Expert System Conceptual Model to Increase Lawyer Performance

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Abstract—**The development of information technology, especially artificial intelligence, has a positive impact in various fields of science. AI or Expert System can create very high effectiveness and efficiency compared to manual processes. The manual process of lawyers in studying and deciding cases takes a lot of time and results with low quality so that it requires the support of information technology to improve the performance of lawyers. The purpose of this study is to help lawyers improve their performance by using information technology methods. The research method uses a combination of quantitative and qualitative approaches. Quantitative approach through interviews and questionnaires to 33 lawyers spread across several cities in Indonesia. The qualitative approach focuses on the study of literature on the support of information technology for the lawyer profession. The result of this research is a conceptual model of an expert system to improve the performance of lawyers.**

Keywords—**Expert System, Conceptual Model, Lawyer**

INTRODUCTION

Information technology especially Expert System or Artificial Intelligent is sufficient to assist with and answer legal problems accurately, quickly, practically, and affordably, so users of legal services will seek out more cost-effective alternatives and lose interest in the services of a law office. The presence of artificial intelligence machines in the legal field represents both a threat and an opportunity for innovators. The emergence of intelligent machines does not supplant human advocates, but rather improves the accuracy and efficiency of legal practitioners' work. In the not-too-distant future, artificial intelligence machines are predicted to take over a portion of the work of legal practitioners [1].

Due to the increasing complexity of law in the future, a doctrinal legal approach is insufficient to investigate and explain legal phenomena; rather, an interdisciplinary approach is required [2].Problems the manual process of lawyers in studying and deciding cases takes a lot of time and results with low quality [3].

Thus, the purpose of this research is to build an Expert System model to improve the performance of lawyers. The research uses a quantitative approach to obtain information about the role of information technology to support the duties and responsibilities of lawyers through the Google form. The respondent is a lawyer who works in several areas in Indonesia. This research also uses a literature review to find problems and solutions with an information technology approach. The purpose of this research is to help lawyers carry out their duties and responsibilities using information technology, especially AI or expert systems. The result of this research is the Expert System Model to support the performance of lawyers.

LITERATURE REVIEW

A. Expert System.

An expert system is a computer program that combines the field-specific knowledge of one or more human experts. A program based on a set of rules that analyzes information (typically provided by a system's user) about a specific class of problems and the mathematical analysis of the problem is the general form of an expert system [4][5].
Depending on the design, the expert system is also capable of recommending a course of action for the user to employ as a means of making necessary adjustments. This system reaches a conclusion by using its reasoning abilities

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International Journal of Applied Engineering & Technology

27

[6][7][8]. The purpose of the Expert System is to transfer an expert's knowledge to a computer, which is then transmitted to a non-expert individual [9].

Expert system divides by the user interface that connects non-expert users with the expert system. Input data or information received by the system through the user interface will be processed by the Inference Engine or Rules Engine. An inference engine is a component of an expert system that attempts to locate the appropriate object using the provided information [10][11][12]. There are two types of inference engines: deterministic and probabilistic.

Forward chaining, backward chaining, and rule value reasoning serve as the foundation for the inference engine (which is a precursor to forward and backward chaining) [13][14].

The part of Application of the Expert System is

a) Knowledge repository (knowledge base). Therefore, we must have a knowledge base of someone's machete, for instance, our physician requires information on lung disease and its symptoms [15][16].

b) Identify the Rule or inference engine to begin reasoning to reach conclusions (goals) from hypotheses (objects) to obtain facts. For instance, dengue fever is both a conclusion and a symptom [17][18].

c) Generate output (results) in the form of solutions based on the reasoning outcomes. For instance, if a migrant suffers from a disease, the treatment entails taking this or that medication [19].

Figure 1 describes the mechanisms and components of an expert system in general [20]
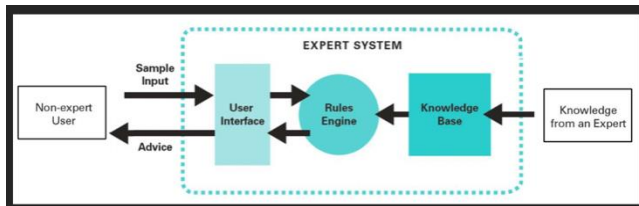

FIGURE 1 Component of Expert System (Ogu and Adekunle (2013)

B. Management Information System

The term "management information system," or "MIS," refers to a system that has been carefully designed to gather, store, and disseminate information necessary to perform management tasks [21].

An MIS seeks to capture the potential of the information system for competitive advantage and to implement the organizational structure and dynamics of the firm for the aim of improved management of the organization [22].

A management information system (MIS primary)'s goal is to collect data from a wide variety of internal and external sources that can be used to improve the quality of the organization's decision making processes. Information for strategic, tactical, and operational planning, coordination, direction, and control is derived from the collected data. As for MIS's secondary function, that would be to process data.

Data processing includes organizing, categorizing, and summarizing information [23].

C. Lawyer Profession

Legal professionals, as opposed to paralegals and charter executive secretaries, are those who "prepare, interpret, and apply the law" [24]. This includes roles such as advocate, professor of law, defense attorney, barrister-at-law, bar, canonist, canon lawyer, civil law notary, counsel, counselor, solicitor, legal executive, and public servant.

To be effective in their profession, lawyers need to apply their knowledge of the law to real-world scenarios.

The level of involvement of an attorney in a case varies greatly between jurisdictions [25].

It is up to the individual states to determine who can and cannot practice law. Considering this, the word "lawyer" may carry a variety of implications in various parts of the world. In certain parts of the world, the roles of barrister and solicitor are separate, while in others, they have been combined. A "barrister" is an attorney who only practices in the highest courts. A solicitor is a type of lawyer that mostly works in the lower courts, handles case preparation, and gives counsel to clients.

PREVIOUS RESEARCH

D. Decision Support System for lawyer

The Decision Support System is used to assist lawyers by using the criteria for making decisions in criminal and civil cases in court by providing several alternatives. This study only uses a qualitative approach by creating a formulation that supports DSS builders for lawyers [26].
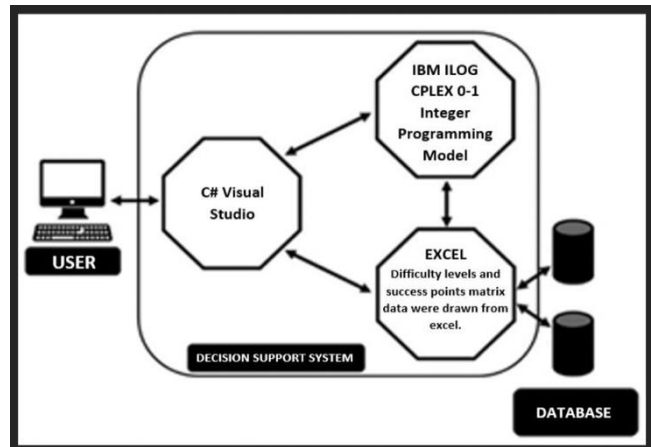

FIGURE 2 DSS model for Lawyer (Dolar et al 2021)

E. Robot Lawyer

In the legal profession, document management is essential. Attorneys often must comb through mountains of text documents to find the information they need. The "Robot Lawyer" conceptual framework is discussed in this article. The system's overarching goal is to educate local attorneys

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International Journal of Applied Engineering & Technology

28

Inayatulloh, Rivaldhy N. Muhammad, Anisya Sonita, Onsardi, Diana,Vivit Fitriyanti and Abnan Pancasilawati

and citizens on the fundamentals of the judicial system. To answer more complicated queries, an expert system that follows a predetermined set of rules must first collect the data and construct a model. Methods for handling textual information are also discussed in the essay. The Russian-language-specific system [27].

F. Assignment Information System for Lawyer

In recent times, the rise in the number of attorneys in our country has contributed to the formation of large law firms where numerous attorneys are employed.

These officials have a greater number of cases and a greater variety of cases than offices with fewer lawyers. It is evident that the offices face challenges such as determining which of their many lawyers to hire for a particular case and which lawyer will achieve the best results in this type of case. The objective of this study is to develop a decision support system that recommends to the manager which lawyer should be appointed, considering the desired efficiency and restrictions in a case involving large law firms, measuring the effectiveness of lawyers [25].

RESEARCH METHOD

The research method uses a combination of quantitative and qualitative approaches. Quantitative approach through interviews and questionnaires to 33 lawyers spread across several cities in Indonesia. The qualitative approach focuses on the study of literature on the support of information technology for the lawyer profession. The result of this research is a conceptual model of an expert system to improve the performance of lawyers.

The questions are designed to determine the supporting factors for the lawyer's performance and adopt information technology as a solution to improve the lawyer's performance. After finding the supporting factors, the research conducted an expert system model design to improve the performance of lawyers. The selection of an expert system as a solution to support the performance of lawyers because the expert system uses artificial intelligence technology that effectively resolves cases that will be faced by lawyers in court. Table 1 show the question for lawyers Figure 3 explains the results of the questionnaire processing.

TABLE I
QUESTION TO SUPPORT DESIGNING MODEL

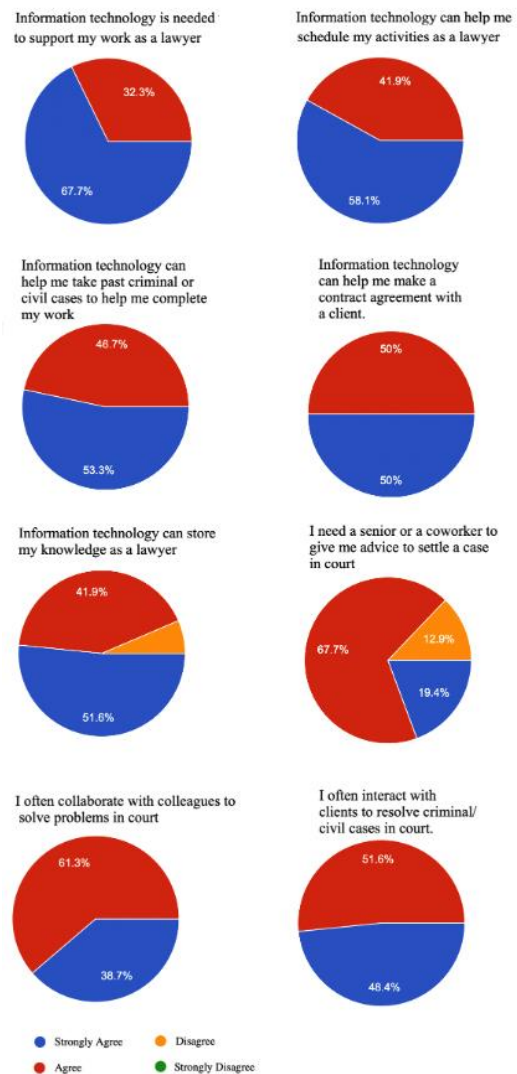| No	Instrument
8	Information technology is needed to support my work as a lawyer
8	
8	Information technology can help me schedule my activities as a lawyer
1	
2	Information technology can help me take past criminal or civil cases to help me complete my work
3	
4	
5	Information technology can help me make a contract agreement with a client.
6	
7	Information technology can store my knowledge as a lawyer.
8	
9	I need a senior or a coworker to give me advice to settle a case in court
10	
11	I often collaborate with colleagues to solve problems in court
12	
13	I often interact with clients to resolve criminal/civil cases in court.

FIGURE 3 The Factors impact Lawyers Performance

Based on the diagram above, it can be concluded that there are several important factors needed by lawyers to improve their performance as components of the expert system model for lawyers. The conceptual model of the expert system that was built also adopted the architectural components of the expert system in general.

RESULT AND DISCUSSION

Figure 4 show the proposed model. The model built is divided into 2 main parts, namely the expert system and the management information system.

The following is a detailed explanation of the expert system conceptual model to improve the performance of lawyers as follows:

1. Lawyer and knowledge engineer collaborate to produce knowledge. In their collaboration, lawyers and engineers use legal regulatory references. A knowledge engineer is an expert in the science of incorporating complex logic into computer systems to simulate human decision-making and complex cognitive tasks. A knowledge engineer contributes some or all the "knowledge" that is ultimately incorporated into technology. Knowledge engineers are frequently employed as intermediaries to translate highly technical information gleaned from domain specialists into the actual computer program or data system. Knowledge engineers interpret and organize system decision-making information. Validation and verification are performed by knowledge engineers. When something is validated, it is checked to make sure it is true or up to par. To verify that the information they are entering into their systems is genuine, a knowledge engineer must validate the data they collect. When developing software, it is essential for a knowledge engineer to include testing and verification steps. The domain expert need only create the knowledge-based system once, and then do routine maintenance.

2. Verification and validation of knowledge are two distinct processes that are used in tandem to ensure that knowledge satisfies requirements and specifications and serves its intended purpose. Sometimes, the words "verification" and "validation" are preceded by "independent" to indicate that the verification and validation will be performed by an impartial third party. This model's validation and verification procedures are carried out by experts with a comprehensive understanding of applicable laws and regulations.

3. The third part of the system is the inference engine, which employs principles of logic to the knowledge base to draw conclusions. The inference engine in this model specifies the logical norms of law and legislation that form the reference for lawyers in resolving criminal or civil matters, as well as all conventional rules and procedures that must be carried out by lawyers while practicing law. The expert system's knowledge base is another crucial component. The knowledge base is gleaned from the expert's personal interactions with the system, through which the expert's expertise is converted into a database of facts and figures.

4. New information will be gleaned from the union of the inference engine and the knowledge base. With each new piece of information added to the knowledge base, the inference engine may be prompted to add new rules. There are two main ways in which inference engines operate, forward chaining and backward chaining, which are used to infer either special rules or facts. In forward chaining, we start with the established evidence and build to the conclusion that something new must be true. Through the use of goals as a starting point, backward chaining identifies the necessary assertions that must be made to reach those goals. The combination of the inference engine and the knowledge base will produce new knowledge. This process would iterate as each new fact in the knowledge base could trigger additional rules in the inference engine. Inference engines work primarily in one of two modes either special rule or facts: forward chaining and backward chaining. Forward chaining starts with the known facts and asserts new facts. Backward chaining starts with goals, and works backward to determine what facts must be asserted so that the goals can be achieved

5. The user interface in this model connects the user with the system. The user interface is designed to be integrated between expert systems and management information systems. The user interface on the expert system is used by experts to transform their knowledge into the system as well as verify and validate knowledge. Meanwhile, the user interface in the management information system is used by the user to manage data and information related to his duties as a lawyer such as on gong cases, case schedules, client agreements and others.

6. The database in this model is a storage centre for expert systems and management information systems. In the context of an expert system, the database will store all knowledge from the inference engine as well as knowledge that has been verified and validated. In the context of a database management information system, it functions to store case histories that have been completed by lawyers. Thus, this information becomes one of the sources of knowledge in the expert system.
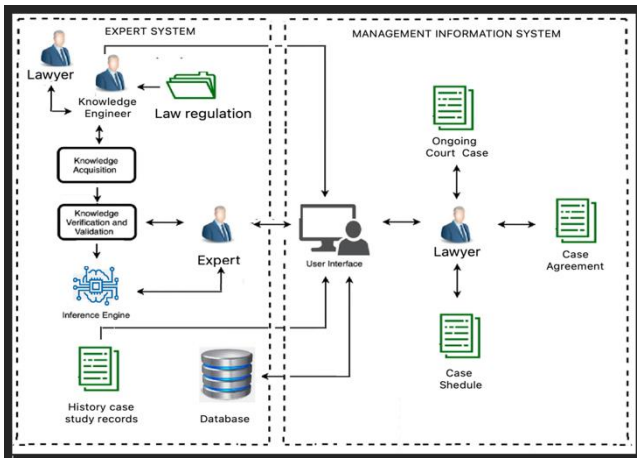
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International Journal of Applied Engineering & Technology

30

Inayatulloh, Rivaldhy N. Muhammad, Anisya Sonita, Onsardi, Diana,Vivit Fitriyanti and Abnan Pancasilawati

FIGURE 4The Proposed Model

Figures 5 through 8 are examples of the user interface of an expert system for lawyers. At the beginning of the system informs client information, case information, court information. At the end, the expert system will recommend solutions for cases handled by lawyers. This feature has a search engine feature that makes it easier for lawyers to find the information needed to improve lawyer performance.

FIGURE 5 Example of UI Client Information

FIGURE 6 Example of UI Case Information

FIGURE 7Example of UI Court Information

FIGURE 8Example of UI Case Recommendation Solution

CONCLUSION

The complexity of the lawyer's task demands the adoption of information technology so that the process and results of the lawyer's performance are more effective and efficient. adoption of expert systems is the best solution for lawyers to support the duties and responsibilities assigned to clients.

The ability of expert systems to create processes that produce the best performance for attorneys will increase client satisfaction.

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International Journal of Applied Engineering & Technology

31

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32