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Kakoli Bandyopadhyay
Lamar University

Souren Paul
North Carolina A&T State University,

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Kakoli Bandyopadhyay[1] and Souren Paul[2]

[1]Lamar University, College of Business, P.O. Box 10033, Beaumont, Texas 77710.
[2]North Carolina A&T State University, School of Business & Economics, Greensboro, NC 27411.

Abstract: A Group Support System (GSS) is a type of Information Systems that helps decision making in an organization in a group setting. Apart from groupware technologies such as email and conferencing systems, not many GSS applications have been widely accepted in organizations. Prior research has studied the factors such as task technology fit, use of appropriation mediators, and appropriation support, etc., that contribute to the successful use of GSS. Not much, however, has been written about the factors that may influence the users' intentions to experiment and eventually accept a GSS. This study utilizes the literature on technology acceptance, adaptive structuration theory, and task technology fit to prepare a framework to investigate the factors that influence the user acceptance of GSSs in organizations.

1 Introduction

Organizations rely on groups of decision-makers and knowledge workers to make plans, solve complex problems, identify decision alternatives, and make final decisions. E-mails, group support systems (GSS), audio and video conferencing systems, work flow systems are some popular technologies that have been used to support various forms of group work in organizations. Collectively these technologies are referred to as groupware. A subset of groupware technology that has been used to support group decision making is group support system (GSS). GSSs combine communication, computer, and decision technologies to support various forms of group decision making [1]. Analyses of prior research demonstrate that the focus is primarily to assess the effectiveness of GSS in improving group decision making activities [2], [3]. However, unlike many groupware technologies, such as e-mail, conferencing systems, the use of GSS is not quite prevalent in organizations. Apart from its use in large business and government organizations in North America, there has not been a widespread acceptance of the technology in organizations. With the exception of a few studies [4], [5], [6] GSS researchers do not seem to address the acceptance problem directly. Instead, they attempted to identify various factors that determine the successful use of the technology. Among the issues that have been discussed in the recent times are task technology fit [7] use of appropriation mediators [8], appropriation support [9] . None of the prior studies that addressed issues relating to GSS acceptance, studied the issue from a holistic point of

view. Chin and Gopal [6] focused on intention to adopt GSS and acknowledged that the possibility of having factors that are unique to GSS environments (page 59). De Vreede, Jones, and Mgaya [5] did highlight some external factors that are unique to GSS; however, they studied only one time use of GSS and acknowledged that the GSS use in the meetings studied was 100% (page 217). In order to build up a robust GSS acceptance model it is necessary to study meetings longitudinally so that variations in GSS use can be surfaced. Briggs, Adkins, Mittleman, Kruse, Miller, and Nunamaker [4] developed a technology transition model (TTM) but also acknowledged that the model was not a replacement of TAM (page 155). Thus, it is necessary to assess if an extension of TAM can be made to include the factors that are unique for GSS. Prior research in GSS has almost ignored to view the GSS acceptance from the perspective of individual user's intention to use the technology. This paper attempts to address this lacuna by incorporating the GSS acceptance in the framework of technology acceptance. From a pool of diverse attributes of a typical GSS, we attempt to identify those that are critical in facilitating the acceptance of groupware in an organization. In doing so, we rely on the rich body of research on technology acceptance [10], [11], [12]. We also rely on adaptive structuration theory [13], [14] and task technology fit [7] to identify the factors that influence the use of GSS in groups and organizations.

We discuss the literature on technology acceptance in the next section. Next, we develop a model for the acceptance of GSS. We also discuss the implications of our research model and conclude the paper with our plan for future research directions.

2 Theoretical Background

Several models have been used in the research of user acceptance and usage behavior that provide explanation and justification for the variables under consideration. Each model will be examined briefly as to its relevance to the present study.

The TAM model, based on the theory of reasoned action by Fishbein and Ajzen [15], was developed by Davis [16] and expanded in Davis, Baggozzi, and Warshaw [17]. According to Davis et al. [17] (p.985), the goal of the TAM model is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified." The model suggests that behavioral intentions to use technology can be predicted by two separate but interconnected variables - perceived usefulness and perceived ease of use. The authors believe that external variables such as system design characteristics, user characteristics, task characteristics, nature of the device or implementation process, political influence, organizational structure, etc. are external variables that influence perceived usefulness and perceived ease of use. Other researchers have included self-efficacy, prior usage and experience, objective usability, and user characteristics as external variables [18].

Davis et al. [17] found that perceived ease of use also influenced perceived usefulness and that these two variables influenced attitude toward using the technology,

which affects behavioral intention to use the technology. They also found a direct relationship between perceived usefulness and behavioral intention to use the technology. They discuss, as do other authors [18], [19], [20], [21], the capability of behavioral intentions to predict actual usage.

The TAM model has been used in the prediction of behavioral intentions to use a technology as well as actual use of a technology. Several types of information technologies have been used to test the TAM model and variations of the TAM model including microcomputer word processing software [17], general information systems [22] , computer spreadsheets [19], information technologies [23], and telemedicine technology [10], [18]. While there has been some disagreement over the exact variables that predict behavioral intentions [18], [17], [24], [22], [25], most variations of the model [18], [22], [23] do include the perceived usefulness and perceived ease of use variables found in the TAM model.

The TAM model does not include the variable of subjective norm that is used in the theory of reasoned action (TRA). The theory of reasoned action is a mathematical formula that is used to predict behavioral intentions. It suggests that behavioral intentions are determined by a consumer's attitude toward some behavior or performance of some act as well as a subjective norm, which is based on the expectations of others concerning the consumer's performance of the act or behavior. It is stated as:

$BI = A_{act} + SN$ where BI = behavioral intentions
A_{act}=attitude toward the behavior or act
SN=subjective norm

$A_{act} = \sum b_i e_i$ where b=belief that performing a certain behavior will lead to a certain outcome
e=consumer's evaluation of the outcome as positive or negative
i=the attribute or outcome under consideration

$SN = \sum nb_j mc_j$ where nb=normative beliefs—belief of the consumer concerning the expectations of significant others concerning the act under consideration
mc= motivation to comply—the consumer's felt need to comply with the expectations of the significant others
j=significant others

Based on this model, researchers must first identify all possible attributes or outcomes under consideration, assess the consumer's belief about the outcomes as well as his/her evaluation of the outcome and sum those. The researcher must then determine the significant others that have an impact on the consumer's decision concerning this behavior and assess the consumer's belief about the significant others expectations as well as his/her motivation to comply with those expectations and sum those. By adding the two

scores for each behavior that could be performed, one should be able to accurately predict which behavior will occur.

TRA presents factors that can be influenced by outside sources as well as factors that are internally motivated. As such, this model has been used and validated in a number of different disciplines to explain numerous types of behaviors.

The theory of planned behavior is based on Fishbein and Ajzen's theory of reasoned action [15]. The theory of planned behavior proposes that the perceived control the consumer has over the situation can also influence consumers' intentions. This theory includes all of the elements of the theory of reasoned action with an added component of perceived behavioral control. According to Ajzen and Madden [26] (pg. 457), perceived behavioral control refers to an individual's perceptions of "the presence or absence of requisite resources and opportunities" needed to perform the behavior. Several studies have shown that when no significant barriers to behavioral performance [15], [21] are perceived, the theory of reasoned action is predictive of intentions, although no predictive effects from the subjective norm component are found in some cases [27], [17]. However, if consumers perceive that barriers exist that can inhibit their ability to perform the behavior, an additional element (perceived behavioral control) is needed to predict behavioral intentions [26].

Another model considered in our research is the decomposed theory of planned behavior (DTPB) by Taylor and Todd [11]. It is based on components of the TAM model, the theory of reasoned action, and the theory of planned behavior. Taylor and Todd [11] found that all three components—attitude, subjective norm, and perceived behavioral control—contribute to behavioral intentions. Additionally, Brown, Massey, Montoya-Weiss, and Burkman [28] tested several models based on TAM, including the Decomposed Theory of Planned Behavior (DTPB) model. It is based on components of the TAM model, the theory of reasoned action, and the theory of planned behavior. In their study, Brown et al. [28] tested the variations of the TAM model on the basis of voluntary versus mandated technology usage. Their findings indicate that the DTPB model provides significant explanatory power above and beyond the TAM model itself. The exception in their study dealt with the absence of a significant relationship between attitude and behavioral intention in mandated situations.

The latest model to be developed from this body of research is a synthesis and unification of eight different models called the unified theory of acceptance and use of technology (UTAUT) by Venkatesh et al. [12]. This model examined the determinants of user acceptance and usage behavior—performance expectancy, effort expectancy, social influence, and facilitating conditions and found that all contribute to the usage behavior either directly (facilitating conditions) or through behavioral intentions (performance expectancy, effort expectancy, and social influence). UTAUT does consider factors such as gender, age, experience, and whether or not use is voluntary. In this model, social influence is representative of the social norm component. Venkatesh et. al. [12] find that social influence is moderated by gender and whether or not the act is voluntary. Their findings suggest that women tend to "be more sensitive to others' opinions," (pg. 453) and that social influence is more predominate in a mandatory setting mainly due to social

pressure because of compliance (the fact that others have the ability to reward desirable behavior or punish undesirable behavior).

Although acceptances of various types of information technologies have been studied in the past, there is a paucity of research on the acceptance on collaborative technology in general and GSS in particular. The exceptions are, however, the studies by Briggs et al. [4], De Vreede et al. [5], Chin and Gopal [6], and Dasgupta, Granger, and McGarry [29]. Based on a field study, Briggs et al. [4] developed technology transition model (TTM) which can be viewed as a specialized extension of TAM. The focus of the model is on the transition of users to become self-sustaining in the use of GSS. The magnitude and frequency of the perceived net value of a proposed change are the independent variables in the model which implies that the model can not explain why some users may not use GSS at all or discard it after the first time use of the technology. De Vreede et al. [5] conducted a field study and proposed a model on the factors that influence the acceptance of GSS. As the study was on one-time GSS meetings, the model can not be considered as an extension or replacement of TAM which focuses on the use of technology over a longer period of time. Chin and Gopal [6] studied whether beliefs about GSS could explain GSS adoption intention. It did not address the issue of actual use of GSS. However, Chin and Gopal [6] did indicate that the intention to adopt GSS may involve some factors that are unique to GSS environments. Dasgupta et al. [29] tested major elements of TAM in an electronic collaboration environment. Although the system used is similar to Intranet and not strictly a GSS, the study involved almost all constructs of TAM with the exception of *behavioral intentions.* The results of the study provide mixed support for TAM. Thus, it is obvious that no complete model for the acceptance of GSS exists and prior studies do indicate that the acceptance of GSS may involve some factors that are unique for GSS environment. In an attempt to address the void, we develop a model for the acceptance of GSS technologies. The model is based primarily on UTAUT and is shown in figure 1. We propose that performance expectancy and effort expectancy will affect behavioral intentions, and the social influence and facilitating factors will provide additional explanatory power concerning user intentions to accept and use a GSS. Meta analyses on GSS research identified group size and group history as two important moderators that influences the relationship between GSS use and group performance [30], [2]. In addition, following on the UTAUT, additional moderating variables age, experience, and personality traits on the use of GSS are also shown in the model.

3 Research Model

The research model is shown in the figure below:

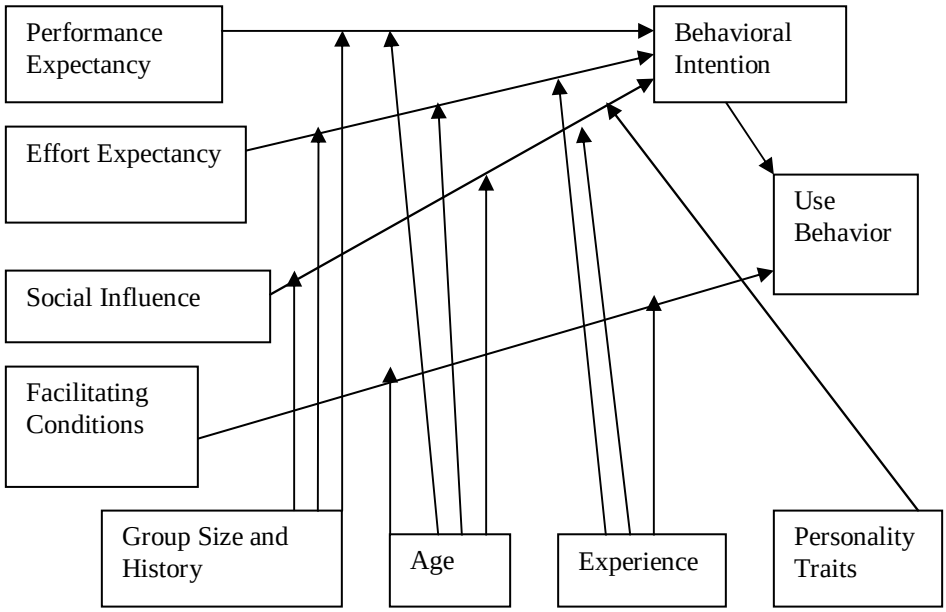

Figure 1. The Research Model

3.1 Performance Expectancy

The use of GSS is expected to decrease losses of group process and strengthen process gains [31]. The use of GSS can weaken the process losses, such as conformance pressure, evaluation apprehension, air time fragmentation, attention blocking and strengthen the process gains, such as sharing of information and objective evaluation of the group task. The reduction in process loss and the strengthening of process gains are expected to translate into improvement in the performance of GSS-based groups. Prior research in GSS demonstrate that the use of GSS results in uninhibited flow of many creative ideas in idea generation sessions; in depth evaluation of group task and solutions; reduction in decision time; improvement in group consensus on the final solution; and so on [32], [33], [34]. Although the findings of the prior studies in GSS demonstrate mixed support for these expectations [3], it will be reasonable to expect that the performance of the GSS users improve along these dimensions.

3.2 Effort Expectancy

The members of GSS-based groups need to follow certain heuristics to perform group tasks. Group members may find it difficult to follow the heuristics unless they have training to use GSS. Although training helps members to understand the heuristics that the group should follow, it can not ensure whether the members followed the heuristics or not. This can be achieved through process facilitation [8]. In absence of facilitation, the members may have difficulty to follow the process structure, reach consensus, and hence, to complete the task. In addition, GSS-based groups also suffer from of information overload. This problem is acute in idea generation tasks. As members submit ideas in parallel, the total number of ideas displayed in the public screen of the GSS balloons and members have hard time processing the input information [35], [36]. Thus, in GSS-based groups, the most basic form of effort expectancies that the group members can have are understanding the system, coordinating with the group to follow the process structure, objective evaluation of large volume of information and diverse options acquired during the group session, resolving differences in views of the group members and reaching consensus.

3.3 Social Influence

The use of GSS can have various forms of social influences in groups. Wei, Raman, and Wei [37] found that GSS-based groups have higher informational influence when the group is engaged in intellective task and lower normative influence in preference tasks. A major cause for the reduction in normative influence due to the use of GDSS can be attributed to the anonymous interactions among the members of these groups. Anonymity enhances depersonalization and lowers accountability in GSS-based groups [38]. The effects of depersonalization and accountability are just the opposite on normative influence in groups. Increased depersonalization accentuates salient social norms that may exist in a GSS-based group whereas decreased accountability provides means to group members to evade the social norms that are imposed from outside. As such, the social influence can be viewed along ‘in-group’ and ‘out-group’ Norms. When group members perceive GSS as a mechanism to accentuate ‘in-group’ norms i.e. foster one’s membership to a social group, they are willing to use the technology. In contrast, if group members view GSS as a mere vehicle to connect individuals of diverse norms, they will be less inclined to use the technology.

3.4 Facilitating Conditions

Following on the Adaptive Structuration Theory proposed by DeSanctis and Poole [13], the issue of appropriation of GSS technology has been discussed in the literature. Wheeler and Valacich [8] advocated Process Restrictive Adaptive Structuration Theory (PRAST) and suggested the positive influence that process structure, such as meeting agenda have on faithful appropriation of GSS. Later Dennis, Wixom, and Vandenberg [9] suggested some additional process supports to enhance faithfulness of GSS appropriation. External facilitators, restrictiveness features of GSS tools used, and appropriation trainings provided to the group members have been identified as additional process support that facilitates GSS appropriation. As such, it is reasonable to argue that agenda setting, external facilitators, restrictiveness of GSS tool, and trainings have positive influence on GSS use.

Needless to stress that the use GSS is also positively influenced by group members' intention to use the technology. Although gender, age, experience, and voluntariness of use have been identified as typical moderating variables in UTAUT, prior research on GSS did not stress much on gender and voluntariness of use. Group type (ad-hoc vs. established) and group members' personality traits, age, and previous experience with the system are identified as moderators variables of GSS research [3]. Based on the above requirements, the metrics for the study constructs are generated and listed in Table 1.

Table 1. The metrics for the study constructs

Construct	Underlying Issues
Performance Expectancy (PE)	– Increased participation in group decision making – Enhanced effectiveness of group decision making – Improved efficiency in group decision making i.e. improved decision time – Generation of many creative ideas in the meetings – Improved consensus in group meetings – In depth evaluation of group task and solution
Effort Expectancy (EE)	– Ease of learning how to use GSS – Ease of using GSS to participate in meetings – Ease of developing skills in using GSS – Ease of evaluating all options generated in the meeting – Ease of reaching consensus in group meetings
Social Influence (SI)	– Using GSS enhances the membership to the a social group – Using GSS is necessary to make a group of members with diverse norms work on a task
Facilitating Conditions (FC)	– Provision to set and enforce meeting agenda – Intervention of external facilitators – Restrictiveness of GSS tool – Undergoing appropriation training
Behavioral Intention to use GSS	– Desire to participate in a GSS-enabled group meeting rather than in a conventional group meeting when it becomes available. – Desire to participate in a GSS-enabled meeting when GSS is available.

4. Implications

The purpose of developing the research model in the paper is to explain the factors that may influence the acceptance of GSS by users in organizations. This research has much potential. First, it fills a void in the GSS literature by addressing the factors that may facilitate the acceptance of GSS in organizations. There are various types of GSS available and knowing which factors (for example, ease of use or improvement in performance) contribute to its acceptance gives the organizations the knowledge to choose a particular one over others. Second, the findings of this study will provide the transnational and multinational corporations a better understanding of user acceptance of GSS. The organizations operating in a global environment characterized by rapid technological changes involving people from different countries working together on a common project will immensely benefit if they can properly utilize a GSS. A GSS will enable ongoing coordination and ensure improvement in meeting efficiency and effectiveness. Third, the GSS vendors can potentially benefit from this research outcome. This study will provide them with the knowledge to design GSS acceptance strategies that may promote GSS usage ultimately. Lastly, from an academic standpoint, this study will enable us to test the modified UTAUT model in a different context.

5 Conclusion

In this paper, we attempt to extend the unified theory of acceptance and use of technology (UTAUT) model proposed by Venkatesh et al. [12] to predict the acceptance of GSS among its users. We have relied on prior research in GSS, especially on research on adaptive structuration theory and subsequent works on GSS appropriation. In addition to proposing a model for GSS acceptance, we identified the underlying dimensions that would measure each construct of the model (Table 1). We intend to test the model by conducting surveys among the users in organizations that have used GSS. While our model addresses a relatively less explored area of GSS research, we must acknowledge that the model that we propose in this paper is our initial endeavor and needs further improvements and refinements which is an agenda of future research.

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