# Expert System To Diagnose The Feasibility Of Drinking Water For Consumption Using Certainty Factor Method In Pdam Tirta Sari Kota Binjai

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#### Abstract

Drinking water is water that has been processed or without processing that meets health requirements and can be drunk directly. Meanwhile, to find out the water is fit for consumption or not. It is difficult to distinguish what causes errors that lead to problems that occur such as health problems. Such as metal content must be safe for consumption. It takes a system that can be used as an information provider to determine the quality of drinking water suitable for consumption which is managed by PDAM Tirta Sari, Binjai City. An expert system using the certainty factor method in diagnosing the feasibility of drinking water for consumption. Drinking water in determining whether or not water is feasible and helps provide valid information about the feasibility of drinking water for consumption to customers.

Keywords: Drinking Water, Feasibility, Certainty Factor Method, PDAM Tirta Sari Binjai City

#### **INTRODUCTION**

Humans meet the needs of body fluids by drinking water. However, not all drinking water is suitable for consumption. To ensure safety for consumption, water must be clean and meet the requirements of healthy water quality. Clean water is defined as water used in households for daily purposes, such as bathing, washing clothes, drinking, cooking and others.

Especially for drinking water, its quality must meet the requirements as stipulated in the Law of the Republic of Indonesia Number I7 of 2019 concerning Drinking Water Resources(Permenkes,2010). Meanwhile, to find out the water is fit for consumption or not. It is difficult to distinguish what causes errors that lead to problems that occur such as health problems. Such as metal content must be safe for consumption. So, we need a system that can be used as an information provider to determine the quality of drinking water suitable for consumption, which is managed by PDAM Tirta Sari, Binjai City.

#### **RESEARCH METHODS**

#### **Expert system**

An expert system is a computer system intended to emulate all aspects (emulates) of an expert's decision making ability. Expert systems make maximum use of specialized knowledge like an expert to solve problems (Rika, 2012).

An expert system, a branch of Artificial Intelligent (AI) is an AI program with a knowledge base obtained from the experience or knowledge of experts or experts in solving problems in certain fields and is supported by an Interference Engine/Inference Engine that performs reasoning or tracking of something or facts and rules that exist in the knowledge base after a search. so that a conclusion is reached(Siswanto, 2010).

The term expert system comes from the term knowledge-based expert system. This term arises because to solve problems, expert systems use the knowledge of an expert that is entered into a computer. Someone who is not an expert uses an expert system to improve problem solving skills, while an expert uses an expert system for knowledge assistants.

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### **Expert System Structure**

There are two important parts in an expert system, namely the development environment and the consulting environment. The development environment is used by the expert system builder to build its components and introduce knowledge into the knowledge base(Sutojo, 2010).

The consulting environment is used by users to consult so that users get knowledge and advice from an expert system like consulting an expert. The following figure shows the important components in an expert system.



Figure 1. Important Components in an Expert System.

# **Benefits of Expert System**

Expert systems are becoming very popular because of the many capabilities and benefits they provide, including:

- 1. Increase productivity, because expert systems can work faster than humans.
- 2. Making a layman work like an expert.
- 3. Improve quality, by giving consistent advice and reducing errors.
- 4. Capable of capturing one's knowledge and expertise.
- 5. Can operate in hazardous environments.
- 6. Facilitate access to expert knowledge.
- 7. It has the reliability that the expert system never gets bored and tired or sick.
- 8. Improve computer system capabilities. Expert system integration with other computers makes the system more effective and covers more applications.
- 9. Able to work with incomplete or uncertain information. Unlike conventional computer systems, expert systems can work with incomplete information. Users can respond with: "don't know" and "not sure" to one or more questions during the consultation and the expert system will still provide the answers.
- 10. Can be used as a complementary medical in training. Novice users who work with expert systems will become more experienced because of the explanatory facility that functions as a teacher.
- 11. Improve the ability to solve problems because the expert system draws on knowledge sources from many experts(Silitonga, 2018).

#### **Definition of Diagnosis**

Diagnosis is a term adopted from the medical and medical fields as a process for determining the type of disease by looking at the symptoms that appear. In the world of education, the term "diagnosis" is a relatively new term. Diagnosis is the determination of a disease by having or examining its symptoms. This term is usually used in medical science. In the world of education, diagnosis has not changed much, which is defined as an attempt to detect, examine the causes, types, and characteristics of student learning difficulties(Mulyadi, 2019).

Diagnosis is a technical term (terminology) that we adopt from the medical field can be interpreted as:

a. The effort or process of finding out what weakness or disease a person is experiencing through careful testing and study of the symptoms (symptoms)

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- b. Careful study of the facts about a thing to find its essential characteristics or faults and so on
- c. Decisions reached after a careful study of the symptoms or facts about a (Abin, 2012).

From the three definitions above, we can see that in the concept of diagnosis, the concept of prognosis has been implicitly concluded. Thus, in diagnostic work, it is not only identifying the type and characteristics and the background of a particular weakness, but also implies an attempt to predict or predict the possibility of suggesting a solution.

Diagnosis is an analysis of the abnormality or misadjustment of the pattern of symptoms. Similar to medical terms, diagnosis is an activity to determine the type of disease by examining its symptoms. Based on this, diagnosis is the process of examining things that are considered wrong or problematic(Suryanih, 2011).

## **Definition of Feasibility Study**

A project feasibility study is a research on whether or not an investment is feasible. Feasibility results are estimates of a business generating a decent profit when it has been operated. Estimates of success may be interpreted differently according to the party carrying out the business objectives. The feasibility of a project can be analyzed with several aspects so that conclusions emerge whether or not a project is feasible (Hussein, 2003).

Feasibility is a series of in-depth studies to determine whether the proposed project will provide greater benefits than the costs incurred. While business is all activities that aim to seek profit and companies that produce goods and services needed by an economic system. Some businesses produce goods such as cars, computer chips, cereal for breakfast. Others produce services such as insurance, hotels, salons, lodging, music concerts.

To determine the feasibility of a project can be seen from various aspects. Every aspect to be said to be feasible must have a certain standard of value, but the assessment decision is not only made on one aspect. Assessment to determine eligibility must be based on all aspects that will be assessed later. The size of the feasibility of each type of business is different, but the aspects used to state whether a project is feasible or not remain the same.

### **Definition of drinking water**

Based on (Permenkes RI No. 492/Menkes/Per/IV/2010) what is meant by drinking water is water that goes through a processing process or without a processing process that meets health requirements and can be drunk directly. cheaper, can be a third of branded bottled drinking water products. It is not surprising that many consumers have switched to refill drinking water services, causing drinking water depots in various cities in Indonesia(Bambang, 2014).

#### Method DefinitionCertainty Factor

Shortliffe Buchanan introduced the Certanity Factor in the creation of MYCIN in 1975 to address the expert's thinking of uncertainty. Certainty Factor (CF) is one of the techniques used to overcome uncertainty in decision making. Certainty Factor can occur under various conditions(Rika, 2012).

In the concept of Certainty Factor, it is also often known as believe and disbelieve. Believe is belief, while disbelieve is disbelief. Certainty Factor is defined as the following equation:

#### CE [h a] : Cartainty Easter in

CF [h,e] :Certainty Factor in hypothesis h which is influenced by facts e.

MB [h,e]: Meansure of Believe, is the incremental value of the trust hypothesis hd influenced by facts e.

MD[h,e]:Meansure of Disbelieve, is an increase in the value of distrust hypothesis h is influenced by facts e.

- H : hypothesis
- E : evidence

## **RESULTS AND DISCUSSION**

From the calculation results of several existing criteria, it shows that the percentage of the highest confidence level is in the water pH criteria, which is 92.40%.

Criteria	pН	Clarity	Smell	Metal Content	Organism Content
Score	92.40%	61.59%	48.47%	39.72%	38.31%

### CONCLUSION

After the implementation and discussion of the program, the following conclusions can be drawn: the pH value of the water is higher and from the cases that have been calculated using the CF method, it is obtained from 50 cases there are 23 cases of water that are suitable for consumption and the remaining 27 cases of unfit water then more attention can be paid to the quality of drinking water.

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