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AN ENHANCEMENT MODEL FOR REQUIREMENTS OF KNOWLEDGE SHARING IN GROUP DECISION SUPPORT SYSTEM (GDSS)

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8.1 INTRODUCTION

This book chapter will focus on the current literature of GDSS followed by knowledge sharing requirements of GDSS. In modern GDSS, the main challenges include decisions are strange, complex and dependent on knowledge especially when it is in a form of group [3]. Group decision making however will resulted to group members may leave, give resignation, or be removed. Newly recruited members of the group need to learn how previous decisions were completed and how knowledge being accessed. All these circumstances may reduce group collaborations. Knowledge can be ambiguous and time consuming when people are distances to get together; therefore, organizations cannot afford to make knowledge drafted and maintained. Having these challenges, there is increasing concern to find the requirements of knowledge sharing in order to enhance GDSS. The exchanged data and information should be recorded and data should be generated in a form of knowledge to be used as explicit knowledge to groups. This research combines some helpful knowledge sharing concepts to enlarge the facilities of GDSS, including knowledge sharing requirements to enhance GDSS.

8.2 OVERVIEW OF GDSS

8.2.1 Definition of GDSS

GDSS can be defined as “an interactive computer-based system that assist finding to solve formless problems by a group of decision makers operating as a group together” [7] or “as computer-based systems, that facilitates two or more clients slotted in a general mission (or goal) and that present an interface to a shared atmosphere” [8] GDSS require real time access to shared data, computer applications which provide structure to group work, and advanced user interface concepts. The key to make groups more productive is to allow a high degree of parallel activity and access to shared data. Users are capable to work; reach decisions, and interchange ideas in parallel and somewhat independently and in different places of a shared task.

8.2.2 Previous GDSS Research Review

In the mid 1980's GDSS research was primarily conducted in university research laboratories as well as organizational grounds, and its attention was directing experimentations as the technologies were growing [15]. The conducted studies mostly tried to examine the distinction between GDSS-supported groups and conventional groups. They mainly determined to find out its effects on performance, participating, user conflict and attitudes.

Several experiments on GDSS have examined effects of supported GDSS comparing to non-supported GDSS on the performance of user. Their completed outcomes showed a bit conflicting image with view to quality of decision and decision time. The outcomes were uncertain and unconvinced. They found that a number of researches have shown using GDSS enhances decision

quality when compared to non-supported GDSS. While different researches have revealed the use of GDSS have no influence on the decision quality. When comparing GDSS with structured manual treatments they identified that the use of GDSS develops decision quality. In majority of the research compared by the writers explains that there is no different distinction in decision quality involving GDSS and manually ordered groups.

With the increasing usage of decision quality and wide volatility in its approaches to groups, we introduce three levels of GDSS systems to provide different group decision-making processes:

- (a) Level 1: Systems intended removing communication barriers, presenting voting features, and accommodating unknown input of member ideas to assist a better information exchange among members in a group.
- (b) Level 2: Systems offer decision models and decision making techniques intended to minimize ambiguity for group decision making processes.
- (c) Level 3: Systems contain features intended to offer expert recommendation and direction in order to control the pattern, content of information exchange or timing.

In GDSS, user behaviors or attitudes is considered as vital to approval and agreement of group technology, particularly when it is related to organizational settings [14].

Number of studies suggested that GDSS could demonstrate fewer satisfactions compared to non-support groups, while other studies suggested an improved stage of satisfaction from use of GDSS. Electronically brainstormed in GDSS was better compared to verbal communication in vast groups as there was no significant distinction between small groups using electronic brainstorming and small groups communicating verbally [2].

8.3 CURRENT STATUS OF GDSS

GDSS is widely considered one of most important types of Decision Support Systems (DSS) especially with the addition of knowledge sharing. Majority of organizations accepted that improvement of group support systems is a longstanding interest to organizational researches. Within this domain, there is an increasing interest to implement new technologies to increase information accessibility of organizational groups, in order to enhance its capability.

In modern group support systems, a group decision occurs as the result of interpersonal communication which means the swap of information among members. The communication activities include opinion exploration, analyzing, socializing, information seeking, information giving, proposal development and negotiation [3].

Today GDSS is adapted for a group of people who initiates collaboration in order to improve integrated systems which can develop complex decision making. This GDSS is classified within a time-place paradigm which means they can be on the same time at same place or different places on different times.

8.4 GDSS WITH OUT KNOWLEDGE SHARING

Most of researches done on GDSS concentrated on group tasks, products, behavior, satisfaction, decision quality, and communication used or techniques accessed, but a few researches focused how knowledge could be shared or exchanged and how this knowledge should be stored. Knowledge sharing is an activity or process through which knowledge, information, skill or expertise is exchanged among group members.

- (a) **Information Sharing in GDSS:** According to research done by [17] studies on GDSS have examined the impacts of information exchange in GDSS groups with decision making. But they found merely a useful of researches assess information interchange in GDSS groups appealing in decision making activities (9, 10 and

6).

GDSS were discovered to exchange large information generally than oral groups [6], have extra probable to demonstrate influenced information exchange to support their favorites than face to face groups [9]. Moreover, GDSS failed to employ information that was shared throughout dialogue, mostly single information [10]. Individuals of a workgroup require being capable sharing information with each other in different methods. A single file on database of shared information can be formed, and each user can utilize database technology to retrieve the database.

They found several problems to apply information sharing with database. Firstly is the complexity accessing database technology to distribute information because the information does not match the database method. With information sharing technology consist several various forms of information, counting transcripts, images, worksheets, databases, digital videos, and sounds which is difficult to put on shared database. Next is when sharing information a user may not retrieve appropriate information instantly and also applying information sharing efficiently demands that all users of a workgroup observe the shared information on an ordinary source. Moreover groups mostly are not in similar position at the similar time which will result to lack of cooperation.

8.5 REQUIREMENT OF KNOWLEDGE SHARING IN GDSS

8.5.1 Definition of KS

Knowledge sharing (KS) is defined as the process of exchanging knowledge (skills, experience, and understanding) among people, community, organization, or groups [11]. Before groups share knowledge, individual group members should follow several knowledge sharing processes. These process includes a serial steps in

order to share knowledge and information or data known as knowledge acquisition and knowledge storing.

8.5.1.1 Knowledge Acquisition

Knowledge acquisition is the process of acquiring knowledge from a human expert to be used by an expert system. This process is commonly defined to include the obtaining and extracting the knowledge from human expert [12]. In most organizations, groups face difficult situations in order to acquire knowledge. One reason for this is that most of group members reluctant to give knowledge especially when knowledge is required from human experts. The process of knowledge acquisition in GDSS setting can be classified into four stages: knowledge acquisition planning, extraction of knowledge, analyzing knowledge, and verification of knowledge [12]. This is demonstrated in Figure 8.1.

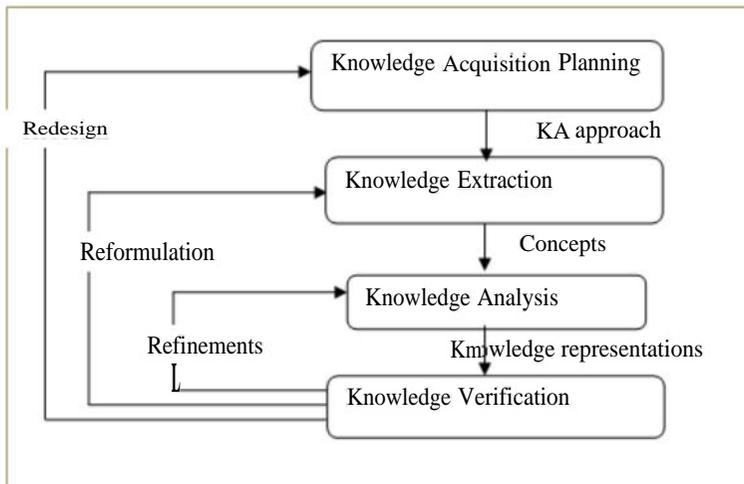


Figure 8.1 Knowledge Acquisition Phases Inside GDSS Environment Setting [12]

(a) Knowledge acquisition planning: The main objective of this stage

is to analyze different knowledge acquisition methods and designing appropriate processes to obtain knowledge. Most important steps in this stage is to understand the domain, to define problem range, to identify the category of application, to analyze characteristics of the problem, to analyze uniqueness of tools supporting the group, to develop process forms, to identify experts, and to plan sessions of knowledge acquisition. After this stage is complete, the knowledge gaining period is recognized and processes to perform knowledge gaining sessions are extended.

- (b) Knowledge extraction: The main objective of this stage is to obtain knowledge from individual expertise via sequence of knowledge acquisition conferences. In this stage, every session has special activity and everyone uses particular knowledge acquisition methods in combination with tools supporting groups. Through every particular session, knowledge drivers have to clarify the session purpose, the method to acquire knowledge, and the expecting outcomes.
- (c) Knowledge analysis: This stage examines the outcomes of knowledge acquisition meetings. Concept of users or classifying structure are intended to analyze and to formalize into illustrations which may be in the structure of regulations, documents, items, dealings, and kind of networks.
- (d) Knowledge verification: This stage concentrates to verify acquired ideas, and categorization configurations with the individual expertise. In this stage, a formal representation is offered to experts. Demonstrated system prototype to the consumers and individual expertise is also functional.

From explanation of knowledge acquisition process, it is clear that knowledge gaining is one of the mainly significant actions gained from various individual expertise. The requirement of knowledge from various skilled may be applied in two behaviors: obtain knowledge beginning every expert in person or by a group of expertise.

8.5.1.2 Knowledge Storing

Data and information acquired from or exchanged between group member individuals should be stored. When an organization groups reach different process of decision making, these created agenda should be recorded in central tool.

Developing knowledge among group members and organizations is a significant issue. Information technology can contribute to the dynamic procedures of knowledge creation, preservation, propagation and absorption in an organization. GDSS can promote creation of knowledge in focus groups by capturing and enhancing more ideas, and thus enhance knowledge creation in terms of the collection of related ideas [13]. The recorded knowledge information in GDSS is kept in a central tool called knowledge repository.

8.5.1.3 Knowledge Repository

Knowledge repository stands for a method or system style that resides and generates an assembly of commercial intellectual capitals. Knowledge repository offers two critical operations which is storing and integrating different knowledge forms and issue plans, and accommodating different input/output operations to allow consumers observe, modify, and produce fresh issue plans from presented knowledge forms [16].

The stored knowledge can be held in this repository, which is likely to be explicitly transmitted or open for sharing. Repository also may reduce the information overload by decreasing the ambiguity.

Recent electronic knowledge repositories in GDSS able to keep group knowledge created from group meetings and offer group members to retrieve previous information or knowledge for references. Therefore, the enhancement of groups is dependent on how they exchanged and shared information. Hence, shared repository is needed to increase the effectiveness and efficiency of

groups.

The GDSS together with repository is likely to offer a large information processing support. It motivates research academics with an extraordinary occasion to tell broad details of group member interactions [13] and can assist the electronic acquisition of knowledge and purify individual experts' knowledge in a parallel fashion [12]. This generated knowledge is transferred into explicit knowledge.

8.6 ANALYZING THE REQUIREMENT OF KS IN GDSS

This study utilized a descriptive analysis of the collected data from respondents. The analysis intends to use quantitative data. Respondents were asked to rank the importance these requirements from 1 being least important and 5 being most important.

More specifically, respondents strongly agreed with 4.12 mean that KS should have ability to store and keep expertise knowledge. While a number of respondents with 4.08 agreed that KS should provide knowledge repository (KR) to store information of group members. Table 8.1 summarizes the mean and standard deviation (SD) of each scale.

Table 8.1 The Requirements of Knowledge Sharing

Requirements of KS	N	Min	Max	Mean	S.D
To increase interaction between groups who need knowledge and those who can provide knowledge	25	3.00	5.00	3.92	.640
Group members can easily seek information of others	25	3.00	5.00	3.88	.725
The existence of Knowledge repository	25	3.00	5.00	3.88	.665
Providing Knowledge repository to store/retrieve information of group members	25	3.00	5.00	4.08	.702
Ability of each group member to view other member's idea	25	3.00	5.00	3.92	.640
Ability to keep and store expertise knowledge	25	3.00	5.00	4.12	.665
Group performance can be encouraged if knowledge clearly shared	25	3.00	5.00	4.04	.675
Group productivity can be encouraged if knowledge clearly shared	25	3.00	5.00	4.04	.675
Group decision making can be increased if knowledge shared	25	3.00	5.00	3.92	.702
Research groups can benefited from GDSS if clearly linked with knowledge sharing	25	3.00	5.00	4.00	.707
Providing knowledge management systems.	25	2.00	5.00	4.00	.763

8.7 GDSS MODEL WITH KS CAPABILITY

Based on previous analyzed models and their components plus the survey results, we proposed a new model. After collecting the components, we analyzed each component to achieve the required objects. This analysis also considered the finding results from questionnaire.

8.7.1 Derivation of the Model

A survey is also conducted to identify the recommendation of proposed features. The model is drafted from the two models namely Typical GDSS Model developed by [7] and GDSS Model for educational multimedia (EMM) problem solving [1]. This also is compared with the results of recommendation of proposed features from the findings. The results show some features are important such as ability to have knowledge sharing, as well as providing KR tool.

8.7.2 Proposed GDSS Model

After analyzing the above models we examined the components of these models and considered the finding of questionnaire. From the result obtained from the questionnaire we proposed model shown Figure 8.2.

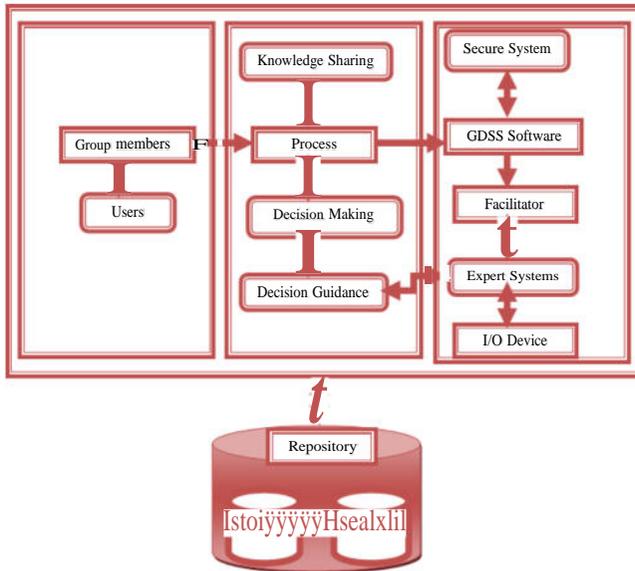


Figure 8.2 Proposed GDSS Model

8.7.2.1 People (Group members)

The first stage of the model contains the people component which also holds the normal group members and outside users. Users can use the permitted files outside from system.

Table 8.2 People components

Components	Description
Group members	These are individual participants who interact to make a particular decision or type of decision. This contains a set of decision makers working together as a group. The members can take decisions in a single location or in distant locations. Group members is relatively large and, therefore, can be applied to a different of group conditions, such as committee, audit board, army tasks, exclusive board meetings, remote workers, and so forth. This can contain a regular group members and Users.

Users: Are external participants who also can access the GDSS system. The users should have regular permissions allowed by group members.

8.7.2.2 Process

The second stage of the model contains the process component where predefined tasks and activities being executed. This stage holds decision making and decision guidance.

Table 8.3 Process components

Components	Description
Process	<p>It is a collection of associated, prepared actions or tasks that produces particular services to supply a specific target for a collection of groups. It is an activity or actions to execute sequence of steps created by of Group members. The role of this component is to collect, analyze, create ideas and generate in a form that Group members understand. This type contains: Decision Making and Decision Guidance.</p> <p>Decision Making: It is a process that involves a variety of activities, most of them dealing with the handling of information. It is considered consist a set of steps or phases which are carried out in the course of making decision.</p> <p>Decision Guidance: It refers the situation of which decision support systems clarify users to structure and execute their procedure of decision making. Therefore, decision guidance is considered a way in which the process is quickened to completely develop decision support systems with capability function.</p>

8.7.2.3 Technology

This stage contains the technology needed by group members in order to execute and achieve these processes in stage 2. This includes

the software to complete the required applications to view other user’s activities and tasks.

Table 8.4 Technology components

Components	Description
GDSS Software	<p>The software of GDSS is a collection of up to a set tools or packages, which are combined into a complete system. Main role of GDSS S/W is to create software packages which can support conflict resolution among participants, provide communication with commercial repository, and allow for execution of quantitative analysis. GDSS software includes modules such as idea generation, idea organization, prioritizing, and policy formulation. This software can be used in a decision room or for a group of people who are at various locations.</p>
	<p>Facilitator: A "group facilitator" is able to coordinate the group's access of the technology, and there provide flexibility, with friendly user interface language accessible for use by each group member. Facilitator describes the function in which facilitator guides group persons the way of using GDSS features and when or how to use them. The facilitators suppose either two ways. One way is that facilitator directs the group to reach productive decision by applying the proper group process. Some functions normally provided by GDSS facilitators include: providing technical support, maintaining and setting the agenda as well as problem solving.</p>
	<p>Expert Systems: These refer to tools planned creating personal experts inside a particular field. Therefore, expert systems are considered as artificial intelligence tools which improve decision making via applying knowledge based and inference methods. On the other hand, decision guidance provides formula to explain the ways needed to resolve problems. These systems mainly detain the tacit knowledge of personal experts and then records on repository.</p>
	<p>I/O Device: Represent a general screen to view or personal monitors in order to display information to all the group</p>

members. The input/output systems may include personal computers for every member inside the group, a numerous central processors, communications equipment for lengthy space, and numerous big viewing screens. This design allocates every participant to work separately and as a group. This also permits each participant to work independently of the others, to publicly demonstrate personal work, and to see the work of other individuals and the group as a whole is preferred.

Audio Conference: The audio conference is a formed for workgroup activity where at least one or more members inside group staying at distant places use communicating with each other within similar time through voice on a computer system. This audio conference offers a communicated audio between group members within the same time from distant locations.

Video Conference: This workgroup activity is considered viewing application where members of a group staying at distant places watch each other within similar time they are talking together.

8.7.2.4 REPOSITORY (Knowledge Repository)

This stage contains the repository required by group members in order to keep and record these processes in stage 2 and external knowledge.

Table 8.5 Knowledge Repository

Components	Description
Repository	It refers to a system or system architecture that houses and manages a collection of corporate intellectual assets.
(Knowledge Repository)	The repository will include a process that will make it easy for everyone to store, organize, access, and analyze the majority of human information on time. In this, the previous knowledge of people experts which stands as activities, are recorded inside a database to be retrieved later as reference if the client experiences a fresh situation

having identical factors.

In repository, system can search the stored data by matching similar characters to the fresh one, and locate the nearby match, and then relates the located one of the previous to the new one. The previous one and the new one are labeled together and then stored.

8.8 CHAPTER SUMMARY

The book chapter presented the previous and current situation of GDSS and requirements of knowledge sharing in GDSS. Prior sharing knowledge group members or individuals should undertake a number of processes including acquiring knowledge and storing. In knowledge acquisition, groups acquire knowledge from human expert. The task is to extract and obtain knowledge from multiple individual experts. While data and information acquired from or exchanged between group members must be recorded in order to turn into stored knowledge. The recorded knowledge information in GDSS is kept in a central tool called knowledge repository. Thus, recorded knowledge in repository can be easily shared and exchanged between groups. The results of presented findings showed that knowledge sharing contributes to enhance GDSS capabilities. After analyzing and comparing previous model components, and comparing it with the finding results from survey, new proposed model were presented. The proposed model contains three stages. This consists of five main components namely; group members which consist users also; process which group members undergone particular processes this includes decision making and decision guidance; GDSS software; facilitator which directs group users; and I/O device which presents viewing screen where users can see other individual tasks.

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