INFORMATION TECHNOLOGY (IT) AND DECISION MAKING: IMPACT OF IT-ASSISTED GROUP DECISION SUPPORT SYSTEMS (GDSS) ON EFFICIENCY AND EFFECTIVENESS OF GROUP DECISIONS

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Abstract

Decision making is one of the most important functions of management. The success of any organization depends on the quality of decisions made by managers at all levels. To make optimal decisions managers require right volume of information, in the right format at the right time. But today managers are overloaded with information explosion. The development of information technology has paved the way for designing of different decision support systems to overcome the information explosion and computing difficulties. At present Group Decision Support Systems (GDSS) are widely and effectively used to make group decisions. This study probes into the impact of IT-assisted GDSS on the decision making and highlights how GDSS enhances the effectiveness and efficiency of group decision making by permitting parallelism, group memory, anonymity, real-time translation of communication among the group members in different languages, facilitating people to take part in decision making meetings from different geographical locations and eliminating the dominance of few in decision making meetings.

Key words: group decisions, decision support systems, parallelism, group memory, anonymity.

Introduction

Management is a process by which certain goals are achieved through the use of resources like people, money, energy, materials, technology, space and time. Decision-making is an essential part of every function of management. Decision-making is the choosing of an optimum course of action from several alternative courses of action. The success of an organization largely depends on the quality of the decisions that its managers make. When decision making involves large amounts of information and a lot of processing, computer-based systems can make the process efficient and effective. (Effy Oz, 2002) Technology has changed the very nature of society, business and jobs. It has changed even the nature of the work and workplace. Tasks ranging from taking orders to analysing business plans are done using computers. Recent development of information technology is bringing the work to the workers rather than the workers to the work. This paper focuses on the impact of IT-assisted group decision support systems on efficiency and effectiveness of group decision making process.

Information Technology

The digitalization of telecommunication transmissions together with the use of high-capacity optical fibre networks has brought new possibilities. Digital communication lines can carry both voice and non-voice traffic at the same time, so separate sites of the same organization, or separate operations, can lease lines for their exclusive use. Alternatively, separate operations can use one of the public integrated services digital networks (ISDNs). As a result of digitalization of technologies the services provided by telecommunication companies have increased tremendously. Today they provide services like Wireless Application Protocol, Extranet services, Home shopping, Cashless services, Video games, Home banking, Video conference, Multimedia database, Interactive video, Internet, Videotext, Mobile videotext, ATM, etc. The most significant technology to impact on business in the last few years has been the Internet. The Internet provides a synthesis of computing and communication capabilities that adds value to every part of the business cycle. Within a short span of time, the Internet, with its interconnected network of thousands of networks of computers and databases, has established itself as a technology platform free of many traditional international boundaries and limits. By connecting their business to this online global infrastructure, companies can expand their markets, reduce communications and distribution costs, and improve their profit margins without massive cost outlays for new telecommunication facilities. That is because the Internet, along with its related intranet and extranet technologies, such as client/server and virtual private networks, provides a low-cost interactive channel for communications and data exchange with employees, customers, suppliers, distributors, manufacturers, product developers, financial backers, information providers and others. In fact, all parties involved can use the Internet and other related networks to communicate and collaborate to bring a business venture to its successful completion. The breakthrough came with the development of the 'packet switching' technique which enables many messages to be sent to different locations at the same time conveniently. The internet usage in the world had been growing at an average rate of 126.4% during the period 2000-2005, and on an average 12.7% of the world population is using internet as on date. In Asia average usage growth had been 133.4% and 7.4% of the people are using internet. (Table I). In the Middle East, the UAE has an average growth rate of 51% and has an internet penetration of 29.6% highest in the region (Table II)

Decision making Process

A decision is easy to make when one option will clearly bring about a better outcome than any other. Decisions become more difficult when more than one alternative seems reasonable and when the number of alternatives is great. In business, there can be hundreds of different courses of action available to achieve a desired result. The problem is deciding on the most suitable course of action.

Herbert Simon (1960) described decision making as a three-phased process:

Intelligence	Collect data from inside the organization
	Collect data from outside the organization
	Collect information on possible ways to solve the problem
Design	Organise the data; select a model to process the data
	Produce reasonable, potential course of action
Choice	Select a course of action

The decision-making process fall along a continuum that ranges from highly structured (programmed) to highly unstructured (non-programmed) decisions. *Structured* processes refer to routine and repetitive problems for which standard solutions exist. In structured decisions, all phases – intelligence, design, and choice – are structured. The manager can use computerized clerical assistance,

data processing, or management science models to support structured decisions. *Semi structured* problems, in which only some of the phases are structured, require a combination of standard solution procedures and individual judgment. Here, a Decision Support System (DSS) is most suitable. It can improve the quality of the information on which the decision is based (and consequently the quality of the decision) by providing not only a single solution but also a range of alternatives. *Unstructured* processes are "fussy", complex problems for which there are no cut-and-dried solutions. In unstructured problem none of the three phases - intelligence, design, or choice – is structured (Turban, 1999).

Individual Decision Making

In individual decision making the final decision is made by an individual manager. The individual may share ideas with others, but does not have to agree with any other person about the data collected, the ideas raised, or the decision made. At present business, and the environment in which it operates, is becoming more and more complex primarily due to the technological revolution, research and development, product changes and information explosion. Managing in such a complex environment involves the executive in dealing with ever-increasing variables, with the result that more information is available than manager can effectively handle. Irrelevant information may overload decision-maker and lead to inferior performance (Ackoff 1967; Lucas 1975; Hollnagel 1987), whereas, relevant information leads to better decision-making. (Cook 1968; Adams and Swanson 1976; Zmud 1979; Ahituv and Neumann 1987; Keller and Staelin 1987; Nichols 1987). Thus, in order to be productive, the management does not need more information but right volume of right information at the right time. If the growing demand for right information is to be satisfied, organisations must improve their ability to retrieve specific information, as per requirements. Management Information Systems (MIS) provide information to decision maker in a timely, accurate, and complete manner at a minimum of cognitive and economic cost for acquisition, processing, storage and retrieval

Group Decision Making

Individual managers seldom have access to all relevant information, hence when important decisions have to be made, a group is typically formed to make the decision or to advice the individual who must make the decision (Hackman and Kaplan, 1974). Groups should make better decisions because, groups have access to a larger pool of information than any of their member acting alone (Hills, 1982), have greater ability to detect errors than any single member (Hackman and Kaplan, 1974; Hill, 1982) and can potentially achieve performance that exceeds the performance of the group's most competent member. In fact, at present most decisions are made collectively. But the main problems in group decision-making have been the explosion of decision-maker meetings, the growing length of those meetings, and the increased number of attendees. Estimates on the amount of manager's time spent in meetings range from 35 to 70 per cent (Lauden 1996). Moreover, information exchange in group decision making is often done poorly; a lot of unique information known to some group members is never shared with the group (Stasser, 1992). Individuals, particularly low-status participants, may withhold information out of apprehension about the group's reaction to it or may feel pressured to conform to the views of the group majority (Hackman, J.R., and Kaplan, 1974; Lamm, and Trommsdorff, 1973). This unique information can be important, leading to poor decisions when it is not considered. The focus on groups and group works and the problems associated with group decision-making have necessitated the MIS designers to design Systems that support group decision-making, where greater information is used.

Exchange and Use of Information in Group Decision Making

In decision-making situation, group members know a host of information about possible alternatives. This information shapes members' prediscussion preferences and, as members communicate information during discussion, shapes the group's decision (Dennis, et. al., 2001). In order to reach a group decision, members engage in three activities simultaneously: information recall (either from memory or notes), information exchange (either giving or receiving information), and information processing (using the information: assessing the cognitive and social implications of the information and storing it in memory) (Briggs, 1995 & Briggs, et al., 1997). Human beings have a limited amount of cognitive resources to spread across these three activities (Ball and Zuckerman, 1992). Most people can engage in only one activity at one time, so that engaging in any activity limits the ability to engage in the others (Lamm and Trommsdorff, 1973)

Group Decision Support Systems

GDSS is an interactive computer based system that facilitates the solution of semi structured and unstructured problems by a group of decision makers. Components of a GDSS include hardware, software, people, and procedures. A GDSS can support multi-user problem solving and decision making in the same or different geographical areas: either in the same location (face-to-face in a conference room) or dispersed throughout a building or across continents (distributed, not face-to-face) (Gallupe, Bell and Yates 1990). Moreover, the group members can work synchronously or asynchronously ("logging on" to the group "meeting" at different times) irrespective of the geographical orientation (Dhaliwal and Tung 2000). GDSS usually use a special meeting room, where each participant is seated at a networked computer. A facilitator operates the network and keeps the discussion moving in the right direction. Typical meetings begin with a brainstorming session, where participants are asked to think of ideas, problems and potential solutions. They type each of these into categories on their computers. These ideas and suggestions are stored in a database and shared with the group through the networked computers. The facilitator chooses individual items and projects them on a central screen for the entire group to analyse, discuss and comment. Participants can key in comments or criticisms of any idea at any time (Post and Anderson 1997). The facilitator controls which phases of the process the group moves to - idea generation, discussion, voting, vote counting, and what type of ranking and voting takes place (Effy Oz, 2002).

Impact of IT-assisted GDSSs on Decision Making

GDSS provides new opportunities for information exchange. One of these is electronic communication that can augment or replace verbal communication. This electronic communication provides a package of many different components, each of which introduces new dynamics into the information exchange and use:

Parallelism: All group members enter information at the same time. All group members have computer workstations, which enable them to contribute information and options by typing ideas, which are immediately shared with all other members. Since all members can type at the same time, no participant need wait for others to finish before contributing information. This parallelism mitigates the blocking that inhibits the exchange of information in verbally interacting groups (Valacich, et al., 1994), where views are voiced in a round-robin fashion.

Group memory: All remarks typed into the computer are stored so that group members can refer to them later in the discussion. One of the key problems in verbal discussion is that listening to group discussion blocks processing of new information, and information

processing blocks the reception of new information from discussion. A group memory enables members to enter or read information at their discretion; they can more easily pause to recall and process information without risk of missing information (Dennis, 1996)

Anonymity: In face-to-face meetings, people are often too shy to raise ideas that their peers may judge as "crazy", even though they are often the best ideas. The GDSS protects the participant's anonymity. In some installations, the monitors are recessed in the desks for further privacy and for ergonomic reasons. Group members can make contributions without attaching their names, which may motivate them to participate differently. Anonymity may reduce the reluctance to contribute information that contradicts the dominant group preference (Nunamaker, et al., 1991). Minorities often express their arguments more frequently and persistently when they communicate anonymously through GDSS than when they communicate verbally.

Elimination of Dominance of few: GDSS has eliminated the typical phenomenon of a few people dominating decision-making meetings. The system displays the anonymous comments on the central screen, tallies votes, and outlines options. Verbal interaction is allowed but kept to a minimum by the facilitator.

Multilanguage display: In this era of globalization many companies are multinational corporations and many others are in the process of becoming multinationals. The representatives from different companies and countries use this facility for negotiations. GDSS can be designed with interpreters to ensure real-time translation of all communication among the group members. When using software tools, each person sees the output in his own language. Documents are generated and displayed in multiple languages. (Effy Oz, 2002)

Facility to participate in group meetings from different Geographical locations: The present day Information Technology facilitates the conduct of meetings entirely on a computer network facilitating people to be at different geographical locations but still participate in the decision-making process. The professionals waste plenty of time and money flying from one place to another to participate in various decision-making meetings. By the judicious implementation of GDSS these professionals can be at a particular place and yet participate in the decision-making meetings convened at different geographical locations. Thus by the appropriate utilisation of Information Technology the services of these professionals can be optimally used with the least wastage of their energy and time, at a relatively lower cost.

Conclusion

The growth of information technology has enabled the decision makers to use decision support systems in individual and group decision making process. The use of IT-assisted group decision support systems has a high degree of impact on the group decision making process. It enhances the efficiency and effectiveness of group decision making by permitting parallelism, group memory, anonymity, real-time translation, facilitating people to take part in decision making meetings from different geographical locations and eliminating the dominance of few in decision making meetings. The GDSS enables everyone to enter comments at the same time, which is faster than waiting for one's turn. Voting is done on the computer and results appear instantly. Also enables group members to process information more thoroughly because it provides a group memory that enables members to review information at will. Anonymity ensures that attendees can contribute without fear of personally being criticised or of having their ideas rejected because

of the identity of the contributor and the idea will be objectively evaluated on its merits rather than on the basis of the source of the idea. GDSS eliminates the dominance of few, where verbal interaction though allowed is kept to a very minimum by the facilitator who controls the proceedings at the group meeting. The Multilanguage display and real-time translation of all communication facilitates the discussion of members conversing in different languages. People can be at different geographical locations but still participate in the decision-making process. Thus IT-assisted decision support systems enhance efficiency and effectiveness of group decision making process. Use appropriate decision support systems and enhance the efficiency and effectiveness of your decisions.

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Table I
World: Internet Penetration & Usage growth rate

Regions	Internet Usage 2000-2005	Usage Growth	Penetration (% Population)
Africa	12,937,100	186.6 %	1.4 %
Asia	266,742,420	133.4 %	7.4 %
Europe	230,923,361	124.0 %	31.6 %
Middle East	17,325,900	227.8 %	6.7 %
North America	218,400,380	102.0 %	66.5 %
Latin America/Caribbean	55,279,770	205.9 %	10.1 %
Oceania / Australia	15,838,216	107.9 %	47.4 %
WORLD TOTAL	817,447,147	126.4 %	12.7 %

Source: internetworldstats

Table II
Middle East Internet Penetration & Usage growth rate

Nations	Internet Usage (2000-2005)	Use Growth	Penetration (% Population)
Bahrain	195,700	389.3 %	27.7 %
Iran	4,800,000	1,820.0 %	7.0 %
Iraq	25,000	100.0 %	0.1 %
Israel	2,000,000	57.5 %	28.6 %
Jordan	457,000	259.0 %	7.9 %
Kuwait	567,000	278.0 %	22.4 %
Lebanon	400,000	33.3 %	9.0 %
Oman	180,000	100.0 %	7.5 %
Palestine (West Bk.)	145,000	314.3 %	3.6 %
Qatar	126,000	320.0 %	16.4 %
Saudi Arabia	1,500,000	650.0 %	6.9 %
Syria	220,000	633.3 %	1.2 %
Turkey	5,500,000	175.0 %	7.5 %
United Arab Emirates	1,110,200	51.0 %	29.6 %
Yemen	100,000	566.7 %	0.5 %
TOTAL Middle East	17,325,900	227.8 %	6.7 %

Source: internetworldstats

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