History of Decision-Making: Development and its Applications

Yusuf Amrozi1,2, Indrianawati Usman1, Muhammad Ali Ramdhani3

1Department of Information System - State Islamic University, Surabaya
2Management Department, Faculty of Economics and Business Airlangga University, Airlangga 4-6 St, Gubeng, Surabaya, East Java 60115, Indonesia.
3Department of Informatics, State Islamic University, Bandung

Corresponding author: indah.mustika08@gmail.com

Abstract. The purpose of this paper is to outline the development of decision making management and implementation of decision making management in an organization. The approach used to explain development of decision making management through literature studies. Whereas application of decision-making management through field research. The case study used in this article was the model of new employees recruitment with the model of Analytic Hierarchy Process. In this model of decision-making, there are three designs to be implemented: First, modeling management. Second, database management. Third, interface management. Management of modeling is used to find the optimum solution to selected alternative decisions. Database management is used as a store of data, including data and information on the knowledge, problems, and solution decisions. The management interface is used as an inter-system communication management with decision-makers. The contributions of this paper is to elaborate the development of decision making management and to provide the optimum solution in selecting the new employees in an organization quickly and accurately.

1. Introduction

The development of management science has established along the length of the social sciences. Each era has a distinct trend towards the appropriate social context. For example the management thoughts before the 1800s, according to Wren, is based on the management era of social system before the industrial revolution, agrarian society, the domination of authoritarian rulers and feudalism. On the management of the 1800s decade, an era which began with the setting of social industrial revolution in Europe seems to bring remarkable shift. In this phase, the forerunner of the classical management has been formed. Classic management is characterized by a rational approach in the governance of the organization[1].

Then, the business associations (companies) existences are common. Characteristics of classical management have been based on science. The classic development ends with a of human relationship management that focuses on the study of the interaction and behavior of actors in managing the organization. Meanwhile, David Lamond writes a good short essay about development of management which has title “On the Value of Management History”[2]. This article focus on towards management decision-making, but the author felt the need to give a little overview on the development of
management. Knowing the development of management according to Stephen comings is a critical point to be able to map the future[3].

In the context of management development in the modern era, in decade of 1900s, and later, modern management thinking is characterized by the adoption of technology to support performance management. Wren illustrated the development of management in his book, the evolution of management thought [1] as in the figure 1:

![Figure 1. The synopsis of management in the modern era](image)

The big question is, since when this the term 'decision making management' appeared? As part of operations management, management decision-making was first introduced by the Michael Scott Morton 1970s with the term management decision system[4]. On the other hand, information technology is used to support this system. Therefore, a decision support system is an invaluable tool for the management in decision-making.

In the present context, what is the benefit of the results right decision making? In today's global business contexts, management challenges are not only how to do internal organization’s work, but also how to collaborate with business partners. The decision makers are not only taking natural decision in the internal organization but also the whole organization[5]. In the context of the contemporary business, the concept of electronic business also requires value chain integration, or integrates along the value chain in the organization's business partners[6]. The precise decisions taken, in a lot of evidence that the business partnership network will have many advantages, both in quality management, quality of service and profits. In this context, Kalakota said that the management decisions that established are one the most important component of the success of e-commerce and e-business[7][8]. Because of it could be considered that e-commerce and e-business is a miracle in this era of information and technology.

2. Literature Reviews
2.1 Decision Making Management
Decision is an act of choice of action strategies [9][10]. Decision is an act which had no time to gather facts. The decision is the selection of the proposed action taken[11]. Decision-making is the process of determining or selecting from alternative actions or decisions that candidates will be selected. Decision making are usually Based on purpose or the problems encountered. In this case, the problem
can be categorized into structured problems. Decision making should take into account the typology of the problem. That decision must also be seen within the framework of tactical or strategic, long-term or short-term[9].

Decision-making is a necessity in an organization as a process of communication and continuous participation of the whole organization[12]. Therefore, planning, decision-making system design and evaluation of decision-making is an important point in the organization's performance. To this day a lot of deployment and research results related to this theme. Some become the reference in this article [13];[14];[15]. In the decision-making process there are four-stage that must be passed. First, the stages of search. Second, the design stage. Third, the decision stage and fourth, the implementation phase decision[16];[17].

2.2 Decision Support System
As mentioned earlier, the decision support system (DSS) was first popularized in the 1970s by Michael Scott Morton in terms of decision management system, as part of the Management of decision making. DSS is a computer-based information system that is intended to assist decision makers by utilizing specific data and models to solve various problems that is not structured[9]. Why DSS suitable to do unstructured problems? Experts divide the problems into three classifications; issues of structured, semi-structured, and unstructured[17].

According to [18] Managers make decision usually use one of three approach types; the classical model, the administrative model, or the political model. The choice of model depends on the manager’s personal preference, whether the decision is programmed or non-programmed, and the degree of uncertainty associated with the decision. Administrative model approach is a decision-making model that describes how managers actually make decisions in situations characterized by non-programmed decisions, uncertainty, and ambiguity situation. Descriptive approach, if managers actually make decisions rather than how they should make decision according to a theoretical idea. Bounded rationality approach is a concept that people have the time and cognitive ability to process only a limited amount of information on which to base decisions.

Structured problem is the problem that is easily mapped or linkages to the other as well as the subject are more likely routine and predictable so that the handling is easier. For example, the issue of the stock material, if known stock is only enough for three days ahead, the management can immediately contact the supplier so within three days of the new stock. Unstructured problem is a
problem that its arrival is not predictable and difficult to identify the linkages with the other. The examples of decisions to be taken on issues that are not structured for example, at the time when and on what conditions the company must add to the production facilities, plant expansion, establishing new products, conduct product differentiation, mergers and more. Hence the decision was taken based on the context of the problem. Decisions can be classified by order of the importance, the level of regulation, and the type of problems faced. DSS is identically computer-based today, as well as the complexity of the data need to be assisted computer system used to process them.

2.3. Management Information System
The performance of management cannot be separated from the support of information systems and technology today. Management requires information as the basis for their decision-making[19]. Management information systems (MIS) became popular in the 1960s, along with the shift from a technological development of computer hardware to software engineering development, which profit organization in the world need to process the data organization.

The information system is a set of functions that work together to manage the collection, storage, processing and distribution of information[20]. Thus there are at least three functions of information systems, namely: 1. take the data, 2. process, transform and convert the data into information, 3. distribute information to users in need. Information is like blood and essential element in maintaining the continuity and the existence of an organization. The information for decision-making quality when the information is valid, complete, renewable or timely[4]. While the management information system is an information system that aims to generate information for the needs of managers in evaluating and making decisions in order to control all activities of the organization[16].

Management information system is intended to generate information pertaining to all activities of organizations such as planning, marketing, production, personnel, and project management. The output of the system is primarily intended for tactical level management. Therefore the cost of information used for decision making short and medium term[9]. McLeod calls this decision support system as part of management information systems[21]. Steve Haijof calls it as computerized decision support system[22]. Ramesh Sharda interpreted this as the evolution of man-machine system[23].

2.4. Analytic Hierarchy Process
AHP method is suitable for use in management decision-making because it offers many advantages such as synthesizing the problem into alternative decision[21][24][25].said that AHP is a decision-making tool that is based on criteria that stored often used in decision-making applications in decision-making applications. AHP was developed by [26][27][28]. He is a mathematician. This method is a framework for effective decisions on complex matters simplify and accelerate the decision-making process by breaking the problems into parts, and then arrange the parts or the variables in a hierarchical arrangement further synthesize these considerations and set the variable which has the highest priority that act to affect the outcome of the situation.

This method is expected to solve complex problems by structuring a hierarchy of criteria, interested parties and the results to attract a variety of considerations in order to develop a weight or priority. This method also combines the strength of feeling and logic that are concerned on the problems, and then synthesizing a diverse variety of considerations into results matched in earlier forecasts. Further than that, Michael M. Delaney, in his research [29] explained how this system can be a negotiating tool in the decision making process.

3. Research Methodology
This paper wanted to explain the development of management decision-making and examples of its application. The introduction points and literature reviews presented about the management decision-making and some of the terminology associated with this research. Furthermore, it is also presented examples of application of decision making management.
4. Result and Discussion

4.1 Management model decision on new employees recruitment

This research is intended to find a decision-making model for selecting the best new employees. By using AHP, therefore, need to be determined at the beginning of criteria to consider a candidate who could be deemed worthy or not to be accepted. The first step is to conduct an analysis to determine criteria or variable as a candidate consideration. This model has five variable criteria as follows:

a. Competencies include the ability of theory, practice, foreign language and communication skills and adaptability.

b. Age, whether the prospective employees in the age category productive or not. If in terms of age, is it 25 years old, or 30 years old and above. In this case the younger is considered better.

c. Work experience, as well as institutions anywhere, work performance achieved, as well as the compatibility between previous work experience and new place. Commitment, covering aspects of responsibility, discipline, as well as ethics and morality.

d. Graduate school / university. This can be seen with, for example, whether a school or university accredited. On the other hand, sometimes labor recruitment agencies still view these graduates from public or private schools.

Figure 3. Hierarchy of decision making with AHP model

4.2. Database system design

Based on the information needs to be expected then technically there are several tables of data that is required: the table of candidates who applied, the table of variable to determine the eligibility of candidates, table of results between variables or criteria of candidates, the registration table, and the table in such a manner correlated results. Thus the data storage and information management will be arranged and recorded properly. The following description of conceptual data modeling of the system.

4.3. Interface system design

Interface system enables decision makers to collaboratively perform retrieval decision by technical means to access the computer system. The interface is designed to be able to support the interaction between the system and the user[9]. Technically, at least there are 3 sub-menus: Registration, Data input, and Result.

5. Conclusion

Changing times and technological developments enable innovation and exploration in the field of management. In the process of development, emerging term management decision-making. One of the problems is an important management decision-making. Failure in decision making can affect the existence and performance of the organization. There are some names and terms that points on management decision-making. Including using the term decision support systems or decision support system. The author argues that the decision support system is part of the management decision-making
that is useful to help decision-makers to make better decisions. Because it is only a tool, then the
decision makers keep users who use the system. The system simply suggest a decision according to
the model that was set before.

In the case discussed in this article, there are three important components of decision support
systems, namely: sub-system modeling, database sub-system and sub-system inter face. The model
used to this article is Analytic Hierarchy Process model (AHP). AHP model is a multilevel analysis
method to variable inputs that are used to determine the optimum solution. In this case rose about the
selection of new employees. The results of the model design shows how the process of determining a
new employee candidate with existing criteria, namely: competence, age, work experience,
commitment, and graduate candidates. In the case of the above candidates elected employee a criteria
based on existing entries.

Support by information technology used in this system. The database system and so arranged
interface that allows management can be easily interacting in the decision making. System is expected
to also work more efficiently with the system design. Therefore in line with the complexity of the
problems faced by the management and development of technology, along with the development
system of decision making management must constantly seek innovation for development both in
terms of concept models and technology.

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