Bureau Management Technologies and Information Systems in Developing Countries

Mehmet Altınöz

Abstract—This study focuses on bureau management technologies and information systems in developing countries. Developing countries use such systems which facilitate executive and organizational functions through the utilization of bureau management technologies and provide the executive staff with necessary information.

The concepts of data and information differ from each other in developing countries, and thus the concepts of data processing and information processing are different. Symbols represent ideas, objects, figures, letters and numbers. *Data processing system* is an integrated system which deals with the processing of the data related to the internal and external environment of the organization in order to make decisions, create plans and develop strategies; it goes without saying that this system is composed of both human beings and machines. Information is obtained through the acquisition and the processing of data. On the other hand, data are raw communicative messages. Within this framework, data processing equals to producing plausible information out of raw data.

Organizations in developing countries need to obtain information relevant to them because rapid changes in the organizational arena require rapid access to accurate information. The most significant role of the directors and managers who work in the organizational arena is to make decisions. Making a correct decision is possible only when the directors and managers are equipped with sound ideas and appropriate information. Therefore, acquisition, organization and distribution of information gain significance. Today's organizations make use of computer-assisted "Management Information Systems" in order to obtain and distribute information.

Decision Support System which is closely related to practice is an information system that facilitates the director's task of making decisions. Decision Support System integrates human intelligence, information technology and software in order to solve the complex problems. With the support of the computer technology and software systems, Decision Support System produces information relevant to the decision to be made by the director and provides the executive staff with supportive ideas about the decision. Artificial Intelligence programs which transfer the studies and experiences of the people to the computer are called expert systems. An expert system stores expert information in a limited area and can solve problems by deriving rational consequences.

Bureau management technologies and information systems in developing countries create a kind of information society and information economy which make those countries have their places in the global socio-economic structure and which enable them to play a reasonable and fruitful role; therefore it is of crucial importance to make use of information and management technologies in order to work together with innovative and enterprising individuals and it is also significant to create "scientific policies" based on information and technology in the fields of economy, politics, law and culture.

Keywords—Bureau Management, Information Systems.

I. INTRODUCTION

THE terms of bureau management technologies and information systems have recently become striking. Developing countries use such systems which facilitate executive and organizational functions through the utilisation of bureau management technologies and provide the executive staff with necessary information. These practices are called information systems.

Within the framework of information systems, it is the management information system which plays the most crucial role. Management information System is composed of three main components: "management", "information" and "system". *Management* deals with making decisions with respect to organization, planning, direction, coordination and control. *Information* is a set of processed, practical and reasonable data. *System* is a structure composed of sub-components that facilitate the access to the objectives and create interaction among the other component since there are concrete components ready for the use of different departments and executive levels.

There is no common view on the concept of management information system or management informatics system, therefore information given by various institutions shape and re-shape the relevant subjects related to these concepts. Information processing system is used to refer to computer-oriented information system, decision support system or information system. Management information system is a system which carries out the processing of information relevant to the future objectives of an institution manually or through technological devices or through both options [1].

Access to computers is a must in any developing country. Computer-assisted systems facilitate management mechanisms and efficient use of information sources that support the directors and managers. This system is also known as management information systems [2].

II. DATA PROCESSING SYSTEM

The concepts of data and information differ from each other in developing countries, and thus the concepts of data processing and information processing are different. Symbols represent ideas, objects, figures, letters and numbers. *Data processing system* is an integrated system which deals with the processing of the data related to the internal and external environment of the organization in order to make decisions, create plans and develop strategies; it goes without saying that this system is composed of both human beings and machines.

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Information is obtained through the acquisition and the processing of data. On the other hand, data are raw communicative messages. Within this framework, data processing equals to producing meaningful information out of raw data.

In developing countries, data processing and information processing differ from each other because of the quality of the input. However, similar processes can also be encountered by the processes. There are three main stages in data or information processing: "saving", "processing" and "reporting". Some researchers go through a detailed explanation with respect to data processing and add the following stages as well: classification, sequencing, calculating, summarizing, data access, storing, re-utilizing, and duplicating.

The saving stage is based on obtaining the data both from inside and outside the organization and keeping data either on paper or in magnetic areas. During the saving process, the source documents should be understandable to prevent any error during the coding process. Data should be appropriate for information processing system, especially in terms of format and sustainability.

The classification stage is based on categorizing the data in line with their content, field of use, type, section and other criteria. Coding process is carried out before classification. Various methods can be used during the coding process: decimal codes, bloc codes, memory codes, sequence codes and vowel codes.

The sequencing stage is based on a systematic listing of the classified data according to certain criteria. Classification and sequencing complement each other.

The calculating stage is based on carrying out mathematical and especially four arithmetical operations by using the data. Calculators, computers and several programs are needed to carry out complex mathematical operations.

The summarizing stage is based on turning information into concrete, quantitative, and fruitful information. Data should be short and to the point. Data should be summarized after being classified, sequenced and calculated.

The processing and reporting stage is based on processing the data related to a department in an organization and reporting the relevant data to the other departments.

The chief goal of data processing is to increase the activities of the organizations which aim at carrying out executive and organizational functions successfully through the use of various data obtained from numerous sources [3]. Therefore, data processing system is a system which re-shapes the data, transforms them into information and makes them ready for the users in order to provide the managers and directors with the much-needed information.

Data processing is the saving and processing of information required for a particular work. A data processing system is based on equipments and techniques used during information processing and saving in order to carry out ordinary and extraordinary bureau activities. The data processing techniques are different and based on paper-pencil technique, complex automatic and electronic joint processing techniques, and the like. A data processing system is used for the following tasks [4]:

1. Providing information on all levels of the work to be done.
2. Providing the executive board with necessary information in case of risky decisions
3. Reporting to the executive board about the workers
4. Preparing information necessary for envisaging economic improvements in the fields of economy and marketing
5. Making economic decisions about the organizational activities

Data which are processed and transformed into information should be submitted to the users. Data processing system is a system which provides the users with the data prepared in line with a particular system. Data obtained from inside and outside the organizations are kept under protection through data saving equipments. In order to be submitted to the users, data should be processed in line with particular techniques. This is indeed the main task of the Management Information System.

III. MANAGEMENT INFORMATION SYSTEM

Every organization needs to obtain information necessary for it. Organizations need to obtain information relevant to them because rapid changes in the organizational arena require a rapid access to accurate information. The most significant role of the directors and executors who work in the organizational arena is to make decisions. Making a correct decision is possible only when the directors and executors are equipped with sound ideas and appropriate information. This is why computer technologies are used and information is stored in computers. Therefore, acquisition, organization and distribution of information gain significance. Today's organizations make use of computer-assisted "Management Information Systems" in order to obtain and distribute information.

Even though there is no definite definition of Management Information System, it can be defined as an information system that facilitates helps the directors make decisions, plan, organize, employ workers and control the organizational activities. According to Darf, Management Information System is a computer-assisted system which obtains and transfers information in order for the management staff to take efficient decisions [5]. Kreitner's decision suggests that Management Information System obtains data and transforms them into information [6]. As Kreitner suggests, Management Information System "is a computer-based network which coordinates the tasks of obtaining, processing, and transforming the information".

Information and information processing system are significant for making correct decisions at an administrative level. Information is the processed from of data [7]. "Information processing" or "informatics" is a set of processes which transform data into information. *Information processing system is a system which facilitates obtaining, storing, processing into particular formats, and submitting*

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information to the respective authorities who are expected to use information in their decision-making processes.

Information processing is similar to production activities. Whereas the production companies change the physical or chemical properties of raw materials in order to produce new products, information processing transform raw information into a new format to be used in planning, organizing, coordinating and controlling the information.

Information system is a system which facilitates the management of complex relations between the organization and its milieu and helps the administrators make decisions about different levels of administrative issues. Information system is also a system which supports informative, programmable, and partially programmable decisions. The following are the information systems which help the administrators make decisions:

1. Electronic data processing systems
2. High-level management information systems
3. Bureau automation systems
4. Decision support systems
5. Expert systems
6. Management information systems

The requirements for rapid production and efficiency make the establishment of management information systems a must. Information processing system is a component of management information processing system. Since the modern organizations have become information processing units, information has to be qualified and processed in a reasonable manner.

Management information system is a system which obtains the data resources with respect to an organization's management, provides information support to the daily activities of an organization and provides the directors at different levels certain hints which would lead to successful decisions [8]. System is an information-task system. Since the information task supersedes the labour task, professional labour employment has become very important. The workers who are dealing with the task of information processing are expected to obtaining data and turn them into information which enables the directors to make decisions and plans.

Information necessary for information processing systems can be obtained from several resources. These resources can be written sources, documents, field research, and oral sources. Organizations obtain information relevant to themselves by processing the respective data. In order to do this, organizations need to determine the information resources and obtain them. Data which are necessary for managerial operations are transformed into information through the use of written sources, documents, field research, and oral sources.

The activities related to Information Management Systems in organizations are carrying out daily bureau activities, preparing files, producing reports, researching, making inquiries, and fulfilling supportive tasks. Moreover, information systems provide information support in order for the products to be sold or bought.

Information systems should be helpful to the decision-making and problem-solving mechanisms of the management staff, particularly the high-level directors. Any kind of fruitful information should have the following qualities:

1. Information should be accurate and complete
2. Information should be easily comprehensible
3. Information should be adequate and easily accessible
4. Information should be updated and flawless

During the decision-making process, a director aims at having an access to all of the data in the computers. Making alternative decisions and deciding upon the best alternative require a rapid access and assessment of information. In general, the objective of an information processing system is to provide the decision makers with the necessary information and, where necessary, to transfer the relevant information to the authorities working outside the organizations.

IV. DECISION SUPPORT SYSTEMS

Decision Support System is a system which supports the director in any decision-making process. Decision Support System is a system which integrates human intelligence, information technology, and software in order to solve complex problems. Decision Support System produces, through computer hardware and software, information needed by the decision maker and provides the executive staff with supportive mechanisms [9].

Decision Support System operates together with Management Information System, and the former is in an interaction with the latter. Decision Support System is used in making nonprogrammable or partially programmable decisions. Decision Support System is also used to increase the accuracy level of decisions which are tactical and strategic [10].

Decision Support System differs from Management Information System in that, in the former, the manager is a member of staff inside the organization, whereas, in the latter, the manager is a member outside the organization. In Information System, the manager works as a member of staff outside the organization. The manager interacts with the information system in order to make a decision about the recurring issues. Decision Support System is a system which enables the manager to interact with the information system. In Decision Support System, management models and techniques are taken under the same heading which could facilitate interaction between the decision makers. Decision Support System can be used to make strategic plans and to control the management. It can also be used as a supportive mechanism in brainstorming, developing alternative ideas and decision making processes.

Decision Support System is composed of three basic components: communication management, model management, and data management. *Communication management* is a kind of management which is based on communication between the user and the sub-units. *Model management* is a kind of management which is based on the transfer and process of work models. *Data management* is a

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kind of management which is based on the transfer of data into the system and on the storing of the data.

The concept of manager refers to "somebody whose chief task is to make decisions". Making a decision is based on identifying the problem, determining the alternatives for the solution of the problem, choosing the best one among many alternatives, implementation of the best alternative, and controlling the implementation. A rational approach on the part of a manager is possible only when he/she has strong background knowledge about the topic under question. It is the Decision Support System which provides the manager with the necessary knowledge [11]. Management Decision Support System is based on the interaction between the manager and the computer, and participation of the decision modeling group as well as communication system group into this interaction.

Decision Support System is helpful when the manager knows some specific details. Such a case is referred to as partially programmable cases. Partially programmable problems change in line with new conditions and the experiences of the manager.

Decision Support System has some indispensable characteristics which are as follows:

1. Decision Support System should meet the needs of the manager easily and should give the manager information in the required format.
2. Decision Support Systems should be designed in line with non-structural and non-programmable decisions.
3. The modeling technique should be supporting all the decision-making processes of the manager and should be easily comprehensible
4. Decision Support System should provide the decision maker with simulation and other analysis tools in addition to the general models.
5. Decision Support System should be designed to meet the requirements for decision making and should be open to the data-base use
6. Decision Support System should be adaptive to the new systems, should be flexible to bridge the gaps in certain fields, and should be reliable and integrated to control the system information.
7. Decision Support System should be transferred to different areas through electronic tools and should be flexible and updated. It should give information in time and it should be efficient and reliable.

Management Decision Support Systems which meet the needs of planning, analyzing and communicating as well as providing information are actually designed through the addition of modeling and inquiring to the management information systems. Therefore, management support system covers management information system and serves as a sub-component of decision support system.

Decision Support System has three main components which are as follows:

a. Data base
b. Decision models
c. User interface

There are specific characteristics which should be present in Decision Support System that facilitate an easy access to the information by the managers and directors. The filing operations should be carried out simultaneously at different places, there should be an inter-documentary connection or interconnection between various documents in order to work on different references, a word or phrase which is frequently seen in a documented should be saved and be easily accessible. There should be an automatic archiving system.

The most important components of Decision Support System are data stores or data bases. The concept of data base is formed after a long-period of experience in the field, and this concept has been used in the field after the development of comprehensive software which responds to the network needs, the improvement of hardware which has large-capacity to store data masses and which is rapid as an alternative to the classic filing systems. Data-implementation freedom principally prevails in the data-base management. In other words, once data are formed, in theory, they become accessible through any kind of programming language and through any kind of implementation program.

Data are collected daily after the operational procedures or periodical implementations, and they are also arranged and they should contain necessary elements for the respective authorities' research and implementations. The collected data are transferred to data bank upon arrangement. Data bank should bring together the ordinary procedures of the organization as well as information inside and outside the organization if the aim is to provide the management staff with all the information needed at any time. Data bank can be described as place of data store to support the decisions of the management staff.

V. Expert Systems

The artificial intelligence systems which transfer people's studies and experiences to computer are called expert systems. An expert system can store expert knowledge within a limited time and can solve the solutions by following rational conclusions. Expert systems are computer implementations which show people how complex processes carried out through expertise and experience.

Expert systems are systems which enable experts to solve complex problems. Expert systems give a new dimension to the management sciences by using symbolic processes. Expert systems are based on computer procedures, as all the other management science techniques. Carefully-designed systems imitate the human intelligence in the solution of particular problems. The reason why the concept of expert systems is used here is that the system replaces one or more persons by gathering their knowledge.

Expert systems are the sub-components of a system which is defined as artificial intelligence and is still in the process of improvement. Today's computers are carrying out most of the tasks which are done by the human beings. Expert systems are

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used in calculation, speaking, memory storing, and comparison of the numbers, drawing, and similar tasks. Artificial intelligence is based on transferring behaviors unique to human beings into software.

Artificial intelligence activities are categorized into four main groups:

 a. Expert systems
 b. Natural languages
 c. Imitation of the sensory abilities of human beings
 d. Robotics

Artificial Intelligence (AI) is usually defined as the science of making computers do things that require intelligence when done by humans, some of these things are speaking, concluding, problem solving and analyzing. The artificial intelligence designs aim at identifying the procedural errors, recovering from these errors, making more improved programs, and preparing software. The activities on artificial intelligence include expert systems and artificial nerve networks as well as having contacts with natural languages by means of computers, robotic activities, and simulation of the human beings' sensory abilities.

Artificial intelligence, which is usually referred to as AI, is one of the most striking issues of recent times. One of the aims of AI is to simulate human beings' intelligence by means of machines. One of the AI fields which are very striking is robotics. Robotics is similar to human beings in terms of ability, movement, strength and view. Robotics is also called blue-collar workers because they do the tasks done by the workers.

Robotics is a sector which provides industrial production activities through the use of mechanic instruments that work with high speed and reliability beyond the ability of human beings, and it is a sector which carries out tasks that require intelligence. The second field of use for AI is expert systems. In line with these systems, major information related to a certain professional arena should be coded as a computer pack. That is, certain computer packs replace many professional people's experience and expertise.

Expert systems are a kind of computer software which processes information stored in some memory units and produce solutions to some problems that require expertise. Expert systems apply the experts' opinions which are transformed into software to particular problems. In case of a problem about which there is no solution in its memory, expert systems scan its information bank and try to find similar problems.

When an expert system makes it clear that it finds the right solution to a problem, it matches the elements of the problem with the elements in the expert system solution. In order for the solutions to be coherent and meaningful, expert systems should be designed to solve potential problems and its efficiency should be increased. Therefore, an expert system should

 a. be able to recognize the events
 b. make regressive and progressive reasoning

 c. require additional information
 d. transform reasoning into output

Expert systems are information-based information systems. In other words, expert systems are computer-based systems which submit information on basic and complex subjects. An expert system is generally a type of software which is programmed to help people make decisions and involve expert knowledge. Expert systems are a type of system which produces solutions by using information transferred to computer by experts of particular subjects.

VI. Conclusion

Bureau management technologies and information systems in developing countries create a kind of information society and information economy which makes those countries have their places in the global socio-economic structure and which enables them to play a reasonable and fruitful role; therefore it is of crucial importance to make use of information and management technologies in order to work together with innovative and enterprising individuals and it is also significant to create "scientific policies" based on information and technology in the fields of economy, politics, law and culture. In order to achieve sustainable social development, sector-based research and development activities should be encouraged, limitations on innovations, technology production and follow-up processes should be lifted, and scientific researches that produce information and technology should be supported [12].

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