

## Association for Information Systems AIS Electronic Library (AISeL)

---

PACIS 1995 Proceedings

Pacific Asia Conference on Information Systems  
(PACIS)

---

December 1995

# The Development of an Instrument for Measuring the Suitability of Using GSS on Support Meetings

Robert Davison  
*City University of Hong Kong*

Follow this and additional works at: <http://aisel.aisnet.org/pacis1995>

---

### Recommended Citation

Davison, Robert, "The Development of an Instrument for Measuring the Suitability of Using GSS on Support Meetings" (1995).  
*PACIS 1995 Proceedings*. 33.  
<http://aisel.aisnet.org/pacis1995/33>

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 1995 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# THE DEVELOPMENT OF AN INSTRUMENT FOR MEASURING THE SUITABILITY OF USING GSS TO SUPPORT MEETINGS

Robert Davison,  
Department of Information Systems  
City University of Hong Kong  
Tat Chee Avenue, Kln,  
Hong Kong

Tel.: +852-2788-7534

Fax: +852-2788-8694

Email: isrobert@msmail.is.cphk.hk

## Abstract

*Over the past decade, a considerable amount of research, both in the laboratory and in the field, has been conducted into Group Support Systems (GSS). A significant proportion of the published research has been experimental, with a variety of subjects undertaking tasks assigned to them by the researchers, in conditions generated by the researchers. This has been true particularly in lab settings. While such work has been valuable, we believe that we should also examine how a group behaves before it has any notion of using GSS to support its meetings. Through such research, we believe that we can more precisely identify not only whether or not a meeting is likely to be suitable for GSS support, but also how well a GSS does support a meeting, post-implementation. This paper presents the design of an instrument that measures meetings in terms of a number of variables. Participant satisfaction is used as a surrogate measure of system success.*

## 1 Introduction

Group Support Systems (GSS), under a variety of names, have been around for more than a decade. Empirical and field studies are more widely published now than at any time in the past. GSS continue to be developed and installation of the appropriate hardware and software now occurs over much of the developed world, as well as in newly developing countries (cf. Vogel, 1992). However, despite this blooming of technology, how much do we really know about the suitability of GSS use? To what extent do we consider, pre-implementation, how appropriate it is to use GSS in different situations? Are we just looking for problems to solve with our beautiful technology? In this paper we report on the development an instrument (see Appendix) that aims to measure how suitable GSS implementation is for a given situation in a problem-focused approach.

Participant satisfaction is suggested as a surrogate for meeting success.

## 2 GSS Background and Research Objectives

During the development of GSS, university based researchers have often used undergraduate student subjects in their investigations and experimentations. Sometimes, such students have been volunteers (Jarvenpaa et al., 1988; Sambamurthy and Poole, 1992), at other times they have received some monetary incentive to encourage their participation (Miranda and Bostrom, 1993; Lewis and Keleman, 1989), yet more often they have received course credit (Jessup and Connolly, 1993; Raman et al., 1993; Lewis, 1987; Huang, 1993). Galliers and Land (1987, p.900) observed that "although the experimental design of such IS research may well be academically acceptable and internally consistent, ... all too often it leads to inconclusive or inapplicable results". Indeed, it had been recognised long before (Lorge et al., 1958) that such investigations lacked any sense of real-world or *external* validity, yet we can argue that these experiments were still necessary in order to pursue the development of the software and associated concepts, and to further the understanding of the technology's potential impacts on groups.

The move to rectify this lack of external validity came in the mid to late 1980s when field studies<sup>1</sup> were first initiated. An increasing number of such field studies have been conducted using not students but 'real' people - businessmen, professionals, diplomats, etc. (Nunamaker et al., 1987; Heminger, 1989; Martz, 1989; Nunamaker et al., 1989, 1991; Lyytinen et al., 1993). What is significant about these studies, though, is that often it was the researchers who offered organisations use of the technology at the university campus (Dennis et al., 1990; Dennis et al., 1991; Nunamaker et al., 1989) in order that they could collect data and generally observe the whole GSS-supported process. As Martz et al. (1992) have recognised, this data gathering process could be quite intrusive in nature and so may have affected meeting processes, though it is hard to say how and to what extent.

Companies were by no means reduced to guinea pig status - they too were able to glean substantial benefits from the use of the technology, and there are cases where a company returned in subsequent years to run another meeting (Dennis et al., 1990) or set up its own facilities so as to run its own meetings more easily. The most well-

---

<sup>1</sup> By *studies* we are referring to those that have been published in the literature. It has been recognised by Dennis et al., 1989, (p.300) that not all field research is published. It may be assumed that actual, non-research usage of GSS in companies is more widespread than the published literature would indicate.

known example of this relates to IBM's move to set up its own GDSS facilities, later developing its own private-named version of the University of Arizona GroupSystems software - TeamFocus (Martz, 1989; Heminger, 1989; Nunamaker et al., 1989).

However, this measure of success does not detract from the fact that these field studies were all too often initiated by the research centres rather than by the companies (and their problems) themselves. An important exception to this is the case of Burr-Brown, where Burr-Brown's CEO approached the researchers upon learning of their work in GSS development (Dennis et al., 1990). To this extent, we can say that the experiments were largely technology driven, rather than problem driven. This perhaps results in part from the general fascination with exploring the technology and the opportunities that it offers, but it is not the intention of this paper to examine the reasons for this trend. Nonetheless, we do feel that this technology driven approach has its flaws. Rather than looking for problems to solve with our technology (sophisticated, powerful, user-friendly and generally attractive as it is), or looking for opportunities to which we can apply the technology in the expectation that we will get some nice, publishable data out of it, we should be in the business of finding solutions to real problems. Hence we advocate a '*back to basics*' approach and seek to address the following research questions:

- How can we measure what kind of meetings are suitable for GSS support?
- How can we measure, post-implementation, how well a GSS supports the meeting?

In addressing these research questions, we need to be able to identify existing problems in a meeting. Thus, we should investigate all inputs to, processes and outputs from meetings, as well as participant characteristics. We have identified the criterion variable 'satisfaction' as being a suitable surrogate for 'how successful was the meeting?' (Frankfort-Nachmais and Nachmais, 1992) (cf. Doll and Torkzadeh's, 1988, use of EUC satisfaction in their study of system success). In determining which factors affect satisfaction, we have developed an instrument that considers many possible factors. The goals of this instrument are that it can:

- i. identify the key issues in meetings with respect to satisfaction;
- ii. focus on participant perceptions of meeting processes;
- iii. be easy to use and complete - both for academic and practical environments.
- iv. be used reliably across many meeting types.

### 3 Research Model

In the development of the instrument, we have undertaken a substantial review of the GSS and socio-psychological literature (Davison, 1995a, 1995b). In this paper, we choose to ignore the physical hardware and software set-up of the technology, as well as the place/time dichotomies and issues of group size and composition. We focus instead on some of the *social attributes* and *individual characteristics* of groups and their members. These features interact in the *meeting process*. Finally we consider *meeting outcomes*, particularly satisfaction - our criterion variable.

#### 3.1 Meeting Outcomes

In our review of the GSS literature, satisfaction has proved to be one of the most frequently measured variables. However, it is often unclear what meeting participants have been satisfied with and this in turn may have led to the inconsistent results observed in experimental research. Indeed, satisfaction not only depends on a large number of variables, but also it can relate to many different aspects of a meeting. These variables include: individual group member characteristics and expectations; task type; nature of incentive provided; degree of personal involvement with or ownership of the issues discussed and any final result (see Nunamaker et al., 1989, for an overview of user satisfaction results). Panko (1995) further points out that meeting participants can be satisfied with: the length of the meeting, the interaction that takes place between participants, the meeting outcome, etc. To this list we would append the concept of satisfaction with 'self', i.e. the level of satisfaction a participant feels with regard to his/her own performance in the meeting, the impression that s/he was able to make on other participants, etc. While this instrument does not specifically consider efficiency as an outcome variable, we do believe that participant impressions of efficiency may have bearings on participant satisfaction.

These various factors clearly support our contention that satisfaction can be a good indicator or criterion of how 'good' a meeting is.

#### 3.2 Meeting Process Attributes

In this stage of the model, we see the interaction of the various independent variables. We believe that it is more appropriate to refer to these interactions in terms of the underlying trends and processes, e.g. 'willingness to criticise others' and 'teamwork', rather than the more functional modes where those processes are seen, e.g. discussion, brainstorming, voting, assumption surfacing, etc. The notion of willingness is key to this discussion, since although meeting members may be thoroughly competent and able to participate, they may not do so for

a number of reasons. This reduced participation is referred to as a process loss.

Process losses are associated with influence behaviour - the exhibited influence from certain individuals. This will be discussed below in 3.3. Process losses have been summarised by Tan et al. (1993) as follows:

the unwillingness of lower status members to criticise the opinions of a high status member, "due to a fear of negative evaluation and reprisals, resulting in evaluation apprehension" (Lamm and Trommsdorf, 1973; Diehl and Stroebe, 1987);

the tendency of lower status members to conform to an expected standard (Hackman and Kaplan, 1974; Shaw, 1981) or to the standard of higher status members (Hollander, 1964);

the non or low participation of low status group members in the discussion process, resulting in "cognitive inertia" where the line of argument taken by the group will very likely adhere to that which the high status member(s) wish(es) (Lamm and Trommsdorf, 1973; Jablin and Seibold, 1978).

Intimidation is a further attribute that can be manifested in meetings. Like influence behaviour, it may have social attribute origins, and hence may be associated with high status minority influence. In a meeting process, intimidation is most closely related to evaluation apprehension (Lamm and Trommsdorf, 1973; Diehl and Stroebe, 1987) and conformance (Hackman and Kaplan, 1974; Shaw, 1981; Hollander, 1964). Intimidation results in inhibition - the reluctance of meeting members to participate as fully or effectively as they might. Inhibition (and disinhibition) have been extensively studied in previous psychological and GSS research (Diener et al., 1976; Diener, 1979, 1980; Zimbardo, 1969; McGuire et al., 1987; Kiesler et al., 1984; Siegel et al., 1986).

Clearly, the extent to which influence and intimidation are perceived, and inhibition is exhibited, by lower status meeting members will determine, to a certain extent, how willing they are to participate. The notion of perception is important, since if a high status individual is not perceived as such, then we would not expect him to have any status related influence on others. One key way in which perception of status can be reduced is through the anonymisation of contributions to a discussion. This has been studied extensively in the GSS literature (Connolly et al., 1988, 1990; Jessup et al., 1987, 1988, 1990a, 1990b; Jessup and Tansik, 1991;

Lyytinen et al., 1993; Valacich et al., 1989, 1992a, 1992b).

Assuming that communication does take place, no matter how limited, we are still concerned with the quality, creativity and openness present in that communication. The generation of novel, creative solutions or ideas is vital, because it promotes the reappraisal of a situation (Nemeth, 1986; Nemeth and Wachtler, 1983). Creative ideas need not only come from individuals. Small sub-groups or teams (Argyris, 1970; Dyer, 1987) of individuals may form to suggest, or at least support, such creative ideas. Reappraisal of a situation in this way is necessary if meeting members are to have as complete as possible an assessment of a problem and its solution. Furthermore, participants may or may not: cease cooperation with other members of the group; ignore attempts at conflict management; free-ride on the contributions of others; and generate irrelevant or counter-productive ideas, etc. All of these variables will mediate the meeting process and so have impacts on the outcome variables.

### 3.3 Social Attributes and Individual Characteristics

One of the strongest independent variables to guide meeting processes is 'influence'. The amount of influence individuals possess depends on, amongst other factors, their social position, age, economic power and importance (Latané, 1981).

Although the idea of majority influence might seem to be a popular one, given that it corresponds to principles of democracy, it does have the drawback that valuable minority views or alternatives may not be expressed (Nemeth, 1986; Nemeth and Wachtler, 1983; Pfeffer and Salancik, 1978). Thus, the idea of more equally distributed participation, usually facilitated in the GSS-context by enabling group members to participate anonymously in brainstorming sessions, has been a frequently studied area of empirical, lab-based research. Emphasis has normally been placed on reducing majority influence (Jarvenpaa et al., 1988; Watson et al., 1988; Zigurs et al., 1988; Connolly et al., 1990; Jessup et al., 1990a; Clapper et al., 1991; Gallupe et al., 1991; McLeod and Liker, 1992).

Where status influence is concerned, individuals are able to exert influence by virtue of their status level. Clearly high-status minorities may be able to wield considerable influence. This may bias not only the accuracy and completeness of information gathering but also its effectiveness and usefulness. Not all processes associated with minority influence are negative though. As Pfeffer and Salancik (1978) make clear, it may be entirely appropriate for high status members to exercise a controlling influence to ensure that resources are not squandered, or, alternatively, that sufficient resources are committed.

Meeting members will very likely possess a wide range of individual characteristics. We are particularly interested in those that relate to oral competence and the corresponding ability to communicate and participate in meetings. This ability suggests some dependence on such characteristics as shyness, apprehensiveness, assertiveness and confidence. Oral competence, on the other hand, relates to knowledge of the language of communication, be it Cantonese, English, Polish or Swahili. In a GSS context, we might also need to determine typing competence. Effective communication, then, depends in part on the levels of oral competence and the communicative/participative ability manifested in the members of a group. However, while we might expect (as Rao and Jarvenpaa (1991) do) lower status individuals to be reticent to participate in meaningful and creative discussion in response to high status minority influence, reduced oral competence need not be the sole reason for this reticence, nor need it be solely a problem associated with lower status individuals. High status individuals may also lack sufficient oral skills for presenting their arguments and engaging in lucid and appropriate discussion. However, in contrast to others, they may well have the assertiveness/confidence to be less affected by their disability.

### 3.4 Instrument Review, Pilot Tests and Questionnaire Design

The information we have gathered from both the socio-psychological and the GSS literature has been pivotal in the design of our research instrument. We have also studied various instruments developed by other researchers, including: McCartt and Rohrbaugh (1989), Robey et al. (1989), Doll and Torkzadeh (1988). Through cycles of pilot tests, we have been able to refine the instrument, asking participants to comment on the format and appropriateness of questions and to suggest additional material that they consider should be included in such an instrument. This exercise has proved most valuable.

A generalised instrument that addresses all possible permutations of meetings would need to have a large number of questions concerning: GSS Technology, Social Attributes, Individual Characteristics, Meeting Environment, Meeting Process Attributes and Meeting Outcomes. Our aim in this research has been to discover which Meeting Process Attributes most effectively predict the Meeting Outcome criterion variable - participant satisfaction. However, as we shall eventually need a more generalised instrument, we have included demographic, meeting structure and environment, and participant attribute questions. The current instrument has 55 items: 1 criterion variable (meeting outcome); 25 independent/mediating variables (meeting process); and 29 more general items. Thus we are interested in the meeting outcome and focus on meeting processes as the

predictors of this outcome. See the Appendix for a list of the 25 independent/mediating variables.

## 4 The Current Investigation

Despite our intention to develop an instrument that could be used to evaluate *any* meeting type, it is clearly impractical to subject all meetings to this process. Certain meetings should be manifestly inappropriate, for example chance meetings in corridors, coffee rooms and underground trains. Quite apart from anything else, these locations are not so conducive to operation and manipulation of GSS technology. More practically, however, if the chairman of a meeting has no agenda, prefers that there be no agenda and in fact intends that the meeting should serve no function other than one where he can impose his views on some other people, then GSS support hardly seems appropriate.

The best meetings for formal evaluation, therefore, are formally organised meetings. Meetings in an academic institution at the level of the Senate or Faculty Board<sup>2</sup>, are likely to be both more suitable, because they do conform with the concept of formal discussion oriented meetings that are well structured in advance, and more practical, because they take place in a location where GSS support is technically feasible. This is not to say, however, that such meetings are either the best candidates for GSS-support, nor that there are no other equally good meeting types. McGrath's (1984) taxonomic circumplex of meeting types indicates that some six categories (all but the purely physical battles and some psychomotor tests) of meetings may be amenable to useful GSS support (see Pervan (1994, p.565) for a concise review of McGrath's taxonomy).

## 5 Anticipated Outcomes

We have recently completed a longitudinal study that aimed to establish the suitability of providing GSS-support for Faculty Board meetings. Immediately after such a meeting, all participants were requested to fill in a questionnaire. From our analysis of the questionnaire data, we aim to be able, first of all, to determine whether or not GSS support is suitable. If it appears that it is, i.e. that GSS can offer substantial benefits to the group in question, then we will proceed to consider if or how implementation can proceed. We clearly cannot force

---

<sup>2</sup> Faculty Board is the term we use in the City University of Hong Kong to refer to the advisory/managerial committee that advises the Dean of the Faculty (a Faculty being a formal grouping of associated departments). Faculty Boards typically comprise elected representatives from the academic staff of each department in the Faculty, Heads of Department, and *ex officio* members such as the Dean of the Faculty. The size of a Faculty Board varies between 20 and 50 members according to Faculty.

acceptance of GSS support, but we can illustrate the problems that have emerged through data analysis and suggest how we may be able to overcome these through the use of a GSS.

The advantage of conducting the questionnaire analysis is that we will have clearer ideas as to which tools to use, whether to make anonymous communication available or not. By using a similar post-implementation instrument, we aim to measure in a more quantitative way how meeting members' attitudes towards the meetings processes, and the meeting processes themselves, have developed.

## 6 Future Research

We expect that we shall make modifications to this instrument consequent upon our analysis of data obtained. With a redesigned instrument, we expect to embark on larger scale projects in the business environment. Initially, again, we shall look at non-GSS supported meetings and their processes. However, we have the clear aim of implementing GSS technology in those environments and measuring how the technology affects processes and outcomes. A limitation of the current study has been the sample size. Clearly it will be essential for us to obtain data from a substantially larger population across a number of organisations.

While we believe that satisfaction is a well validated surrogate of meeting success or quality, we are nonetheless puzzled at the over-simplified understanding of satisfaction as evidenced by the literature. When we measure satisfaction, are we measuring a composite value? Can we be sure what a participant means when he says that he is satisfied with a meeting's process or outcome? Do we need to break down the construct into its constituent parts and examine which parts depend on which meeting processes attributes and to what extent? Zigurs and Dickson (1990) have compiled a useful taxonomy of satisfaction components that may be useful for this avenue of research.

## 7 Conclusion

This paper has chronicled the first stages in the development of a validated instrument that can measure a number of meeting attributes: individual and group characteristics, processes and outcomes. Designed for situations that involve either traditional, 'manual' support or GSS support, the instrument includes items that are equally applicable to both situations. Irrespective of whether this instrument is chosen for measuring the processes that lead to outcomes, the author suggests that a problem-focused approach should be adopted when considering GSS implementation to support meetings. Only through so doing, we believe, will it be possible to identify how GSS can best support a meeting.

## 8 Bibliography

Argyris, C. *Intervention Theory and Method*, Addison-Wesley: Reading, Mass., 1970.

Clapper, D.L., McLean, E.R. and Watson, R.T. "An Experimental Investigation of the Effect of a Group Decision Support System on Normative Influence in Small Groups", *Proceedings of the Twelfth Annual Conference on Information Systems*, pp.273-282, 1991.

Connolly, T., Jessup, L.M. and Valacich, J.S. "Idea Generation in a GDSS: Effects of Anonymity and Evaluative Tone", *Working Paper*, University of Arizona, AZ., 1988.

Connolly, T., Jessup, L.M. and Valacich, J.S. "Effects of Anonymity and Evaluative Tone on Idea Generation in Computer Mediated Groups", *Management Science*, (36: 6), 1990, pp.689-703.

Davison, R.M. "A Survey of Group Support Systems: Technology and Operations", *Working Paper 95/02*, Dept of Information Systems, City University of Hong Kong, 1995a.

Davison, R.M. "Socio-Psychological Aspects of Group Processes", *Working Paper 95/03*, Dept of Information Systems, City University of Hong Kong, 1995b.

Dennis, A.R., Nunamaker, J.F. and Vogel, D. "GDSS Laboratory Experiments and Field Studies: Closing the Gap", *22nd Hawaii International Conference on Systems Science*, Hawaii, (III), 1989, pp.300-309.

Dennis, A.R., Heminger, A.R., Nunamaker, J.F. and Vogel, D.R. "Bringing Automated Support to Large Groups: The Burr-Brown Experience", *Information and Management*, (18), 1990, pp.111-121.

Dennis, A.R., Nunamaker, J.F. and Paranka, D. "Supporting the Search for Competitive Advantage", *Journal of Management Information Systems*, (8:1), 1991, pp.5-36.

Diehl, M. and Stroebe, W. "Productivity Loss in Brainstorming Groups: Towards the Solution of a Riddle", *Journal of Personality and Social Psychology*, (53), 1987, pp. 497-509.

Diener, E., Fraser, S.C., Beaman, A.L. and Kelem, R.T. "Effects of Deindividuation Variables on Stealing Among Halloween Trick-or-Treaters", *Journal of Personality and Social Psychology*, (33), 1976, pp.178-183.

- Diener, E. "Deindividuation, Self-Awareness, and Disinhibition", *Journal of Personality and Social Psychology*, (37), 1979, pp.1160-1171.
- Diener, E. "Deindividuation: The Absence of Self-Awareness and Self-Regulation in Group Members", in: Paulus, P.B. (Ed.) *Psychology of Small Group Influence*, Erlbaum: Hillsdale, NJ., 1980.
- Doll, W.J. and Torkzadeh, G. "The Measurement of End-User Computing Satisfaction", *Management Information Systems Quarterly*, (12:2), 1988, pp.259-274.
- Dyer, W.G. *Team Building: Issues and Alternatives*, Addison Wesley: Reading, Mass., 1987.
- Frankfort-Nachmais, C. and Nachmais, D. *Research Methods in the Social Sciences*, Edward Arnold: London, 1992.
- Galliers, R.D. and Land, F.F. "Choosing Appropriate Information Systems Research Methodologies", *Communications of the ACM*, (30:11), 1987, pp.900-902.
- Gallupe, R.B., Bastianutti, L.M. and Cooper, W.H. "Unlocking Brainstorms", *Journal of Applied Psychology*, (76:1), 1991, pp.137-142.
- Hackman, J.R. and Kaplan, R.E. "Interventions into Group Processes: An Approach to Improving the Effectiveness of Groups", *Decision Sciences*, (5), 1974, pp.459-480.
- Heminger, A. *Group Decision Support System Assessment in a Field Setting*, Unpublished Doctoral Dissertation, University of Arizona, 1989.
- Hollander, E.P. *Leaders, Groups, and Influence*, OUP: New York, 1964.
- Huang, W., Raman, K.S. and Wei, K.K. "A Process Study of Effects of GSS and Task Type on Informational and Normative Influence in Small Groups", *14th International Conference on Information Systems*, Atlanta, 1993, pp.91-102.
- Jablin, F.M. and Seibold, D.R. "Implications for Problem Solving Groups of Empirical Research on 'Brainstorming': A Critical Review of the Literature", *The Southern States Speech Communication Journal*, (43), 1978, pp.327-356.
- Jarvenpaa, S.L., Rao, V.S. and Huber, G.P. "Computer Support for Meetings of Medium-Sized Groups Working on Unstructured Problems: A Field Experiment", *Management Information Systems Quarterly*, (12:4), 1988, pp.645-666.
- Jessup, L.M., Connolly, T. and Galegher, J. "The Effects of Anonymity on Group Process in Automated Group Problem Solving", *Working Paper*, University of Arizona, Tucson, AZ, 1987.
- Jessup, L.M., Tansik, D. and Laase, T.D. "Group Problem Solving in an Automated Environment: The Effects of Anonymity and Proximity on Group Process and Outcome with a Group Decision Support System", *Proceedings of the Academy of Management*, Anaheim, CA, August, 1988.
- Jessup, L.M., Connolly, T. and Galegher, J. "The Effects of Anonymity on GDSS Group Process With an Idea-Generating Task", *Management Information Systems Quarterly*, (14:3), 1990a, pp.313-321.
- Jessup, L.M., Connolly, T. and Tansik, D.A. "Toward a Theory of Automated Group Work: The Deindividuating Effects of Anonymity", *Small Group Research*, (21:3), 1990b, pp.333-348.
- Jessup, L.M. and Tansik, D.A. "Decision Making in an Automated Environment: The Effects of Anonymity and Proximity with a Group Decision Support System", *Decision Sciences*, (22:2), 1991, pp.266-279.
- Jessup, L.M. and Connolly, T. "The Effects of Interaction Frequency on the Productivity and Satisfaction of Automated Problem-Solving Groups", *Proceedings of the 26th Annual Hawaii International Conference on Systems Science*, Hawaii, (IV), 1993, January, pp.142-151.
- Kiesler, S., Siegel, J. and McGuire, T.W. "Social Psychological Aspects of Computer-Mediated Communication", *American Psychologist*, (39), 1984, pp.1123-1134.
- Lamm, H. and Trommsdorf, G. "Group versus Individual Performance on Tasks Requiring Ideational Proficiency (Brainstorming): A Review", *European Journal of Social Psychology*, (3), 1973, pp.361-387.
- Latané, B. "Psychology of Social Impact", *American Psychologist*, (36), 1981, pp.343-356.
- Lewis, L.F. "A Decision Support System for Face-to-Face Groups", *Journal of Information Science*, (13), 1987, pp.211-219.

- Lewis, L.F. and Keleman, K.S. "Experiences with GDSS Development: Lab and Field Studies", *Journal of Information Science*, (16), 1989, pp.195-205.
- Lorge, I., Fox, D., Davitz, J. and Brenner, M.A. "A Survey of Studies Contrasting the Quality of Group Performance and Individual Performance", 1920-1957, *Psychological Bulletin*, (55:6), 1958, pp.337-372.
- Lyytinen, K., Maaranen, P. and Knrnttila, J. "Unusual Business or Business as Usual: An Investigation of Meeting Support Requirements in Multilateral Diplomacy", *Accounting, Management & Information Technology*, (3:2), 1993, pp.97-117.
- Martz, W.B. *Information Systems Infrastructure for Manufacturing Planning Systems*, Unpublished Doctoral Dissertation, University of Arizona, 1989.
- Martz, W.B., Vogel, D.R. and Nunamaker, J.F. "Electronic Meeting Systems: Results from the Field", *Decision Support Systems*, (8:2), 1992, pp.141-158.
- McCartt, A.T. and Rohrbaugh, J. "Evaluating Group Decision Support Effectiveness: A Performance Study on Decision Conferencing", *Decision Support Systems*, (5:2), 1989, pp.243-254.
- McGrath, J.E. *Groups: Interaction and Performance*, Prentice Hall: Englewood Cliffs, NJ, 1984.
- McGuire, T.W., Kiesler, S. and Siegel, J. "Group and Computer-Mediated Discussion Effects in Risk Decision Making", *Journal of Personality and Social Psychology*, (52:5), 1987, pp.917-930.
- McLeod, P.L. and Liker, J.K. "Electronic Meeting Systems: Evidence from a Low Structure Environment", *Information Systems Research*, (3:3), 1992, pp.195-223.
- Miranda, S.M. and Bostrom, R.P. "The Impact of Group Support Systems on Group Conflict Management: An Empirical Investigation", *Proceedings of the 26th Annual Hawaii International Conference on Systems Science*, Hawaii, (IV), 1993, pp.83-94.
- Nemeth, C.J. and Wachtler, J. "Creative Problem Solving as a Result of Majority vs Minority Influence", *European Journal of Social Psychology*, (13), 1983, pp.45-55.
- Nemeth, C.J. "Differential Contributions of Majority and Minority Influence", *Psychological Review*, (93:1), 1986, pp.23-32.
- Nunamaker, J.F., Applegate, L.M. and Konsynski, B.R. "Facilitating Group Creativity: Experience with a Group Decision Support System", *Journal of Management Information Systems*, (3:4), 1987, pp.5-19.
- Nunamaker, J.F., Vogel, D.R., Heminger, A., Martz, W.B., Grohowski, R., and McGoff, C. "Experiences at IBM with Group Decision Support Systems: A Field Study", *Decision Support Systems*, (5:2) 1989, pp.183-196.
- Panko, R. Networked communication, *gss-1@uga.cc.uga.edu*, January 17th, 1995.
- Pervan, G.P. "The Measurement of GSS Effectiveness: A Meta-Analysis of the Literature and Recommendations for Further GSS Research", *Proceedings of the 27th Hawaii International Conference on Systems Science*, 1994, pp.562-571.
- Pfeffer, J. and Salancik, G.R. *The External Control of Organizations: A Resource Dependence Perspective*, Harper and Row: New York, 1978.
- Raman, K.S., Tan, B.C.Y. and Wei, K.K. "An Empirical Study of Task Type and Communication Medium in GDSS", *Proceedings of the 26th Hawaii International Conference on Systems Science*, Hawaii, (IV), 1993, pp.161-168.
- Rao, V.S. and Jarvenpaa, S.L. "Computer Support of Groups: Theory Based Models for GDSS Research", *Management Science*, (37:10), 1991, pp.1347-1362.
- Robey, D., Farrow, D.L. and Franz, C.R. "Group Process and Conflict in System Development", *Management Science*, (35:10), 1989, pp.1172-1191.
- Sambamurthy, V. and Poole, M.S. "The Effects of Variations in Capabilities of GDSS Designs on Management of Cognitive Conflict in Groups", *Journal of Information Systems Research*, (3:3), 1992, pp.224-251.
- Shaw, M.E. *Group Dynamics: The Psychology of Small Group Behaviour (3rd Edition)*, McGraw Hill: New York, 1981.
- Siegel, J. Dubrovsky, V.J., Kiesler, S. and McGuire, T.W. "Group Processes in Computer-Mediated Communication", *Organizational Behaviour and Human Decision Processes*, (37), 1986, pp.157-187.
- Tan, B.C.Y., Wei, K.K. and Watson, R.T. "Neutralizing Status Influence: An Empirical Study with a Group Support System", *14th International Conference on Information Systems*, Atlanta, 1993, pp.77-90.



Valacich, J.S., Dennis, A.R. and Nunamaker, J.F. "The Effects of Anonymity and Group Size in an Electronic Meeting System Environment", *Working Paper*, University of Arizona, 1989.

Valacich, J.S., Dennis, A.R. and Nunamaker, J.F. "Group Size and Anonymity Effects on Computer-Mediated Idea-Generation", *Small Group Research*, (23:1), 1992a, pp.49-73.

Valacich, J.S., Jessup, L.M., Dennis, A.R. and Nunamaker, J.F. "A Conceptual Framework of Anonymity in Group Support Systems", *Proceedings of the 25th Hawaii International Conference on System Sciences*, (III), 1992b, pp.101-112.

Vogel, D.R. "Group Support Systems in International Contexts", *Paper Presented at the 2nd International Organisational Behaviour Teaching Conference*, Curtin University of Technology, Perth, WA, 16-19 December, 1992.

Watson, R.T., DeSanctis, G.L. and Poole, M.S. "Using a GDSS to Facilitate Group Consensus: Some Intended and Unintended Consequences", *Management Information Systems Quarterly*, (12:3), 1988, pp.463-478.

Zigurs, I., Poole, M.S. and DeSanctis, G.L. "A Study of Influence in Computer-Mediated Group Decision Making", *Management Information Systems Quarterly*, (12:3), 1988, pp.625-644.

Zigurs, I. and Dickson, G.W. "Computer Support for Decision Making Teams: The Issue of Outcome Quality", *Faculty Working Paper Series*, College of Business and Administration, University of Colorado, 1990.

Zimbardo, R.G. "The Human Choice: Individuation, Reason and Order Versus Deindividuation, Impulse and Chaos", in: Helmer, J. and Eddington, N.A. (Ed.) *Urbanman: The Psychology of Urban Survival*, The Free Press: New York, 1969, pp.196-238.

D)

To what extent would you say that this meeting was result oriented?  
What percentage of meeting time do you think was spent on discussion of agenda-based items?  
Was jargon often used in the meeting?  
Were you confused by jargon used?

## Appendix -Independent/Mediating Variable Questionnaire Items

A) With regard to your own participation in the meeting, please indicate to what extent you agree with the following statements:

You feel that you played a useful role.  
The language of the meeting prevented you from participating.  
You found it hard to understand other meeting members when they talked.  
You experienced problems expressing yourself.  
You felt reluctant to put forward your own ideas.  
You experienced pressure, either to conform to a particular viewpoint or not to contradict others.  
Other meeting members paid attention to you when you talked.

B) With regard to all meeting members as a whole, how would you rate the discussions in the meeting in terms of the following scales?

Very meaningful	...	Totally meaningless
Very appropriate	...	Totally inappropriate
Very free and open	...	Totally closed/restricted
Creative/imaginative approaches used	...	Familiar/unimaginative approaches used

C) Please indicate to what extent you agree with the following statements:

Other members lost control of their emotions in the meeting.  
Other meeting members appeared willing to answer questions when asked.  
Meeting members worked together as a team.  
Meeting members had sufficient access to the information they needed so as to participate actively in and fully understand the meeting.  
The time spent in the meeting was efficiently used.  
Issues raised in the meeting were discussed thoroughly.  
The quality of the meeting would have been improved if meeting members had had the opportunity of contributing ideas anonymously.  
Some group members tried to intimidate others, e.g. by talking loudly, using aggressive gestures, making threats, etc.  
Some group members tried to use their influence, status or power so as to force issues on the other meeting members.  
You felt inhibited from participating in the discussion because of the behaviour of other meeting members