

Advanced decision support systems for managers

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Abstract

Managers need to make timely decisions to solve the problems in the organization or to take advantage of the opportunities. But accessing the related information and knowledge is a necessity for the purpose of decision-making. Current transactional information systems in organizations easily manage the affairs of the organization, but they do not provide the necessary ability and intelligence to take a good decision and business performance management. Here, the importance of using such systems to support management decisions and business intelligence tools are highlighted. The purpose of this paper is to analyze the decision-making process, the structure, components, and features. Also a decision support system (DSS) is described. Then, the types of decision support systems will be defined and their abilities and functions will be expressed. The following performance management and business intelligence are explained. Finally, Intelligent Decision Support System will be examined and their functions and abilities to develop a decision support tool for decision-making will be analyzed.

Keywords: Decision Support Systems, Intelligent Support Systems, Decision-Making, DSS

Introduction

Every day, many decisions are taken by the members. But most of the major decisions are taken by managers. Management is a process by which organizational goals are achieved by applying resources (people, money, energy, materials, space and time). These resources are considered as an input and achieving the goals are considered as an output of this process. Managers monitor this process to optimize that. To be able to understand how computer support managers, at first needs to be explained what managers are doing (Turban, 2006).

Managers based on their position in the organization, culture, and organizational policies and own character, doing many things. Mintzberg divided roles of the management into three categories: The individual (as a ceremonial leader and liaison), informational (monitor, dissemination and speaker (or decision maker) entrepreneur, vehicle problems, resource allocator and negotiator (Mintzberg, 1973). Therefore, Mintzberg and Véstly analyze the role of the decision makers in the information age (Mintzberg, 2001). Huber Finally, described the role of top management in today's complex and the turbulent atmosphere (Huber, 2003).

Essentially, the role of the first information systems was to support their basic information. But in recent years, information systems have been upgraded to support all three roles. The decision is defined to choose between two or more options. Decisions are different in nature and are frequently undertaken by individuals and groups. Purposes of decision making in an organization can be divided into two major groups: solving a problem and taking advantage of opportunities. In both cases, managers must make decisions. Researchers have found that only ten percent of the directors, principally due to the difficult decision space, think of all the things they mentioned are very good. It seems to be a trial and error method, which is likely to approach decisions in the past, in many cases, expensive or ineffective. Therefore, managers need to learn how to use new tools and techniques that help them to make better decisions about their use (Huber, 2003). Many of the techniques used the quantitative analysis approach and are supported by the computer.

Lack of necessary intelligence in the operational systems

Information systems in many organizations support as well as the ongoing operations such as processing orders, accounting documents, warehouse management, purchasing, material control, production operations.

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However, these systems do not tell managers how they can improve their activities and what corrective actions to be done to improve employees' activities comply with the strategies. Enterprise resource planning systems, despite the transparency of the processes between the different units, is not able to create analytical consciousness required to manage organizational performance (Weill, Ross). Enterprise resource planning systems faced staffs and managers with a flood of information, but this information is not necessarily prepare required intelligence for organizational managers to help them taking a better decisions (Open Group Consortium, 2007). For example, a detailed report of the various items of inventory management is not appropriate for decision making. Even the initial processing of the data and create reports of sensitive goods inventory shortage, a senior executive is not convincing. What the Chief wants a balance between the strategic objective of reducing the storage and supply of capital goods required customers to optimize the domestic units of the organization. For this work needs to analyze the large volume of data available in the sales, warehouse, logistics and financial systems are touched.

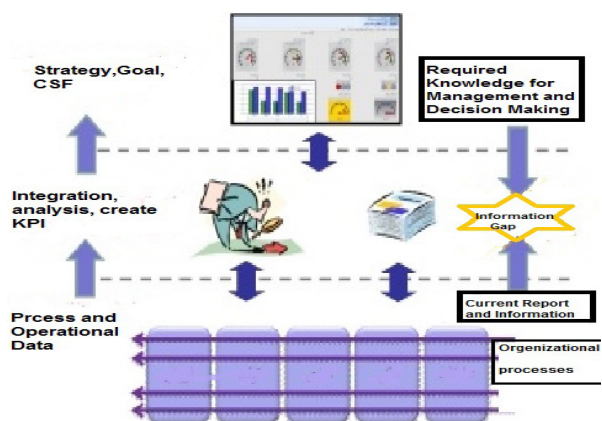


Figure 1. Structure of required information for management'

As shown in Figure 1. Data collection and integration of various data sources and store them in a data warehouse is the best way to access key information about managers. This data warehousing is designed based on the management decision scenarios and organizational key performance indicators, and they have high performance in the representing of multi-dimensional reporting. Mechanisms for gathering, processing, transmission and storage of information requires a comprehensive and detailed architecture. A major challenge facing managers regularly communicate with all levels of the organization and information about the organization's goals and strategies (Timothy *et al.*, 2007).

If the managers and employees of organizations who want to describe their strategies, in most cases you do not hear completely identical. Many workers are unaware of their organization's overall strategy, they are often completely passive pressurized daily activities and problems that they spent all their time. A short distance data communication between the mission and vision of the organization and senior management personnel are daily activities. Performance management concepts have been developed to eliminate the gap of information and communications. Methodology that supports tools such as Performance Management Strategy maps and score cards are used, Strategies that will help achieve the goal of all the activities. Peter Senge: "Many leaders and managers of organizations have good personal goals and visions that never become common objectives is not an organization. The lack of a sense of what it is, a mechanism that will translate personal goals to the collective goals." (Senge, 1999)

Methodologies such as Activity Based Costing (ABC) approach based on the reality of the current financial reinsurance organization offers. But just having a good financial outlook may not be important in all aspects of performance evaluation because many of the capabilities and assets of the organization's financial indicators are not measurements (Kaplan, Norton, 2007). For example, the level of skills, corporate culture, customer satisfaction, waiting time shopping and many other issues cannot be measured by financial indicators.

Management Support Systems (MSS)

Origine of these systems, decision support systems (DSS), which were used in the mid-70s. This system is basically a bit of analysis and decision support. The second group is Executive Support System (ESS) that are implemented in the mid '80s to support the informatic roles of executives. The third group, group decision support systems (GDSS) to support the management and staff team work. Fourth, technology is an intelligent system (IS) technology, and the four independent variables can be used or they can be combined with each other so that each can provide different capabilities. Decision-making (personal and organizational), the decision process is relatively consistent. Simon explained that the process consists of three basic steps: Intelligence, design and choice. The fourth phase (implementation) was added later. Providing comprehensive four-step modeling process is shown in Figure 2.

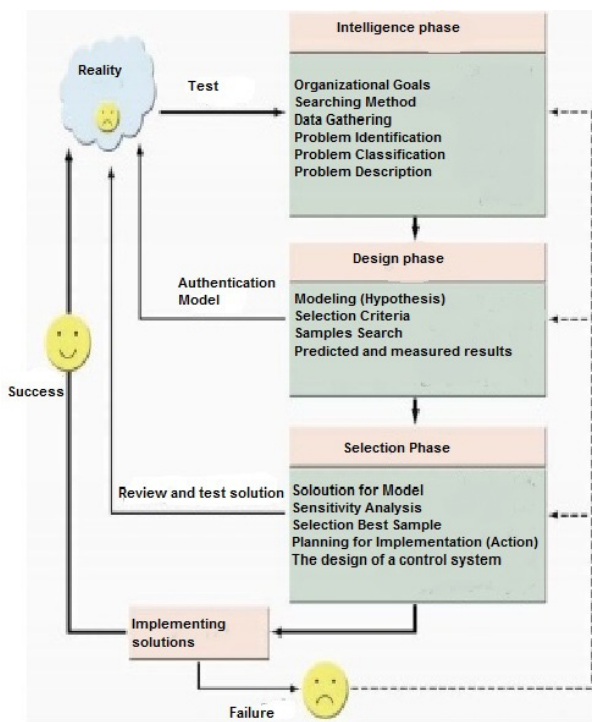


Figure 2. Decision-making process (Stonebraker, 2002)

Decision-making process begins with the intelligent phase in which managers assess the situation, identify and define the problem. In the design phase, the decision makers design models that simplify the problem. This is making the assumption that the facts are simple and describe relationships among all the variables is done. This model is then evaluated and the decision-makers selected criteria to evaluate potential solutions identified set. This process is repeated for each of the decisions in complex situations. The output of the predecision, is an input for the main decision. A computer-based decision support system automatically tries diverse activities in this process that most of them are modeled. A model of decision making provides a simple and abstract reality. Modeling, one can test virtual reality model of analysis (rather than analysis of reality itself) pay. Provided by the model can be found in varying degrees of abstraction to four video analog (analog), and mental math to divide. Goori and Scott Morton framework for decision support offered. Simon is based on the framework of the first half, according to which decision-making processes throughout the chain of decisions that are highly structured (planned) to infinity decisions unstructured (non-scheduled) are included in the (Gorry, Morton, 1971). Structured and iterative process applied to everyday issues which are standard solutions for them. Non-structured processes, problems “vague” and complex and there are no predetermined solution does not exist for them. In an unstructured problem, none

of the three stages of a structured decision not to base decisions often have human intuition.

Semi- structured problems that are structured where only some of these steps require a combination of standard solution procedures and individual judgment. Examples of semi-structured problems are exchanged bonds, setting budgets for marketing and investment analysis. Here, DSS is the most appropriate option. In this system, the quality of decisions based on information that will not only provide a single solution but a set of possible scenarios increases.

The second half of framework is based on the classification of 1965. This framework includes three major management activities are defined:

- 1 - strategic planning, -2 Management control,
- 3 - Operational Control (Turban,2010).

Decision support systems

In a broad definition, a decision support system, a computer-based information system that combines models and data, Extensive collaboration with the user to solve some problems of semi-structured and structured deals. Due to a lack of general agreement about the DSS, of exactly what components formed, there is clearly no consensus on the characteristics and capabilities of DSS. However, most of the DSS system, at least some of the features offered in the following ones.

- Decision makers at all levels of management, individual, group, mainly semi-structured and non-structured situations, with real data and supporting human judgment brings.
 - The number of decisions, or consecutively depending on me for support.
 - All stages of the decision-making process (identification, design, selection and implementation of the various types of decision support.
 - User over time to address changing conditions, is compatible.
 - In many cases easy to DSS design and use.
 - To promote learning that leads to new demands, improving current programs, learn more and more.
 - Usually, quantification of models (standard and customized uses.
 - It is equipped with advanced knowledge and access to a lot of problems, provides effective and efficient solutions.
 - DSS can be used, by the web distributed.
 - The sensitivity analysis enables easy implementation of DSS (Turban, 2006).

DSS Structure and Components

The DSS as shown in Figure 3, at least part of the data management, model management component, the user interface is composed of end users. and can additional software (e.g. multimedia applications) are provided. Tools such as Excel, including some of the components and end-users can use it to build DSS. DSS users of its data from the data

warehouse, database and other data sources. When a user has a problem, his problem is evaluated by the processes described in Figure 3. The DSS system is built. Data from the left and from the right are models. Knowledge can be obtained from the corporate knowledge base. As more problems are solved, more knowledge is collected in the knowledge base (Turban, 2010).

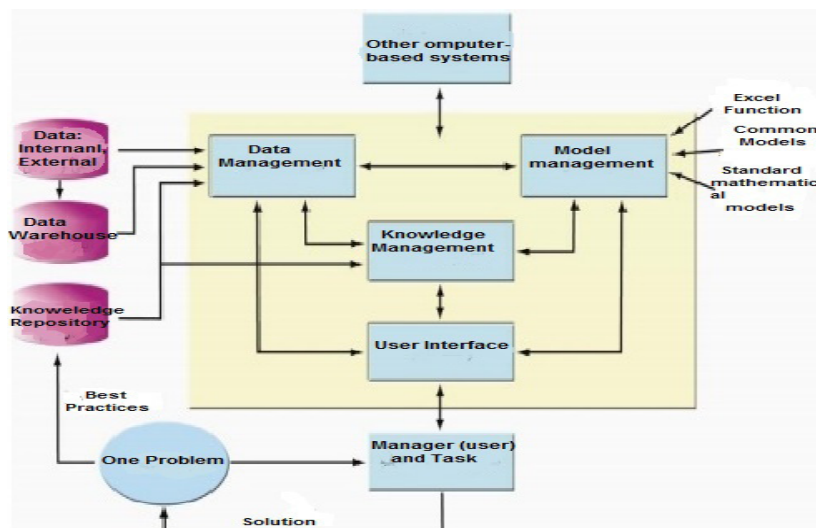


Figure 3. DSS system architecture

Decision-making is a common process in many cases. When the band decision, electronically supported, this support group decision support (GDSS) can be read. Two types of group decision making are considered: physical group whose members are in the same place), such as meeting rooms and virtual team members are in different locations. A group decision support system, which is an interactive computer systems solution, semi-structured or non-structured problems by a group of decision makers makes it easy. The purpose of a GDSS to support the decision-making process. The first generation of systems, GDSS, attend to support in what was called the room was designed.

Managerial and organizational decision support systems

The first word of organizational decision support systems (ODSS) were discussed by Kasuren and Keen who identified the three support level of the individual, groups and organizations. They believed that computer systems can be used to support the decision for each of these levels extended. (Hackathorn, Jeen, 1981).

ODSS features include 1 - Impact on multiple organizational units or corporate problems, 2 - to influence organizational functions or hierarchical layers, 3 - including computer-based technologies, as well as regular, communications technologies. ODSS often organization-wide information systems such as executive support systems interact or be combined. In addition, the Web has led to the development of organizational decision support systems (Shim et al, 2002).

Executive support systems

Executive Information System (EIS), which is also known as executive support system (ESS) , a technology that is specifically designed in response to the specific needs of senior executives. Senior executives and senior managers, information systems terminology, concepts support system is different for various people. The following definitions, EIS is distinct from the ESS. EIS is a computer-based system that responds to the needs of high-level managers. The system provides direct access to relevant and timely information, through direct access to management reports, monitoring the

organization's performance and manage growth and improve instruction. It is very user friendly and takes advantage of the high graphics (Business World, 2004).

Main features of this system are: exceptions reports, query. The system easily connects to on-line electronic services and Email.

ESS is a comprehensive support system that goes beyond the EIS analysis and automated support is in office.

Some of the major features and benefits of the ESS support systems are as follows (Singh et al, 2002).

- Query: the ability to go into detail on all levels
- Critical Success Factors CSF are key factors for the success of a company, these factors can be institutional, industrial, etc are a part.

- The main performance indicators: Special scales CSF

- Access to state: latest data, KPI, the ideal and the real, are available.

- Trend analysis: short, medium and long-term KPI or other measures, using prediction methods are designed.

- Case Analysis: Analysis at any time and consistent with all elements of good communication.

- Report exceptions: the management concept based on exceptions, deviations greater than the specified range are reported. Reports may only be deviated.

ESS and EIS products and technologies more comprehensive for years, to manage the operation of a business or organization has become. Business performance management, BPM, a method for measuring organizational performance is the performance comparison of some measures, the analysis of the performance and how to improve their planning.

Performance Management and Business Intelligence

Performance management process to measure and evaluate the achievement of objectives and strategies to optimize the performance of individuals, teams and the enterprise. Performance management includes techniques for determining strategies, setting goals, planning, budgeting, forecasting and modeling. For implementing performance management use scorecards in the organization. The business intelligence tool and process technologies to convert data into information and information into knowledge needed for decision making in the organization. Data warehousing technologies in data warehouses, data collection and data integration, reporting, analysis, data mining and business intelligence from being used (Fryman, 2007).

Dashboards allow management to business intelligence. The use of these two systems together, enabling new levels of interaction strategies to promote organizational forms for all employees. In addition to observing and analyzing key information associated with business processes to help manager's decisions and to take appropriate corrective action. The main benefits of this system are as follows:

- promote strategies
- monitoring and corrective measures to implement strategies
- Provide information to all staff and students

One study in 2006 showed that managers in performance management solutions as the crowning achievement of the advantages of using this approach can be considered. Other achievements of the strategy to improve customer service, grow revenue, increase profitability and better utilization of resources. Another study of 1047 firms that have applied performance management solutions is given in Figure 4. Accurate reporting and decision-making as the most important achievement of this solution are listed in (Eckerson, 2007).

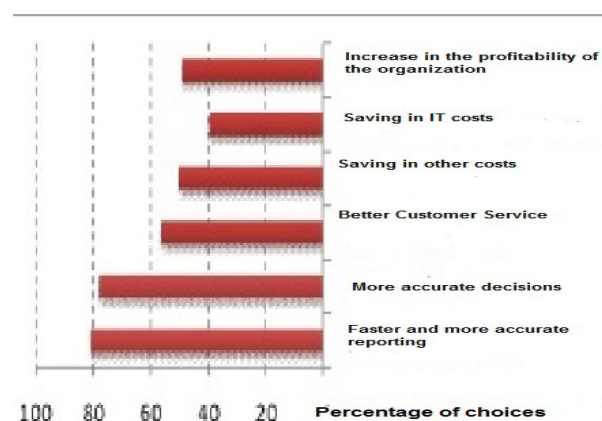


Figure 4. Results of the Performance Management System

Business activity monitoring systems (BAM)

In this system, one of the main tools for controlling business activities. Control Systems business, is comprised of enterprise systems when Managers about potential opportunities, challenges and threats ahead and tell them to react through models and collaboration, empowers. Situations, immediately discovered, quickly becomes the analysis of the reaction is shown. BAM process internal and external data integration and interoperability of enterprise decision for the group provides. The main activity of the system, detecting dangerous situations growing fast, and respond quickly to the BAM technology as the best solution

for a class of BPM, business process and analyze the data by the time they are used. Results and events in an enterprise portal (such as an enterprise business process management tool, called dashboards) will be presented. Insights dashboard of business metrics show reasonable offers. Nowadays, developed tools for integrating and and business intelligence, real standards (such as XML) and advanced software development techniques and tools, this technology makes it possible to update (Keating, 2003).

Dashboard: dashboard, essentially viewing online analytical processing. Dashboards, managers are required to provide updated information in the correct context is established. Ideally, the administrator can view the dashboard, to focus on issues important to business. Intelligent Systems business, a dashboard systems that are the foundation of enterprise information systems, information systems managers, and altered the system of OLAP, data warehouses have access to.

Artificial Intelligence Support systems (AI)

Intelligent systems: artificial intelligence is a term that describes a variety of commercial applications. Most experts agree that the AI is associated with two ideas. The first consists of the thinking processes of human AI is the AI cars will be offered through these processes (Russell, Norving, 2002). In the wake of September 11 because of the AI's ability to aid in the fight against terrorism, has attracted much attention. Another development that has attracted much attention in the AI, a large number of intelligent devices in the market (Rivlin, 2003).

AI programs: despite their limitations, are extremely valuable. They facilitate computer use and access to knowledge is widespread. A major potential advantage of artificial intelligence, increase the speed and stability of fundamental routines are common. These problems include: They solve problems that are difficult with conventional processing and data problems that they are not completely clear. Another advantage of AI, a significant increase of productivity in bulk material handling multiple tasks and help summarize or paraphrase information or to search the information is huge. Intelligent systems are: expert systems, natural language processing, speech perception, robots and sensor systems, fuzzy logic, neural processing, computer vision and scene detection and intelligent computer-aided instruction. More about this is explained briefly.

Expert System: Rule-based systems are usually consultations computer.

Natural Language Processing: discharged and understand human language makes it possible for computers.

Speech understanding: recognize words and understand sentences with a short sound the computer makes possible.

Robotics and sensors: programmable combination of mechanical and computer programs, their environment through sensors detect.

Computer vision and scene detection: interpretation of the content of the images taken by the camera to the computer, makes it possible.

Machine learning: An interpretation of the data content and data obtained by the sensors, the computer makes possible.

Handwriting recognition: recognize the signs (letters, numbers) enables handwritten notes to the computer.

Process neural network (s) using massive parallel processing, capable of identifying patterns in large amounts of data .

Fuzzy logic: enabling computers to argue with some of the information.

Intelligent agents: software programs that are applied to a superhuman or a machine.

Semantic Web: intelligent software applications that understand the web page content.

Genetic Algorithms: Combining automated analysis and computer programs.

Expert systems: try to mimic that of human experts. Expert systems, decision support, or they can be completely replaced them (Edwards, Schwab, 2003).

Expert Systems and Applied Artificial Intelligence technologies are the most successful commercially.

Arnold offered to assist in your research of intelligent decision, it is best to supplement the expert decision-makers to analyze and solve complex problems are (Arnold et al, 2004).

Typically, ES software, a decision that could be compared to a human expert, the surface of the problem in some specific domains generally be limited. ES basic idea is simple: Expertise of a specialist (or other source of expertise) is transferred to the computer. Then, this knowledge is organized and stored in the computer. If necessary, users can request specific advice to computer. Computer can understand and come to fruition. Then, like a human expert, non-expert to provide advice and, if necessary , explain the rationale behind this recommendation. ES systems can sometimes do better than an expert.

Expert System has the following benefits:

- Increased output and productivity

- Increase quality with good advice
- providing and promoting patient rather rare specialties such as medical diagnosis system
- Ability to work in dangers environments.
- access to knowledge centers and Accountability
- Increased reliability and confidence
- Increased functionality through integration with other systems of the ES
- Ability to work with incomplete or inaccurate information provided training

- improved decision-making and problem-solving capabilities
- Reduce time to decide
- Reducing sleep time engine diagnostics

Components of an expert system including knowledge base, inference engine, scratch pad (workspace), and a user interface sub system explain (justify) In the future, the system will include the refinement of knowledge. The components of an expert system are shown in Figure 5 [Turban, 2010].

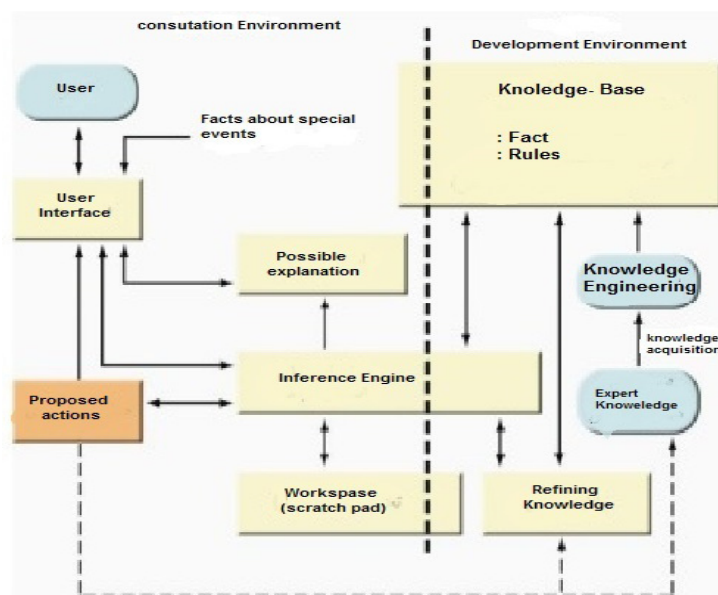


Figure 5. Process and Structure of an Expert System

One of the most useful applications of expert system, placing it as a component of other systems. Expert systems are thus integrated components or systems that have become part of a transparent process.

Advantages and applications of neural networks: the neural network technologies, including its usefulness for pattern recognition, learning and interpretation of the input is incomplete and noisy. Neural networks, have the potential to provide some of the characteristics of human problem solving simulation for decision support systems or expert systems, doors are the problem. One of these properties, Pattern Recognition 19. Neural networks are able to make large amounts of data model design and specification, when the logic or rules are unknown, analysis. Neural networks for financial applications, such as the timing of buying and selling shares (Eckerson, 2007), bankruptcy prediction (Gentry *et al.*, 2002), predicted rates (Davis *et al.*, 2001), and detect fraud. (Mercator Advisory Group, 2004), are very useful.

Neural processing beyond the processing mechanism and data mining is considered as one option, able to create a computer-based information system with the hybrid system is a powerful combination.

Genetic algorithms: are another means of machine learning, neural networks, genetic algorithms, which automatically and independently of how to solve the problem. This tool generates thousands of random computer programs, and then re-combined using principles such as mutation, selection, and amplification of the gene, Darwin's concept of natural selection applies. This tool tries to generate numerous improvements (Koza *et al.*, 2003) neural processing as an effective technology in pattern recognition, are shown. It was translated into many programs is often integrated with fuzzy logic.

Fuzzy logic: Fuzzy logic by simulating human reasoning process, in order to deal with uncertainty and the computer enables precise and logical than the old computers. Often, fuzzy logic can be used

with other intelligent systems. For example, the Advanced Passenger Information System, a convenient way to offer the traveler, the travel time is used for optimization of fuzzy nerve (Dharia, Adeli, 2003).

Hybrid Intelligent Systems: combination of two or more systems above link is known as an intelligent system often with other intelligent systems or traditional systems (like DSS) is integrated.

Web-based Executive Support System: Web is a complete environment for deploying decision support system capabilities on a global basis (Simic, Devedzic, 2003). Web-based Executive Support Systems include all types of decision support systems, including a variety of intelligent, and the hybrid. Web-based Executive Support Systems for enterprise systems are very good. The system allows access to rich data, ease of data retrieval, ease of use and learning, reduce paperwork and processing the raw data, make better decisions, made of DSS applications, reducing development costs provides.

Simulation: simulation in general DSS, as a way to conduct a computer-based model of the system is known. Semi-structured and unstructured situations such as DSS deals, including complex reality is that it may easily be analyzed using standard optimization or other models but can often be investigated by simulation. Therefore, simulation is one of the most useful tools of DSS (Law, Kelton, 1999). For example, simulate a more practical decision support tools are part of the airline industry for short-term decision (Adelantado, 2004) Among the benefits of simulation for decision support can include.

- Considering the complexity of real problems, it makes possible.
- a description.
- To examine various problems
- can show the effects of time compression.
- Can be conducted anywhere.

Conclusions

Nowadays having accurate and timely information and knowledge as competitive advantage are the key success factors in organizations. Therefore, organizations that are able to respond appropriately and optimally deploy and use the support system can be effectively realize their strategies and achieve their goals. In the past, most organizations were based on trial and error to take place. In the past, most organizations were based on trial and error to take place. Recently, with the development of intelligent support systems (BI), such as expert systems, data mining and

statistical techniques, neural networks and genetic algorithms are expected organizations to analyze vast amounts of data and detect patterns appropriate to predict the future in this area.

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