Group Support Systems: Tools for HR Decision Making

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Abstract. Recently, many quantitative or qualitative techniques have been developed to support human resource management (HRM) activities, including Human Resource Information System (HRIS). More importantly, HRIS can include Expert System (ES), Decision Support System (DSS), and Executive Information System (EIS). As DSS and Group Support System (GSS) are able to facilitate human resources (HR) groups to gauge users' opinions, readiness, satisfaction, etc., increase their HRM activity quality, and generate better group collaborations and decision makings with current or planned HRIS services. Consequently, GSS can help HR professionals exploit and make smart use of soft data and act intelligently in their decision making process. This paper presents an in-depth discussion on what GSS is and how it works, which may shed some enlightenments to HR professionals on what grounds GSS can be integrated as part of HRIS and support HRM.

Keywords: Decision Support System (DSS), Group Support System (GSS), Group Decision Support System (GDSS), human resources (HR), human resource management (HRM), Human Resource Information System (HRIS)

1 Introduction

Decision making is not necessarily a group phenomenon. However, with the growth of team work, team decision making has become a common process in business and organizations. Often these teams are dispersed geographically which makes group decision making difficult and costly. The development of group support system solved the problem and enhanced group decision making process because this technology facilitates communications of information among remote team members. Group support system was developed after the appearance of decision support system, another important technology for decision making for organizations. In the late 1960s, a new

type of information system came about; model-oriented DSS or management decision systems. By the late 1970s, a number of researchers and companies had developed interactive information systems that used data and models to help managers analyze semi-structured problems. These diverse systems were all called *decision support systems* (DSS). From those early days, it was recognized that DSS could be designed to support decision-makers at any level in an organization. DSS could support operations, financial management and strategic decision-making.

Group decision support systems (GDSS) which aims at increasing some of the benefits of collaboration and reducing the inherent losses are interactive information technology-based environments that support concerted and coordinated group efforts toward completion of joint tasks [10]. The term *group support systems* (GSS) was coined at the start of the 1990's to replace the term GDSS. The reason for this is that the role of collaborative computing was expanded to more than just supporting decision making [23]. For the avoidance of any ambiguities, the latter term shall be used in the discussion throughout this paper.

Human resources (HR) are rarely expected like other business functional areas to use synthesized data because HR groups have been primarily connected with transactional processing – getting data into the system and on record for reporting and historical purposes [11]. For them soft data doesn't win at the table; hard data does. In most of the business functional areas, data collected from transaction processing systems (TPS) may not exhibit much sense to managers before they are processed. Whereas after being processed with certain software, they can produce significant value to managerial decision making to the extent that information gathered from the processed data can be the determinant of the final decision. Data collected for HR through TPS on the other hand seldom requires further processing or synthesis. However, the HR decision making process may require human determinants, computers, information systems, and communication technology in addition to the soft data, especially in collaborative decision making where anonymity may play a key role. Data generated and/or collected from these sources for the decision making are more facilitating and decisive, thus making them the more vigorous, powerful and hard-earned data in HR decision making process.

Recently, many quantitative or qualitative techniques have been developed to support human resource management (HRM) activities, classified as management sciences/operations research, multiattribute utility theory, multi-criteria decision making, ad hoc approaches, and human resource information systems (HRIS) [7]. More importantly, HRIS can include the three systems of expert systems (ES), decision support systems, and executive information systems (EIS) in addition to transaction processing systems and management information systems (MIS) which are conventionally accepted as an HRIS. As decision support systems, GSS is able to facilitate HR groups to gauge users' opinions, readiness, satisfaction, etc., increase their HRM activity quality, and generate better group collaborations and decision makings with current or planned HRIS services. Consequently, GSS can help HR professionals exploit and make smart use of soft data and act more intelligently in their decision making process.

The paper will first discuss what GSS is and the strengths and weaknesses of GSS. Understanding of GSS, its pros and cons in particular, can assist HR professionals to appreciate its functions and values in the decision-making process of HRM. Then recent

research findings in GSS will be discussed with a hope of stirring up an inspiration in the e-HRM research on the application of GSS in HRM. Finally, future trends of GSS will be briefed to promote the incorporation of the improvements in communication technology for better collaboration in HRM.

2   Group Support Systems

In the early 1980s, academic researchers developed a new category of software to support group decision-making. Execucom Systems developed Mindsight, the University of Arizona developed GroupSystems, and researchers at the University of Minnesota developed the SAMM system *[24]*. These are all examples of early Group Support Systems. "A Group Support System could be any combination of hardware and software that enhances group work. GSS is a generic term that includes all forms of collaborative computing" [27]. The increased need for GSS arises from the fact that decision-making is often a group phenomenon, and therefore computer support for communication and the integration of multiple inputs in DSS is required. The desire to use GSS therefore comes from the need of technological support for groups.

GSS *are* designed to remedy the dysfunctional properties of *decision*-making *groups, such as groupthink, lack of coordination, information overload, concentration block, etc.* These systems are becoming popular in aiding *decision*-making in many organizational settings by combining the computer, communication, and *decision* technologies to improve the *decision*-making process. These systems use a key tool to improve the quality of *decisions made by a group.* This key tool is the anonymity of members of a *decision*-making *group*. The purpose of GSS is to maximize the benefits of group work, while minimizing the dysfunctions of group work. This maximization and minimization can be made possible by GSS mainly by two factors: anonymity, which is enabled by removing the identifications of those who are contributing ideas and parallelism, which refers to ideas from contributors can flow to the facilitator simultaneously via electronic media without additional interference. In this way, genuine idea generation and communication are maximized and interfering factors are minimized within the group, especially a hierarchical group.

2.1   Strengths and Weaknesses of GSS

GSS provides support for communication, deliberation, and information flow especially for group activities that may be distributed geographically and temporarily. Group work has numerous benefits and advantages. First, groups are better at understanding problems and catching errors than individuals [15], [16]. Second, a group has more information than any one member which when combined can create new knowledge. Third, working in a group stimulates creativity and synergy. Finally, groups balance out the risk-tolerant and risk-averse. GSS offer many benefits. First, GSS support parallel information processing, parallel computer discussion, and generation of ideas. Second, they promote anonymity, which allows shy people or those who do not want to disclose their identities to contribute and helps prevent aggressive individuals from driving the meeting. Finally, these systems help keep the group on track and show the bigger picture. The two keywords here are parallelism and anonymity [27].

Some of the potential dysfunctions of group work are not automatically eliminated by GSS: first, groupthink, as suggested above, where people begin to think alike and not tolerate new ideas; second, lack of coordination, excess time consumption, poor quality solutions, and nonproductive time; third, duplication of efforts and high cost of

meetings, including travel; finally, information overload, concentration blocking (disturbance from inappropriate influences, free-riding discussions), and group misrepresentation (improper or badly chosen groups) can be added as the potential dysfunctions of group work. Process dysfunctions are caused by structural characteristics of the group setting that could hinder a group from reaching its full potential. Process dysfunctions hinder productivity because of unequal participation or unequal air time. This happens in a setting where only one person can take control of the floor. This sort of dysfunction can be countered by the use of computerized exchanges because people may enter their comments and thoughts simultaneously. Power [24] utters that simultaneous expression of ideas may be beneficial to the quantity of ideas generated. This is because computers have the capacity for concurrency. Finally, process dysfunctions are usually caused by limitations in the structure and forms of meetings.

Social dysfunctions, as Power [24] describes, can hinder group productivity through undesirable social processes that occur in the group. Social processes refer to those activities, actions, and operations that involve the interaction between people [8], [20]. For example, a group may limit the quality and quantity of input from any of its members by social processes such as evaluation apprehension, conformity pressures, free riding, social loafing, cognitive inertia, socializing, and domination due to status imbalance, groupthink, and incomplete analysis. These problems arise from processes present in all groups and are rooted in the ways in which group members change their behavior to adapt to the group. Finally, the prevalent analysis of group decision-making is that social influences within the group lead the rational individual astray.

The view of GSS portrayed by Power [24] is that they are text-based tools made with purpose of remedying some problems of *decision*-making in co-present *groups.* These *systems* claim to remove the social obstacles that prevent individuals from attaining their full potential in the *group.* Anonymity is central to achieving this full potential of individuals in a group. Shy people tend not to speak in a group discussion face-to-face. This hinders them from contributing to the group. GSS solve this problem by allowing these individuals to evade their shyness in the public and input their contributions through individual human computer interaction devices, thus achieving the goal of removing this social obstacle from these individuals and facilitating them to reach their full potential in the group. Meanwhile, the systems help prevent aggressive individuals in the group from driving the meeting, which is typically a potential intimidating source to the shy people in a group.

2.2   Recent GSS Research Findings

Decision-making in an organization today has become more the work of some form of group. Whether this group is a board, team, or a unit, important issues can be at stake. It is fair to ask, given the possible problems that occur in a group setting: Would the group setting have a negative effect on the quality of decisions that have to be made by the group? Current research in this area suggests that GSS, if implemented and used correctly, can improve the quality of group decision making significantly by minimizing the negative effects of group decision-making and by maximizing the benefits of group collaboration and decision-making. GSS have come a long way since their inception. Current and previous research efforts have made significant findings on the effects of the numerous criteria that affect the decision making process in a group setting while using GSS. The results show that while the Internet has made it easier and less costly to use GSS than ever before, the social effects of group decision making can have a

significant effect on the quality of decisions made in a group setting using GSS. By manipulating things such as visual cues, group versus individual-based incentives, anonymity, group size, feedback, leadership role, communication mode, type of tool used, social presence (degree of personal connection in communication settings) [13], [18], [21], face-to-face versus distant, shift work or non-shift work, the fit between facilitation style and agenda structure, and finally, a relationship versus a task focus, it is possible to significantly impact the quality of decisions made by a group using GSS.

According to Barkhi, Jacob, and Pirkul [3], GSS are divided into two groups; Distributed GDSS(DGDSS) and face-to-face GDSS(FGDSS). DGDSS groups consist of members who use a GSS at the same time but at different places. On the other hand, FGDSS groups consist of members who use a GSS at the same time and same place. The authors studied and compared the decision process and outcomes of groups that use FGDSS to those that use DGDSS. The results indicate communication mode and incentive structure can influence the effects of each other. Therefore, the appropriate design of incentive structures may be important to the success of virtual organizations.

The Web-based Multi-Criteria Group Support System (MCGSS), according to Lu et al., [17], Zahir and Dobing [28], is designed so that users can enter their preferences in an easily understood and user-friendly interface through a web browser. They state that easy-to-learn and user-friendly interfaces are essential if GSS are to become more commonly used in organizational decision-making and that MCGSS uses a new visual mode of preference entry. The relative importance of any two objects is expressed through a pair of side-by-side bars drawn in a graphical window. The ratio of the heights of two bars represents the user's relative preference for the two objects. Bar heights can be adjusted dynamically by dragging the mouse or utilizing some other device. Their article presents the design of a web-based MCGSS that can be used by a group of geographically dispersed decision-makers. This system takes advantage of Internet technology and enables a novel procedure to aggregate intensities of preferences.

In line with Kim [14], the role of leadership facilitates group processes by adding structure to group interaction. The effects of leadership on group performance in GSS settings still remains one of the least studied areas of GSS research. An analysis of comments by group leaders show that they are more efficient when making comments on group objectives and interaction structure, but this is only true in the early stages of group interaction. In the later stages, it is of increasing importance that group leaders make comments that encourage interaction and maintain cohesion between members of the group. Dennis and Wixom [9] presented a meta-analysis investigating five moderators. These moderators are as follows; tool, the type of group, task, the size of the group, and facilitation. The authors studied their effects on GSS. Results of the study draw multiple conclusions. First, process satisfaction is less for decision-making tasks than it is for the idea-generation tasks. Second, the GSS tool itself influences decision quality. Finally, the authors conclude that group size is an important moderator when it comes to measuring satisfaction with the process and decision time.

Rutkowski, Fairchild, & Rijsman [26] demonstrated experimentally that in the context of dyadic conflict, patterns of interpersonal communication, supported by a particular Group Support System technology, affect the quality of decision making. The authors found that GSS are efficient tools that support inter-group communication and relations. The authors also delved further into this topic and discussed the implications of their research on the study of intercultural negotiation and conflict resolution. They observed

that groups are becoming increasingly important in organizations and that intercultural negotiation and conflict resolution use electronic groupware to facilitate communication and workflow. Barkhi [2] compared the performance and information exchange truthfulness of groups under these various experimental conditions. The author utilizes a game theory perspective to study the behavior of members in these groups. The results indicate that communication channel and incentive structure mitigate strategies that lead to decision choices and information exchange truthfulness among members in a group.

GSS can improve communication and learning as demonstrated by Bandy and Young [1]. Their study examined the impact of two collaborative technologies and a priming agent upon communication complexity and learning style in a group decision-making context. Their findings revealed that communication complexity was significantly greater in groups using a GSS compared to groups using a simple chat system, suggesting that characteristics of the GSS served to structure discourse among group members. Burke [6] examined how GSS learning environments (face-to-face vs. distant) and task difficulty level (simple vs. difficult) influenced participation levels and social presence among accounting students working collaboratively on an accounting task.

Hostager, Lester, Ready, & Bergmann [12] examined the effects of agenda structure and facilitator style on participant satisfaction and output quality in meetings employing GSS. This study indicates that GSS facilitators should try to find a fit between their facilitation style and the agenda structure, while not forgetting to adopt either a relationship or a task focus and ensuring that they are consistent with their choice. GSS are designed as an analysis tool to support the decision processes of a group. Inherent in the design is the developer's desire to make the basic meeting process better either by increasing process gains or reducing process losses. Further, it is suggested by Martz and Sheperd [19] that one way that GSS attack these losses is by providing immediate feedback.

2.3   GSS in the Real World

There are three options for setting up GSS technologies. One of them is in a special-purpose decision room, another is at a multiple-use facility, and the third is a web-based groupware with clients running wherever the group members are.

2.3.1   Facilitating Meetings

One example of the use of GSS is the system developed by a group of researchers of the University of Arizona to facilitate the organization of meetings. A typical meeting room consisted of a microcomputer for each participant, as well as a large projector for the display of either individuals' work or the combined results of the group efforts. A typical meeting is composed of a three-tier process consisting of electronic brainstorming, idea generation, as well as voting. Under the electronic brainstorming phase, all group members typed at separate terminals using electronic brainstorming software, and recorded their ideas regarding questions posed for the day. Even though these sessions were anonymous, everyone could see the abundance of ideas. Additionally, an issue analyzer assisted the group in identifying and consolidating key ideas generated from the idea generation. Lastly, a voting tool provided various methods for prioritizing key terms. Here, even though voting is anonymous, the results are readily displayed for all to view. This GSS by Nunamaker et al [22] was used at an

IBM site. It was found that process structure helps focus the group on key issues and discourages irrelevant digressions and unproductive behaviors.

2.3.2 Web-Based GSS

A web-based decision support system (DSS) is a DSS built with web technologies so that the DSS users access with web browsers through an internet connection. In addition, web-based DSS applications that are developed by companies may be deployed on company intranets to support internal business processes or can be integrated into public corporate websites to enhance services to trading partners [25].

Most web-based DSS are currently individual DSS systems [4]. On the contrary, web-based *GSS*(GSS) provide a broader approach to solving complex problems that are less structured. As noted earlier, there are a few web-based GSS and one of them, GroupSystems, is a local area network-based client-server that exists for online collaboration. Several commercially available web-based GSS products also contain decision-making tools. These products provide support to the group decision-making process with tools that facilitate brainstorming, idea generation, organization, prioritization, and consensus development.

2.3.3 Distance Learning

Several courseware packages that have GSS functions facilitate distance learning. They range from such tools like Blackboard, through Microsoft NetMeeting, to PlaceWare Virtual Classroom. Distance learning, as a tool, can be an effective part of GSS. Many corporations have taken advantage of it mostly through web-based streaming and other private company intranets. Distance learning, therefore, can act as a strong collaborative and knowledge management tool in GSS, with a distinctive feature, namely, being accessible every hour of the day.

2.3.4 GSS for Political Events

The multi-faceted use of GSS is reflected in the dynamism inherent in organizational structures. For instance, political risk associated with corporations' decisions to expand internationally could be alleviated using GSS. This is because the key to analyzing political events is obtaining good information about these events. GSS thus provides higher reliability in accessing this needed information, through anonymity, simultaneity (may apply only to certain types of GSS), and documentation, features that are lacking in face-face interactions. Among other advantages, anonymity offers participants a greater degree of freedom in expressing their thoughts, and presents them with a greater sense of confidence to be more critical. Blanning & Reining [5] suggest a two-characteristic framework depending on whether analysis of the event under consideration is static or dynamic, as well as whether the analysis is one-dimensional or multi-dimensional.

3 Future trends of GSS

GDSS is transforming into GSS and the same ideology used for enhancing group meetings is being used in other areas as well. The idea is not just to increase the effectiveness of decision-making, but to incorporate the current improvements in communication technology to redefine collaboration. Anonymity is also becoming more and more widespread in this new Internet culture; its effects on collaboration are very interesting as discussed, e.g., allowing shy people to contribute and helping prevent

aggressive individuals from driving the meeting. The findings presented in this paper uncover the social effects that might affect group work. These findings can also be applied to other fields in which collaboration is experiencing growth as in education and social networking. By combing the Internet, emerging technologies, and the findings in social behavior as they relate to group work, with the exploding growth currently being experienced in communication, the results and the rate of introduction of new ways of collaborating will be absolutely amazing.

4   Conclusions

GSS, if implemented and used correctly, can improve the quality of group decision making significantly by minimizing the negative effects of group decision-making and by maximizing the benefits of group collaboration and decision-making. GSS have come a long way since their inception. Current and previous research efforts have made significant findings on the effects of the numerous criteria that affect the decision making process in a group setting while using GSS. The results show that while the Internet has made it easier and less costly to use GSS than ever before, the social effects of group decision making can have a significant effect on the quality of decisions made in a group setting using GSS. Based on the unique functionalities and by manipulating things such as visual cues, group versus individual-based incentives, anonymity, group size, feedback, leadership role, communication mode, type of tools used, social presence, face-to-face versus distant, shift work or non-shift work, the fit between facilitation style and agenda structure, and finally, a relationship versus a task focus, it is more than likely possible to significantly improve the quality of decisions made by a HR group using GSS.

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