1970 in dealing with military planning problems in the United States. AHP model uses human perceptions which are considered "experts" as the main inputs. The "expert" criteria does not mean that the person must be genius, smart, hold a doctorate degree and so on but it more refers to a person who really understands the problems that are raised, feels the consequences of a problem or has an interest in the problem. [5]

2.2.1 Basic Concept of Analytical Hierarchy Process (AHP)

AHP is a general theory of measurement which is used to find ratio scales, both from discrete and continuous pairing comparisons. AHP describes multi-factor problems or complex multi criteria into a hierarchy.

Hierarchy is defined as a representation of a complex problem in a multi-level structure of which the first level is a goal, followed by the levels of factor, criteria, sub criteria, and so on down to the last level of the alternative.

With hierarchy, a complex problem can be broken down into groups which are then organized into a hierarchical form so that the problem will appear more structured and systematic. [6]

2.3 Types of Coffee

In the world, coffee is divided into 4 types, namely [7]:

1. Arabica

Arabica has various flavors. This cannot be denied that many people can find it out with sour but rich in taste different from Robusta. Arabica is not tasteless but it has various flavors in one cup of coffee.

2. Robusta

Robusta has the highest levels of caffeine from other types of coffee and has strong enough of bitter taste such as dark chocolate to crispy taste like peanuts but Robusta is tasteless, in other words while it is served hot or cold, the taste which is produced does not change.

3. Liberica

Liberica has many flavors the same as Arabica but the sour taste which is produced tends to be like sour taste of fruits.

4. Excelsa

Excelsa has a distinctive sour taste that is like berry such as cherry, strawberry and so on. However, this type of coffee is very difficult to find because it grows independently in the forest.

III. RESULTS AND DISCUSSION

3.1 AHP model

The stage for completing AHP method is analyzing the current event, modeling AHP method, lvl 1 AHP of weight and percentage from characteristics of coffee value, M1 paired comparison matrix, total values for M1 paired comparison matrix, percentage of weight from M1 characteristic values, percentage of M1 consistency test, lvl 2 AHP of weights and percentages of coffee types according to characteristic values, M2 Aroma paired comparison matrix, percentage of M2 consistency test, M3 paired comparison matrix, percentage of M3 consistency test, M4 Aftertaste paired comparison matrix, percentage of M4 consistency test, M5 acidity paired comparison matrix, percentage of M5 consistency test, M6 Mouthfeel paired comparison matrix, percentage of M6 consistency test, M7 overall paired comparison matrix, percentage of M7 consistency test, calculation of coffee types for characteristic values, percentage results for consumer input.

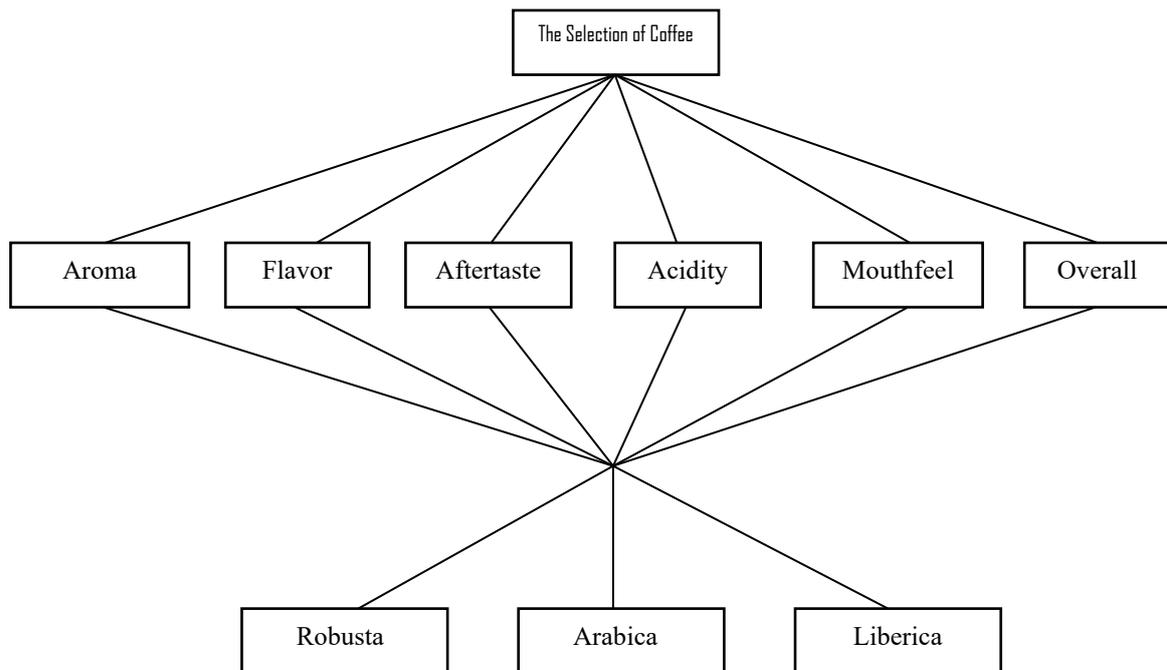


Figure 1 AHP Model

3.2 Calculation Results of AHP Model

The following are the calculation results of AHP model:

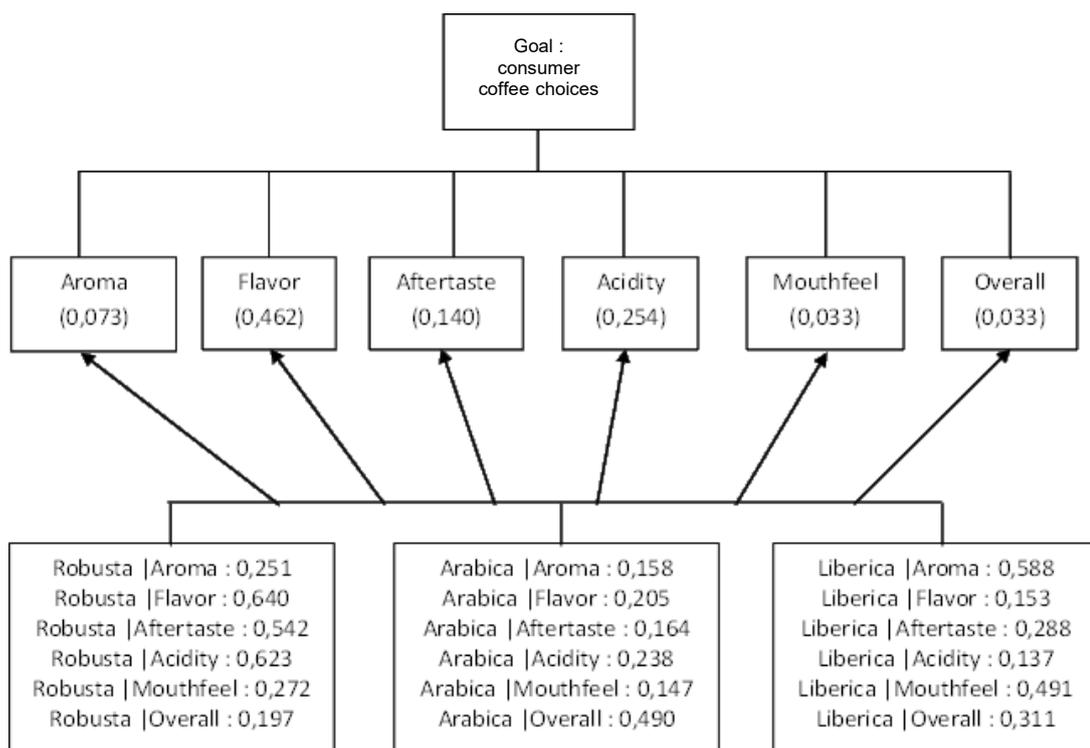


Figure 2 Calculation Results of AHP Model

3.3 Results of Evaluation and Recommendation

The characteristics of coffee that are desired by consumers and the basic knowledge of consumers to coffee are almost 44.6% of them do not know about the characteristics of coffee. And for the common consumers about the characteristics of coffee can be seen from Table 1 Percentage Calculation of

the Coffee Types. The company provides recommendations for selecting Robusta coffee that is expected to be suitable for common consumers.

Table 1 Percentage Calculation for Coffee Types

	Aroma (M1*M2)	Flavor (M1*M3)	Aftertaste (M1*M4)	Acidity (M1*M5)	Mouthfeel (M1*M6)	Overall (M1*M7)	Total
Robusta	0,073 X 0,251	0,462 X 0,640	0,140 X 0,542	0,254 X 0,623	0,033 X 0,272	0,033 X 0,197	0,56
Arabica	0,073 X 0,158	0,462 X 0,205	0,140 X 0,164	0,254 X 0,238	0,033 X 0,147	0,033 X 0,490	0,207
Liberica	0,073 X 0,588	0,462 X 0,153	0,140 X 0,288	0,254 X 0,137	0,033 X 0,491	0,033 X 0,311	0,212

IV. CONCLUSIONS AND SUGGESTIONS

4.1 Conclusions

The conclusions from the results of the discussion about the decision support system in selecting the characteristic of coffee using AHP method are as follows: .

1. AHP model (Analytic Hierarchy Process) can help in selecting the coffee types. When consumers determine which coffee types is suitable, with AHP the percentage in selecting coffee types can be obtained based on the weights of characteristic value.
2. Questionnaire is used to find out the desires and knowledge of consumers about coffee. The results of the questionnaire analysis provide information on the percentage of desires and knowledge that is positive and negative in selecting coffee types.
3. Decision Support Systems to choose the characteristics of coffee can provide information about which coffee types that are in accordance with the desire of consumers. This information can be used as material for consideration and further learning to coffee consumers.

4.2 Suggestions

In the decision support system on selecting the characteristics of coffee, the authors have several suggestions as follows:

1. Study can be further developed to make the Decision Support System application in selecting the characteristics of coffee.
2. Study can be further developed with the process of drying the coffee beans, where they come from, what varieties are used, and calculating the coffee brewing methods that are used.
3. Study can be further developed by involving the Ph level of water that is used, and using other methods.

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