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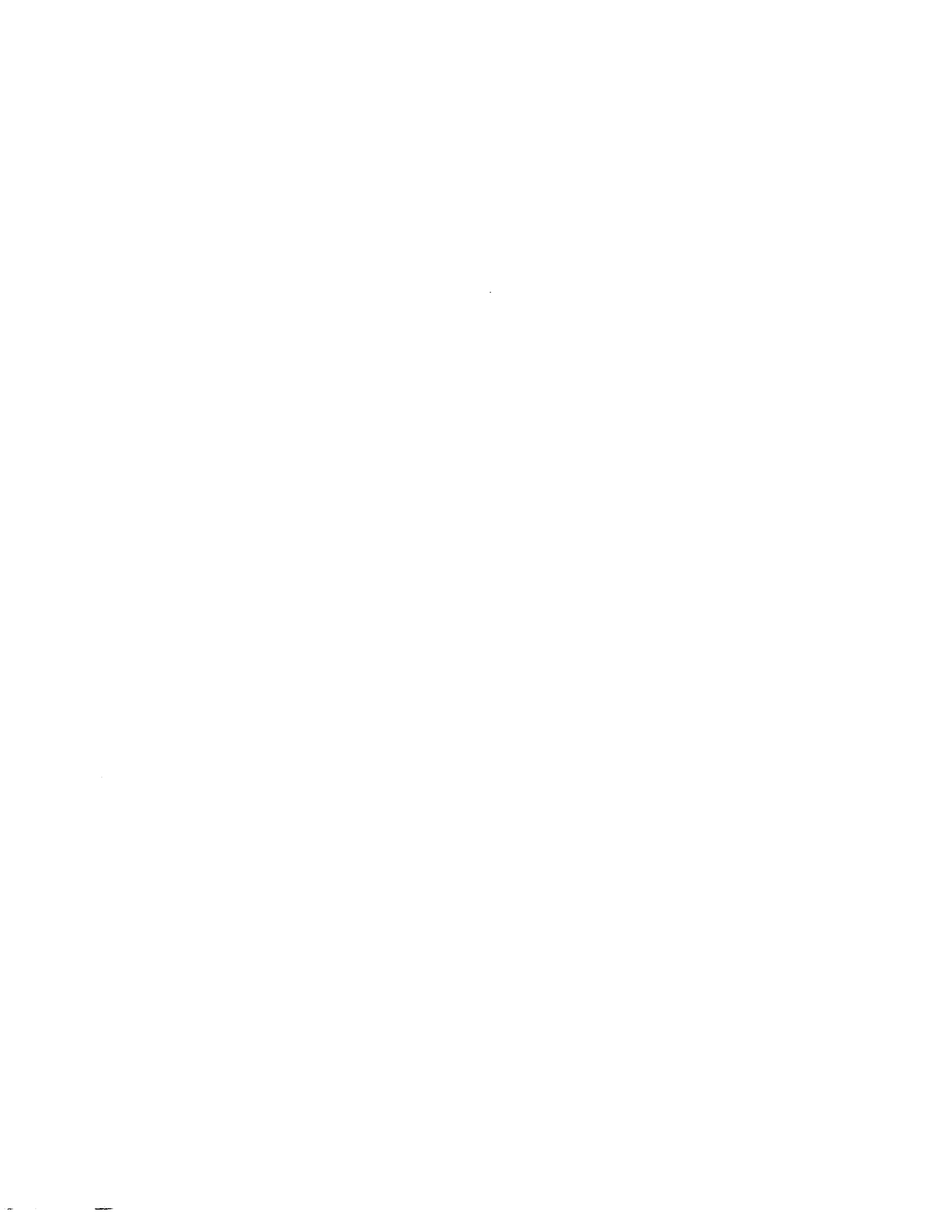
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A study on the impact of a negotiation support system on the negotiation process and outcomes

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A Study On The Impact of a Negotiation Support System on The Negotiation Process and Outcomes

Dissertation

Presented in Partial Fulfillment of the Requirements for
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By

Hyeun-Suk Rhee

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1993

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ACKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

1.1 Background

Technological advancements, coupled with the desire to improve group decision making have led to the development of Group Decision Support Systems (GDSSs). A GDSS integrates computer support, communication facilities, and decision process techniques for use in face-to-face or distributed meetings (DeSanctis and Gallupe, 1985).

Empirical research in GDSS has typically concentrated on the impact of computer support on cooperative problem solving tasks (e.g., idea generation). These tasks normally do not include conflict of interest and/or competition between the participants. However, very often, problem solving tasks involving multiple participants generate conflict and competition between group members. For example, organizational activities such as transfer pricing and capital budgeting could generate conflict and competition between managers and require resolution of conflict. Negotiation, thus, becomes a critical activity for managers involved in a group task with conflicting interests. Therefore, it is

important for a researcher to investigate the issues bearing on developing a negotiation support system.

Negotiation Support Systems (NSSs) are a special class of GDSS which emphasize computerized assistance for situations involving strong disagreement on factual or value judgments among group members (Jelassi and Foroughi, 1989). Research so far on NSS has focused on identifying the relevant factors for structuring a NSS (see, for example, Anson and Jelassi (1990), and Jelassi and Foroughi (1989)). Among these factors, electronic data input and display for communication between negotiators, and a negotiation support tool designed to assist in analytical processing activities are proposed as key components for a NSS.

Although there are attempts to identify relevant factors for designing NSS, no work has been done to develop a general research framework for analyzing a NSS's impact on the negotiation process and outcomes. So far there are few studies that have empirically tested the impact of a negotiation support tool on the negotiators' behaviors. Nunamaker et al.(1991) also point out the lack of this focus saying " ...the tasks explored thus far in the electronic meeting context do not even approach the boundaries of the application domain in either 'soft' or 'hard' negotiating situations". The absence of this focus motivates this study.

1.2 Purpose of the Research

The purpose of this study is twofold: (1) to develop a research framework for studying the impact a NSS has on negotiating groups and (2) to conduct an empirical investigation on the impact of specific features of a NSS on the negotiation process and outcomes.

The research framework this study proposes is a modified version of Pinsonneault and Kraemer's research framework (1989). Pinsonneault and Kraemer developed a research framework for analyzing the impact of technological support on the group process and outcomes. Based on this framework, this study proposes a research framework for studying the impact of computer-based support systems on negotiation specific environments. It illustrates the factors and variables influencing negotiators' behavior and relates these factors and variables to the development of a negotiation support system.

Within the research framework, a laboratory experiment is conducted to test the impact of communication medium and special features of a negotiation support system on the negotiation process and outcomes. For the communication medium variable, two levels (computer-mediated communication and face-to-face (FtF) communication medium) are utilized. The features of a negotiation support tool considered in this study are "Historical Feedback (HF)" and "What-if" analysis capability. HF refers to a tabular representation of offers made between negotiators during a negotiation session. "What-if" analysis provides an aid to negotiators to analyze different alternatives before making an

offer.

The negotiation task we use for this study is a transfer pricing problem which has four issues and five alternatives in each issue. This task is a mixed motive task which requires negotiators to cooperate as well as to compete each other.

In the experiment, three-person groups negotiate to agree on the transfer pricing terms of the four components. Half of the total number of groups communicate through computer (computer-mediated communication groups) and the other half interact face-to-face. Within each of these two communication medium conditions, half of the groups are provided computer-based negotiation support tools while the other half are provided only paper, pen, and a calculator.

The influence of communication medium and negotiation support tool combinations will be investigated by comparing negotiators' performance in terms of negotiation process and outcomes. Negotiation process variables this study investigates are conflict management behavior, judgment accuracy, and negotiation time. For negotiation outcome variables, joint profit, inequality of resource distribution, and satisfaction will be measured.

1.3 Nature of this Research

This research is one of the first experimental attempts to investigate the impact of computer-based support tools on group member's negotiation behavior. The negotiation support tool used in this study has features that specifically support identifying alternative solutions and analyzing alternative solutions. It is an exploratory study that aims to get an initial understanding of the impact of negotiation support tools on the negotiation process and negotiation outcomes.

1.4 Structure of the Dissertation

The remainder of this dissertation is organized as follows. Chapter 2, provides a literature review, summarizes theories and experimental findings in the negotiation literature. It also surveys the studies in computer-mediated communication and negotiation support system.

Chapter 3 proposes the research framework on which this study is based. This chapter addresses the research questions and hypotheses this dissertation attempts to investigate.

Chapter 4 describes the experimental methodology used in this study. A detailed description of the experimental design, variables and measures, task, subjects and experiment procedures are discussed.

Chapter 5 consists of two parts. The first part discusses the statistical methods used to analyze the data. Then it presents the results of analysis.

Chapter 6 summarizes the research findings and discusses the results including the implications. Limitations and extensions of the study are discussed. Finally, the study is concluded along with implication for further NSS research.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature relating to the negotiation task type, GDSS, NSS, and Computer-mediated communication systems.   Section 2.2 summarizes theories and experimental findings in the negotiation literature. Section 2.3 surveys the studies in computer-mediated communication. Computer-mediated communication refers to humans using a computer for communication purposes.   This electronic communication channel processes written communications among a group of persons and it has been recognized as one of major features of NSS. Section 2.4 reviews the studies in the GDSS and NSS area.

2.2 Negotiation Studies

This section is divided into three subsections.   First, the different characteristics of the negotiation task from those of other group task types are

described and how those differences affect group task performance is discussed. Second, negotiators' approaches toward conflict and negotiation are identified and discussed. Then, the factors that hinder negotiators from taking the optimal approach are discussed.

2.2.1 The Characteristics of The Negotiation Task

"If we want to learn about groups as vehicles for performing tasks, we must either (a) assume that all tasks are alike, in regard to how groups of various kinds can and do perform them; or (b) take into account differences in group performance as they arise from differences in tasks". (McGrath, p. 53, 1984).

The group task is a major variable that affects the group's problem solving process and its outcomes. Therefore, the former notion (notion (a)), in the above paragraph, that a group's task performance is not affected by type and characteristics of the task being performed cannot be accepted. The task is important because it impacts the skills required in the group to solve it, the measures of success of group performance, and the process the group uses to perform its task (Hackman, 1969; Morris, 1966; Gallupe, 1985). Studies in computer-based decision support systems also make the point that the group task is one of the most important variables that affect the group's task performance (Gallupe, 1985, 1988; Dennis, Nunamaker et al., 1991; Kraemer and King, 1988; Weedman, 1991).

There are many schemes used to classify group tasks (see Hackman, 1969, Steiner, 1974; McGrath, 1984). These classification schemes differ but

overlap in terms of their basis of classification. McGrath (1984) developed an integrative topology, the group task circumplex, to classify group tasks based on the classification schemes developed by Hackman (1969), Steiner (1974), and so on. He divided group processes into four general processes: to Generate (alternative); to Choose (alternative); to Negotiate; and to Execute (see figure 2.1). McGrath summarizes the four Quadrants as follows.

Quadrant I, Generate, is divided into two subtypes; Planning and Creativity. Planning Tasks refers to tasks asking the group to describe how to carry out some plan of action. Creativity Tasks refers to tasks asking the group to generate ideas about something.

Quadrant II, Choose, is also divided into two types: Intellective Tasks and Decision-Making Tasks. The former refers to tasks for which there is a demonstrable right answer, and the group task is to invent/select/compute that correct answer. The latter refers to tasks for which there is not demonstrably correct answer, and the group's task is to select, by some consensus, a preferred alternative.

Quadrant III, Negotiate, is an extension of quadrant II, under conditions where there is intra-unit conflict. The key word here is not solve, but resolve. There are two task types which call for 'negotiate' group process: Cognitive Conflict Tasks and Mixed-Motive Tasks. The former requires resolving conflicts of viewpoints between group members. It refers to cases where the members of the group do not just have different preferences, but have systematically different preference structures. They may interpret information

differently, may give different weights to different dimensions, and/or may relate dimensions to preferences via different functional forms. Mixed-Motive Tasks include resolving pay-off conflicts. Pay-off conflicts mean that conflicts are caused by a conflicting payment scheme between negotiators.

Several subtask types can be categorized in the Negotiate Quadrant. They are (a) tasks involving conflicts of both viewpoints and interests or pay-offs (b) tasks requiring resolution along a single and quantified dimension (c) tasks in which the two or more parties' joint choices determine pay-offs to each (d) tasks in which opposing members try to establish subsets (coalition) that can control the allocation of payoffs. The negotiation task is a mixed-motive task. The terms "bargaining" and "negotiation" are used interchangeably in this paper.

Quadrant IV, Execute, deals with overt, physical behavior, with the execution of manual and psychomotor tasks. There are two types: Contests and Performances. Contests are tasks for which the unit of focus, the group, is in competition with an opponent, an enemy, and performance results will be interpreted in terms of a winner and a loser. Performances are those overt task executions that do not involve competition against an enemy, but rather involve striving to meet standards of excellence or standard.

These four group processes are not only distinguished from but related to one another. Furthermore, the subtypes within each task type can be ordered, more or less, in a progression that moves, by small transition steps, from one boundary of the category to the other. As the name mixed-motive indicates, participants with a mixed-motive task are motivated both to cooperate and to

compete with one another. Competition results from differing outcomes desired by each party. Cooperation is required, however, due to the interdependence of these outcomes. Neither party can achieve its goals unilaterally (Anson and Jelassi, 1990). The key process for negotiators, therefore, is resolving interest and/or pay-off conflicts.

In summary, the negotiation task is a mixed-motive task containing elements of competition as well as elements of cooperation. It requires negotiators to resolve their conflicting interests. Therefore, the group processes involved with the negotiation task differ from those with planning task, creativity task, or other type of cooperative problem solving tasks.

2.2.2 Structuring Negotiation Processes

Negotiation is a form of decision making in which two or more independent parties talk with one another in an effort to resolve their opposing interests to make joint decisions (Pruitt, 1981, Kelley and Thibaut, 1978; Lewis and Fry, 1977). The negotiation process is the interactive part by which negotiation outcomes are attained. One way of exploring negotiators' behaviors is in terms of their approaches to conflict and negotiation. These approaches are termed "negotiation tactics or strategies" (Pruitt and Carnevale, 1980), "conflict handling behavior" (Ruble and Thomas, 1976), or "conflict management behavior" (Poole et al., 1991).

Ruble and Thomas (1976) proposed a classification model of conflict handling behavior which includes two dimensions; a cooperative dimension and an assertiveness dimension. Cooperativeness is defined as the attempt to satisfy the concerns of the other person, while assertiveness is defined as a party's attempt to satisfy his own concerns. Based on this two dimensional model for conflict behavior, three general modes of conflict management behavior have been distinguished; "Avoidance", "Distributive", and "Integrative".

In avoidance behavior, negotiators seek to flee or to smooth over the conflict. Avoidance tactics minimize explicit discussions of conflicts. These include statements that deny the presence of conflicts, shift the focus of conversations, or communicate about conflicts indirectly and ambiguously (Sillars et al., 1982).

Negotiators using the distributive approach view negotiation as a 'win-lose' situation and pursue their own interest, without regard for others' need or interests. In other words, they are assertive and noncooperative, and competition oriented. They conceal information and employ pressure tactics (e.g., threats, positional commitments, and persuasive arguments) to elicit unilateral concessions. This negotiation approach is also called "positional bargaining" (Lewicki, 1985; Pruit, 1981) or "hard negotiation" (Fisher and Ury, 1981).

On the other hand, negotiators using the integrative approach view negotiation as a 'win-win' situation, and exchange truthful information, generate more alternatives, and express supportiveness or a desire for reconciliation, such

as compliments or concessions. The integrative approach, also called "coordinative behavior" (Magenau and Pruitt, 1979) or "soft negotiation" (Fisher and Ury, 1981) is to collaborate with the other party in search of a mutually acceptable solution. According to Ruble and Thomas (1976), the integrative behavior is a combination of unassertiveness and cooperativeness in his two dimension model.

Many researchers in the negotiation area claim that the integrative approach is the optimal way to deal with conflicting interests between negotiators. Integrative agreements are represented in negotiations where there exists no agreement that all parties would prefer more (Bazerman, et al., 1988). The integrativeness of an outcome is measured by the magnitude of joint benefit that it provides to negotiators (Pruitt, 1981). This is in contrast to distributive outcomes where one party benefits at the expense of another, without any of the concern for joint benefit that underlies the integrative outcome concept.

Whereas, distributive bargaining (i.e., bargaining with the use of the distributive approach) can escalate hostilities surrounding the current conflict, and poisons relationships for future interdependent situations (Fisher and Ury, 1981), integrative bargaining (i.e., bargaining with the use of the integrative approach) is optimal in that it increases joint benefit, the probability of implementation of the reached agreement, and the desire for future interaction (Walton and McKersie, 1965; Graham, 1985). It also enhances organizational effectiveness in intra-organizational negotiation settings (Pruitt, 1981).

As Lewicki and Litterer (1985) point out, most negotiation situations contain some elements that require distributive negotiation processes, and others that require integrative processes. It is also possible that negotiators use a more distributive approach in the earlier stages of negotiation and more integrative approach in the later stages of negotiation (Pruitt, 1981). Therefore, integrative bargaining does not necessary mean that negotiators use an integrative approach through all phases of negotiation. However, in the context of integrative bargaining, the use of the integrative approach to dealing with conflict should be given more weight, and the distributive approach should be used within an overall integrative framework (Anson and Jelassi, 1990).

2.2.3 Barriers to using Integrative Bargaining

Although integrative bargaining is the optimal way to deal with conflicting interests in most negotiation situations, there are a number of difficulties in its successful use. This subsection discusses three factors: cognitive bias, limitations on a human's information processing ability, and social-emotional factors that impede integrative bargaining.

2.2.3.1 Cognitive Bias

Suboptimal or inefficient outcomes in negotiation often result from the negotiators' inaccurate perceptions of their opponents (Bazerman and Carroll, 1987; Thompson, 1991). Negotiators often assume that the "outcome pie" is fixed in nature, and therefore, the other party's interests are completely opposed to their own. This assumption is labeled "the fixed-pie perception".

The fixed-pie perception is a judgment error because negotiators' interests are often not completely opposed and the potential for integrative agreement exists in many negotiation situations (Raiffa, 1982; Walton and McKersie, 1965). With this judgment error, parties fail to make any efforts to more fully explore their various options, some of which may improve everyone's welfare.

Most negotiations involve multiple issues, each of which typically varies in importance to the negotiators (Lax and Sebenius, 1986; Pruitt and Rubin, 1986). Therefore, the opportunities to obtain integrative agreement does exist by logrolling, a process of making tradeoffs based on each negotiator's ability to offer something of relatively less value to oneself than to others in return for something of relatively more value to oneself then others. However, a fixed pie perception prevents negotiators from noticing this logrolling possibility.

Prior research has shown that most negotiators hold such fixed pie perceptions even in tasks with integrative potential (Thompson and Hastie, 1990). Thompson (1991) measured negotiators' perceptions of their opponents' interests several times during a negotiation that involved integrative potential. They found at the outset of negotiation most negotiators had a fixed-pie perception. Negotiators who maintained their fixed-pie perception throughout the negotiation settled for outcomes that were lower in terms of individual and joint benefit than did negotiators who made accurate judgments about the other party.

Another strong association between outcomes and perception accuracy has also been demonstrated in Bazerman and his colleagues' study (1985). Their

finding is that even as the inaccuracy of perception is reduced during negotiation, variable-sum perception of task (i.e., perception that the sum of one another's outcomes are nonconstant) results in higher outcomes than do fixed-sum perception (i.e., perception that the sum of one another's outcomes are constant). These findings suggest that inaccurate perception leads to less optimal outcomes.

Reasons for the fixed pie bias are explained by the several researchers. A general explanation is that the competitiveness of our contemporary society naturally induces a distributive, win-lose orientation in negotiators (Bazerman et al., 1987). Availability (Tversky and Kahneman, 1973) may also be used to account for the prevalence of this cognitive bias. Negotiators may draw upon and/or generalize from distributive negotiation experiences that they have had and use this information in an ongoing activity. According to Walton and Mckersie's (1965) integrative bargaining model, information exchange is necessary to make accurate judgments and reach integrative agreements.

2.2.3.2 Limitations on human's cognitive ability

Most negotiation task usually entail many problem dimensions, issues, criteria, and alternative solutions which provide logrolling potential to negotiators. Logrolling potential exists when the parties have differing priorities among the issues under consideration so that it is possible for them to exchange concessions. Many researchers claimed that in situations with logrolling potential, integrative agreements are more readily developed if the issues are considered simultaneously rather than sequentially (Froman & Cohen, 1970;

Yukl, 1974).

Unfortunately, it is not always easy to arrange simultaneous consideration of issues. Integrative bargaining involves four types of analytical activities : eliciting each party's preferences on issues, identifying alternative solutions based on trade-offs between these preferences, analyzing the extent to which alternative solutions address issues, and evaluating alternatives (Anson and Jelassi, 1990). Limitations of humans as information processing systems in performing the above activities also contribute to sub optimal agreement (Bazerman & Neale,1983; Bazerman et al., 1985). Therefore, as the complexity grows, it becomes increasingly difficult for individuals to adequately comprehend and evaluate all of the issues and criteria one by one. Furthermore, identifying potential trade-offs at both the issue and solution level is even more difficult (Jarke, 1986; Anson and Jelassi, 1990).

2.2.3.3 Social-Emotional Factors

Another barrier for integrative bargaining is social-emotional factors. Conflicts are exemplified by a number of social-emotional characteristics. One factor is the relationship between negotiators. Intense mutual distrust and little positive foundation in the relationship have a negative effect on the integrative bargaining (Kessler, 1978). Similarly, Swingle and Gills (1968) report that the positive bonds between negotiators encourage the desire for coordination, that is, the desire to work with the other in search of a mutually acceptable solution.

Kessler(1978) also identified other negative factors that affect integrative bargaining. Those factors are; (2) intense emotional involvement in the issue, (3) abstract issues rather than specific issues, (4) an unconscious or pre-conscious issue underlying the presented problem, and (5) wide disparity in the financial or personal power of the negotiators.

To achieve integrative bargaining solutions, therefore, requires the elimination or minimization of the factors causing one to deviate from it. And it also requires the environment which supports negotiators for using the integrative approach.

2.3 Studies in Computer-Mediated Communication (CMC)

Numerous studies have attempted to evaluate the efficiency and quality of computer-mediated communication system in comparison with the Face-to-Face (FtF) communication mode. Most CMC research is conducted using a cooperative problem-solving task (see, Rice, 1984, for a review). The findings can be summarized in terms of four factors: communication efficiency, interpersonal behavior, participation of group members, and decision quality.

Communication efficiency refers to the group members' ability to function, or to communicate data, ideas, opinions, and feelings among themselves in the least wasteful manner (Siegel, 1986). To measure communication efficiency of CMC, researchers include the time required to

reach consensus, the number of remarks exchanged by group members, and the number of task-oriented remarks as a function of total remarks. Results indicate that CMC group members exchanged fewer remarks and took longer to reach consensus than the FtF group members (Kiesler et al., 1984; Siegel, 1986; Dubroski et al., 1991; Hiltz et al., 1986). However, the CMC group used greater task oriented remarks in their communication (Hiltz et al., 1986). Computer-mediated communication is known to be less intimate and immediate than FtF communication, thus creating feelings of de-personalization (Johansen, 1979; Kerr and Hiltz, 1982). This feeling of de-personalization enables group members to focus on the task rather than on personal issues (Poole et al., 1991).

Interpersonal behavior refers to overt expressive behavior which is, or seems to be, affective in tone (such as insulting, laughing, shouting) (Siegel et al., 1986). Prior studies demonstrate that there is more affective expression, both positive and negative, in CMC than in FtF. Negative affect comes out more strongly than positive affect in CMC (Johansen et al., 1979; Kerr and Hiltz, 1982; Siegel et al., 1986; Sproull and Kiesler, 1986; Watson et al., 1988). Siegel et al. (1986) concur in identifying de-individuation as a possible explanation for uninhibited and antinormative behavior. De-individuation which is defined as the process whereby submergence in a group produces anonymity and a loss of identity, and a consequent weakness of social norms and constraints (Festinger et al., 1952; Zimbardo, 1969). Kiesler et al. (1984) observe that "computer-mediated communication serves to comprise some of the same conditions that are important for de-individuation, anonymity, and reduced self-regulation".

Participation of group members refers to the distribution of communication in the group. Communication via computer lacks mechanisms for displaying or enforcing social differentiation among people (for example, taking the head seat at a FtF meeting differentiates a chairperson, or eye contact may help a person dominate a conversation). The loss of this differentiating social information reduces the social influence function of communication (Edinger and Patterson, 1983; Patterson, 1982). In fact, studies support higher equalization of member participation in CMC groups than in FtF (Gallupe et al., 1988; Johansen et al., 1979; Rice, 1984; Siegel et al., 1986; Kiesler et al., 1984; Dubroski et al., 1991; Hiltz et al., 1986). In terms of decision quality, there have been no differences found due to communication modes (Turoff and Hiltz, 1982; Hiltz et al., 1986).

Based on the findings of previous studies on CMC with cooperative problem-solving task, one would characterize CMC as having the properties of 'low communication efficiency', 'de-personalization', 'de-individuation', and 'equal participation'. The question then arises as to how these properties of CMC affect groups' interaction within a negotiation task, and whether these characteristics foster or inhibit integrative bargaining.

'De-personalization' is expected to have the benefit of diffusing the conflict, enabling members to focus more on issues and arguments and less on personal antagonism (Rice, 1984; Williams, 1977). This feature satisfies one of the conditions for integrative bargaining that is 'focusing on the task rather than the person' (Fisher and Ury, 1981). Poole et al. (1991) also claimed that the less immediate electronic medium may enable the group to face up to conflict

more easily.

'De-individuation' appears to be contradictory to 'de-personalization'. De-individuation may shift group discussion to personal antagonism rather than to issues, whereas de-personalization directs group discussion to issues. De-individuation may intensify conflict and mutual distrust between negotiators and provide little positive atmosphere in the relationship between negotiators. The emotional involvement in the negotiation process is known as a social-emotional barrier for integrative bargaining (Kessler, 1978). These opposing properties of CMC, de-personalization, and de-individuation need to be explored further in the negotiation.

'Low communication efficiency' results from several aspects of CMC. With CMC, participants type on a keyboard and read from a computer terminal; whereas, in FtF communication mode, participants communicate by talking, listening, and observing nonverbal (paralinguistic) behavior. These two communication modes differ in the level of information richness and formality. "Information richness" is the ability of information to change one's understanding of a topic within a given time interval. The FtF communication mode is richer than the written document (Daft and Lengel, 1986). "Formality" of a communication mode is defined as the degree to which only the communicator's verbal messages are passed through the channel (formal) or the paralinguistic messages are also delivered through the channel (informal) (Morley and Stephenson, 1969). Based on these criteria, CMC is low in information richness and high in communication mode formality.

Another characteristics of CMC, 'equalization of member participation' may not have an impact on the small size of negotiation groups due to the imposed nature of a negotiation task. In summary, the 'de-personalization' property of CMC may enhance integrative bargaining; whereas, 'de-individuation' and 'low communication efficiency' may impede integrative bargaining.

Generally speaking, negotiation tasks are more complex and difficult than cooperative problem solving tasks. Negotiation tasks therefore, require a substantial amount of information exchange to identify and resolve differences between negotiators' interest. This cognitive requirement may add additional workload when operating a new communication mode.

2.4 Review of Negotiation Support System Literature

Negotiation Support Systems (NSSs) are a special class of Group Decision Support Systems (GDSSs) which emphasize computerized assistance for situations in which there is strong disagreement on factual or value judgments among group members (Jelassi and Foroughi, 1989). This section of literature review provides an overview of the existing literature on negotiation support systems.

The first subsection outlines studies in GDSS and relates to the concept of NSS. The second subsection examines theoretical and conceptual papers in the NSS area and the third subsection describes Arunachalam's experimental study on NSS. The review of this literature will highlight the major issues as they

apply to NSS. It will indicate where opportunities exist for further research into NSS.

2.4.1 Research on GDSS

According to DeSanctis and Gallupe (1987), a Group Decision Support System is an interactive, computer-based system that facilitates the solution of unstructured problems by a set of decision makers working together as a group. They view the group decision making process as the process of information exchange among group members and propose three levels of group decision support systems. Level 1 GDSSs provide technical features aimed at removing common communication barriers, such as large screens for instantaneous display of ideas, voting solicitation and compilation, anonymous input of ideas and preferences, and electronic message exchange between members. Level 2 GDSSs provide decision modeling and group decision techniques aimed at reducing uncertainty and "noise" that occur in the group's decision process. Level 3 GDSSs are characterized by machine-induced group communication patterns and can include expert advice in the selecting and arranging of rules to be applied during a meeting.

The GDSS settings are categorized based on the group size and group member's proximity. The four GDSS settings are 'the decision room' environment for face-to-face meeting with smaller group, 'the legistrative session' for face-to-face meeting with larger group, 'the local area decision network' for dispersed with smaller group, and 'the computer-mediated conference' for dispersed with larger group.

Much of the GDSS research, to date, has focused on the decision room environment with Levels 1 and 2 GDSS (see, Valacich et al., 1991; Jessup and Valacich, 1993, for a review). The group tasks used in the most of experimental research are planning, idea generation, problem solving, and issue discussion and these tasks are mainly involved with the group processes of Quadrants I (Generate) and II (Choose) in the McGrath's group task circumplex model. Depending on the type of task confronting the group, the features selected from the shell GDSS will vary, and the added features or enhancements to the system may change (DeSanctis and Gallupe, 1987). For example, electronic message exchange that is one of the main features of Level 1 GDSS may have a different impact depending on the group process.

Tasks requiring groups to generate ideas (e.g., brainstorming tasks) may require only the transmission of specific ideas; evaluative and emotional connotations about message and source are not required and are often considered to be a hindrance. On the other hand, tasks requiring groups to negotiate and resolve conflicts of views or conflicts of interests may require the transmission of maximally rich information, including not only "facts" but also values, attitudes, affective messages, expectations, commitments, and so on (McGrath and Hollingshead, 1993). Therefore, one may not generalize the findings in GDSS studies with cooperative group tasks to the other task domain.

2.4.2 Theoretical and Conceptual Framework Studies

Jelassi and Foroughi (1989) define NSSs as interactive, computer-based tools intended to support negotiating parties (and possibly a human mediator) in

reaching agreement. They view the five factors described by Fisher and Ury (1981) as relevant factors for designing a NSS and discuss NSS features related to those factors.

According to Fisher and Ury (1981), for integrative bargaining, five factors should be considered; (1) Separate the people from the problem, (2) Provide communication between negotiators, (3) Help negotiators identify their real interests, (4) Generate options for mutual gain, and (5) Use objective criteria. Jelassi and Foroughi (1989) argue that a number of features of a NSS can help negotiators to achieve these factors. The proposed features of a NSS are a structured decision making technique such as the nominal group technique or brainstorming, setting a time limit on verbal communication, multiple communication channels for formal as well as informal dialogue, displaying preferences on the public screen, computerized conferencing, and using group decision modelling tools such as multiple criteria decision making and a mathematical technique.

Similarly, Anson and Jelassi (1990) describe the possible features of NSS to assist negotiators in resolving social conflict. They claim that the objective of NSS is to improve: (1) the quality and acceptance of negotiated agreements; (2) the relationship between negotiators; and (3) the conflict resolution skills of negotiators. According to Anson and Jelassi (1990), a number of the main features of a NSS, similar to the features discussed in Jelassi and Foroughi (1989), function to minimize the obstacles in using integrative bargaining.

Major contributions of their paper are to illustrate a framework for implementing NSS through the integrative bargaining process and to propose a direction for future research in the NSS area. Anson and Jelassi (1990) also raise a question about the applicability of GDSS research from cooperative situations to conflict situations and claim that it should be further investigated. They claim that little attention has been given to applying computer support to the entire negotiation sessions, or to addressing social-emotional and cognitive impediments. Among several research issues they raised, the following two research questions are interesting:

1. In a conflict situation, research is needed to determine the reaction of people to the electronic channel when they are in emotionally charged states.

2. The negotiators' cognitive limitation issues provide a potentially fruitful area for further exploration. Whether the use of NSS can improve a negotiator's judgment needs to be explored further.

Other research that has recently contributed to the theoretical framework for NSS is Lim and Benbasat's (1993) work. They view a basic NSS configuration as a Decision Support System for each party and an electronic link between the DSSs so that the negotiators may communicate electronically. Lim and Benbasat considered NSSs within the context of a dyad (two parties) negotiation. They maintain that the major functions of a NSS should be to support requirement analysis, for example demand forecasting for the marketing manager, strategic analysis which includes analysis of other party's needs.

From the theoretical and conceptual papers in the NSS area, this study derives two conclusions:

1. Information system tools may help conflicting parties.

2. To understand how, when, and what features of NSS affect negotiators' behavior, much more effort on experimental research into NSSs is necessary

2.4.2 Experimental Research

Only one experimental study testing a feature of a NSS with a negotiation task has been identified. Arunachalam, in his doctoral dissertation (1991), conducted an experiment examining the effects of communication channels (computer-mediated (i.e., electronic communication channel versus face-to-face communication) and structure (no formal structure versus modified Nominal Group Technique) on the performance of 3-person groups with a transfer pricing negotiation task. Arunachalam found that computer-mediated groups and unstructured groups obtained lower outcomes, distributed resources more unequally, deviated more from integrative agreements, and maintained more inaccurate perceptions than both face-to-face groups and structured groups.

The contribution of this research is that it is one of the first experimental works to investigate the effect of electronic communication channel and group process techniques on three party negotiation. However, whether the results of this experiment can be generalized to the other features of a NSS is questionable.

Therefore, an interesting question is whether the same results would be obtained with different features of NSSs.

In summary, systematic studies of the effect of computer support on negotiation are rarely available. The reasons for the lack of research are the following:

1. The concept of a Negotiation Support System is relatively new.
2. There is little theory to guide to design of a NSS and NSS research.
3. NSS research is difficult to do and requires a great amount of resources.

NSSs are systems that have the potential to improve negotiators' ability to resolve their conflict. However, very little experimental work has been conducted into the use of NSS. Even we know very little about the effects of a standard feature of a NSS such as an electronic communication channel on negotiators' behavior. Therefore, this study attempts to explore the impact of computer-mediated communication and a negotiation support tool on the negotiation processes and outcomes.

CHAPTER III

A RESEARCH FRAMEWORK, RESEARCH QUESTIONS
AND HYPOTHESES

3.1 Introduction

Dubin (1976) mentioned, it is important to establish a conceptual and theoretical bases for any study exploring new phenomena and to understand a relation of a particular study within the overall context. Therefore, this study first considers a research framework proposed by Pinsonneault and Kreamer (1989). Then, based on the Pinsonneault and Kraemer's framework, this study proposes a research framework for studying negotiation support system.

In section 3.3, the research questions and hypotheses for an empirical investigation of a negotiation support system are described within the research framework discussed in section 3.2.

3.2 A Research Framework for Studying NSS

A conceptual model that is appropriate for the study of the technological impact on group process is Pinsonneault and Kraemer's research framework (1989). This section briefly describes Pinsonneault and Kreamer's framework. On the basis of this framework, a research framework for studying the impact of NSS on the negotiators' behavior is proposed.

3.2.1 Pinsonneault and Kraemer's research framework

Pinsonneault and Kraemer's model (see Figure 3.1) suggests that five contextual variables are important for analyzing technological support on group process and outcomes. According to Pinsonneault and Kraemer, "contextual variables" refer to factors in the immediate environment of the group rather than in the broader organizational environment. These five factors are personal factors, situational factors, group structure, technological support, and task characteristics. Their explanations for the each five factors are briefly summarized as following.

"Personal factors" refer to the attitudes, behaviors, and motives of individual group members. The four factors were identified as personal factors. These are attitude, abilities, individual motives, and background.

"Situational factors" refer to the extent of existing social networks and relationships among members of the group and to the characteristics of the development of the group. First is the existing social network between group

members. It impacts the communication and interpersonal dimensions of group process. Second are the reasons for group membership, either voluntary reasons or involuntary reasons. Third means that the stage of development of the group.

"Group structure" refers to patterned relations among members of the group. Five aspects of group structure are: (1) work group norms, (2) power relationships, (3) status relationships between members, (4) group cohesiveness, and (5) density of the group.

Pinsonneault and Kraemer claim that "Technological support" includes four basic sub-factors: (1)the type of support, (2)the degree of support, (3)the degree of anonymity, and (4)existence of facilitator in part of the support. Type of support has two subtypes; Group Communication Support System (GCSS) and Group Decision Support Systems (GDSSs). GCSS are systems that primarily support the communication process between group members to reduce communication barriers in groups, for example, teleconferencing, electronic mail. GDSS on the other hand are those systems that attempt to structure the group decision process in some way. GDSS can support individual decision processes through decision models, for example, decision model and group decision process technique.

"Task characteristics" refer to attributes of the group's substantive work. Three main factors of task characteristics are the degree of complexity, the nature of the task, and the degree of uncertainty.

Group process variables refer to characteristics of the group's interaction and attempt to capture the dynamics of that interaction. There are three different categories: (1)decisional characteristics, (2)communication characteristics, and (3)interpersonal characteristics. The structure of this group processes is also likely to affect the group outcomes.

Finally, Pinsonneault and Kraemer distinguish group outcomes into two different types; task related-outcomes and group related outcomes. The former refers to the characteristics of decision outcomes, issues of implementation, and the attitude of group members toward the decision. The latter refers to group members satisfaction with regard to the group process and the willingness of group members to work in groups in the future.

3.2.2 A research framework for NSS

Applying Pinsonneault and Kraemer's framework to the NSS domain, a research framework for NSS can be proposed as following (see Figure 3.2).

Personal factors include aspiration level, motivational orientation, background, risk taking behavior, and other individual characteristics such as ability, personality, sex, race, etc. Aspiration level is the value to the bargainer of the goal toward which he or she is striving. The way a bargainer behaves in a negotiating situation reflects motivational orientation, namely, individualistic, cooperative, and competitive (see, Rubin and Brown, 1975, for details). The background of the negotiator may include previous experience with a negotiation

task and other factors like expertise. Risk-taking behavior is the attitude toward uncertainty in the negotiation (Harnett et al., 1973).

Four aspects of *group structure* have been found to influence the negotiation process: (1) power and status between negotiators (Herman and Kogan, 1968; Kogan et al., 1972) (2) group cohesiveness (sense of oneness) (Shaw, 1976), (3) history of group and expectation of future work, and (4) commonality of goals (the degree of cooperativeness among negotiators) (Jelassi and Foroughi, 1989).

Situational factors refer to the variables that describe negotiating circumstances such as accountability, time pressure, mediator, and negotiation settings. Accountability indicates the extent to which a negotiator's constituents can reward or punish the negotiator on the basis of his/her performance (Carnevale et al., 1991; Benton, 1972; Druckman and Mahoney, 1977). Negotiation settings can be distinguished depending on factors such as size, on-going, proximity or visual access between negotiators, and communication mode (Weeks and Chapanis, 1976; Carnevale et al., 1991; Lewis and Fry, 1977). Time pressure (Hammer, 1974; Carnevale et al., 1977; Pruitt and Drews, 1969), and the role of a mediator (Pruitt, 1981) are also thought to be important factors influencing negotiation behavior.

Task characteristics refer to the attributes of the negotiation task such as nature, complexity, the degree of uncertainty, and conflict level (Poole et al., 1991).

Technological support refers to the features of NSS that are provided for negotiators. Similar to the Pinsonneault and Kraemer's classification, a NSS has two subtypes: (1)Group Communication Support System (GCSS) and (2)Group Negotiation Support System (GNSS). GCSS supports the communication process between group members and GNSS utilizes the features of GDSS in a negotiation context. With DeSanctis and Gallupe's formalization(1987), GCSS corresponds to the Level 1 GDSS and GNSS corresponds to the Level 2 and Level 3 of GDSS.

The negotiation process is the interaction that occurs between negotiators prior to the outcomes. One possible way of classifying negotiation process variables are;(1) conflict management behavior, (2) judgment accuracy, and (3) time to reach an agreement. Conflict management behavior refers to the negotiator's approach toward conflict and negotiation. Three general models of conflict management behavior have been distinguished: distribution, integration, and avoidance (Ruble and Thomas, 1976; Sillars et al., 1982). Judgment accuracy refers to the negotiator's perceptions of the other parties' priorities across issues (priority judgment) and within issues (compatibility judgment) (Thompson and Hastie, 1990). Time to reach an agreement refers to the elapsed time from the beginning of the negotiation session to the agreement.

Negotiation outcome is the product of bargaining. The negotiation outcome also has two subcomponents: task-related outcomes and group-related outcomes. Both factors might be affected by technological support. Task-related outcome variables are joint profit, satisfaction on the agreement, impasse rate, and choice shift. Group-related outcomes include two variables:

satisfaction of the negotiators with group negotiation process and willingness of the negotiators to work in the group again.

The focus of this research is to study the impact of specific features of NSS, specifically computer-mediated communication and negotiation aids, "Historical Feedback" and "what-if" analysis, on the negotiation process and outcomes. "Historical Feedback (HF)" refers to a tabular representation of offers made between negotiators during a negotiation session. "What-if" analysis provides an aid to negotiators to analyze different alternatives before making an offer. These aids are believed helpful specially for the negotiators with a complex negotiation task. The negotiation task this study uses is a transfer pricing task that involves negotiation among two buying division managers and one selling division manager over four different components each of which has five alternative levels of consideration.

3.3   Research Questions and Hypotheses

From the general construct of the framework proposed in the previous section, this study chooses specific variables to investigate the effect of a NSS on integrative bargaining. This experimental investigation focuses on two research questions: "How do different communication modes affect the negotiation process and outcomes?" and   "How negotiation aids affect the negotiation process and outcomes?"   More specifically,   "How do computer-mediated groups manage conflict, perceive other parties' priorities, and reach an agreement?", and "Can use of negotiation support tools, such as HF and 'What-

if' analysis, foster integrative bargaining which yields more a productive agreement?" Our first research question relates to a feature of Level 1 NSS, computer-mediated communication, or GCSS, and the second research question considers features of a GNSS.

3.3.1 Propositions

This thesis has two propositions: (1) The use of negotiation support tools is more effective in terms of negotiation process and outcomes. The effectiveness of negotiation process is measured by considering conflict management behavior, judgment accuracy, and negotiation time. Negotiation outcomes are measured by measuring joint profit, equality of resource distribution, and satisfaction. The use of support tools will increase the use of integrative approach, judgment accuracy, joint profit, equality of resource distribution, and satisfaction for the negotiation process and outcomes.

(2) The effectiveness of negotiation support tools will be more prominent in the CMC groups than in the FtF groups. In other words, the use of negotiation tools to support computer-mediated communication groups is more effective in terms of negotiation process and outcomes than the use of negotiation tools to support face-to-face meeting groups.

In the next section, hypotheses which operationalize the two propositions are stated with the reasoning behind them. The hypotheses are stated in a "directive" fashion in order to give the reader a better idea of the meaning of the

hypotheses.

3.3.2 Hypotheses

To address the major research questions two general propositions have been generated. The following hypotheses are based directly on the two propositions above and attempt to relate the previous findings in the relevant areas discussed earlier. The hypotheses to be tested in this research can be divided into two categories, negotiation process and negotiation outcomes.

3.3.2.1 Hypotheses on Negotiation Process

Negotiation process is defined as the interaction that occurs between negotiators prior to the outcomes. By analyzing what happens during the negotiation process, a better understanding of the negotiation outcomes may be achieved. The negotiation process variables this study has focused on are conflict management behavior, the accuracy of negotiators' judgment about the other party's priorities, and time necessary to reach an agreement.

<u>Hypothesis 1: Conflict Management Behavior</u>

H1a: Computer-mediated communication negotiators will use a more "distributive approach" than face-to-face negotiators.

H1b: Negotiators with the negotiation aid will use a more "integrative approach" than negotiators without the negotiation aid.

One characteristic of CMC, de-individuation, is positively related to the distributive approaches (Fisher and Ury, 1981). The written text is the only means of communication between negotiators with CMC, and people are known to maintain written positions more rigidly than fluid spoken stances (Johansen et al., 1979). Therefore, CMC negotiators might have a more rigid attitude in the negotiating situation use more flaming, thereby producing a more distributive approach. However, negotiation support tools are expected to help the negotiators realize the possibility of trade-off between issues, thereby enhancing more integrative approaches.

Hypothesis 2: Judgment accuracy about the other parties' priority

H2a: Negotiators with CMC mode will perceive their opponents' priorities less accurately than negotiators with FtF communication mode.

H2b: Negotiators with negotiation aids will perceive their opponents' priorities more accurately than negotiators without negotiation aids.

H2c: Negotiation aids will be of more help to CMC negotiators than FtF negotiators for perceiving opponents' priorities.

Although the de-personalization feature of CMC may help negotiators to focus on the negotiation task, the characteristics of de-individuation, low information richness, and formality in CMC may hinder negotiator from exchanging a truthful information and perceiving others' priorities accurately. Cognitive effort is required to memorize and evaluate the offers which are made during the negotiation process. HF, which summarizes all offers and shows the

sequence of offers made during a negotiation session, is expected to help the negotiators identify the nature of the disagreement clearly and understand other parties' interests on the issues. Therefore, HF will help negotiators perceive their opponents' priorities more accurately. This feature of HF is expected to help CMC negotiators more than FtF negotiators because it will compensate inefficiency of communication medium for CMC negotiators.

Hypothesis 3: Time to reach negotiation agreement

H3a: Negotiators with CMC will take longer to reach agreement than negotiators with FtF communication mode.

H3b: Negotiators with the negotiation aids will take less time than negotiators without the negotiation aids.

One of the main differences between voice media (face-to-face, audio-video, and audio-only) and written media (teletyping and text display via CMC) is that voice media results in faster solutions. William (1977) proposed two reasons to explain this difference. First, speaking is faster than writing or typing - a difference that is not compensated for the fact that reading is usually faster than listening. Second, one can engage in other activities (e.g., searching) while speaking, but not while writing or typing. For these reasons, the written media are slower, and also less wordy, since subjects cut out all redundancy in an effort to compensate for this slowness.

We expect that this slowness of CMC will be even more evident with the negotiation task. For the problem-solving task which is factual in nature and which emphasizes the cooperation between group members, paralinguistic cues do not provide much additional information. However, in a negotiating situation, nonverbal cues such as body gestures and facial expressions etc., could add a lot of meaningful information to help interpret the other party's position. This low communication efficiency of CMC will make CMC groups take longer than FtF groups.

The negotiation support tools, HF and "What-if" analysis may compensate for the inefficiency of CMC by providing a summary of offers made during a negotiation session at any point and by calculating the profit point of a given combination of offers. These capabilities allow negotiators to save some time by not scrolling previous windows to find the sequence of offers made and to calculate the profit points.

3.3.2.2 Hypotheses on Negotiation Outcomes

Negotiation outcomes refer to the attributes of the negotiation agreements. For this study, negotiation outcomes include joint profit, the equality of resource distribution, negotiator's satisfaction with the communication medium and agreement.

Hypothesis 4: Joint Profit

H4a: CMC negotiators will achieve lower joint profit than FtF negotiators.

H4b: Negotiators with the negotiation aids will achieve higher joint profit than negotiators without the negotiation aids.

H4c: Negotiation support tools will help CMC groups more to achieve higher joint profit than they help FtF groups.

Hare (1976) argues that the first step for reaching agreement is to see the nature of the disagreement clearly. Inefficiency of CMC prevent negotiators from seeing where the disagreement between negotiators exists, thereby, result in lower joint profit.

Of the four types of analytical activities involved in integrative bargaining mentioned in the chapter 2, HF is expected to assist negotiators in eliciting each parties' preferences on issues and identifying alternative solutions on trade-offs between these preferences. "What if" analysis of possible alternatives for the solution may help negotiators to consider issues simultaneously and to examine more alternatives. Therefore, negotiators with the negotiation support tools are expected to achieve higher joint profit than negotiators without the supports. In fact greater joint profit was achieved if the issues were considered simultaneously rather than sequentially (Thompson, 1991). With a summarized table of contents and sequence of offers made during a negotiation session, negotiators may spend less time to clarify and to memorize the messages exchanged therefore, may assign more time to analyze the offers made and

alternatives to be offered. This features of negotiation support tools are expected to alleviate the drawbacks of CMC such as formality and inefficiency.

Hypothesis 5: The inequality of resource distribution

H5a: The CMC negotiators will distribute their resources more unequally than the FtF negotiators.

H5b: The negotiators with negotiation aids will distribute their resources more equally than the negotiators without negotiation aids.

De-individuation, one of the main characteristics of CMC may foster negotiators to view the negotiation as win-lose situation and use more distributive approach to deal with their conflict and negotiation. Therefore, CMC negotiators may behave more selfishly and competitively, and care less about the others' positions. Thus, CMC groups will divide their resources more unequally. However, providing negotiation support tools will help negotiators perceive the other parties' interests more accurately and to realize the possibilities of logrolling.

Hypothesis 6: Satisfaction

H6a: Satisfaction with the communication medium and outcomes by CMC negotiators will differ from satisfaction with the communication medium and outcomes by FtF negotiators.

H6b: CMC groups with the negotiation support tools will be more satisfied with the communication medium and agreement than CMC groups not supported by negotiation aids.

Hypothesis 6a is exploratory in nature because of the paucity of prior research in this area. Therefore, a nondirectional hypothesis is proposed. The low communication efficiency of CMC may lead to difficulty and frustration when exchanging information. HF and "what-if" analysis are expected to reduce these feelings, thereby improving overall satisfaction of negotiators with the process and outcomes.

Other hypotheses are also possible. For this initial study, these hypotheses were considered to be the most important. Based on the findings of this study, future study on NSS will generate more detailed research hypotheses.

3.4 Summary

This chapter has outlined a research framework for studying the impact of a NSS on the negotiators' behavior. This framework is adapted from Pinsonneault and Kraemer (1989) to map into the NSS domain.

Based on the research framework and related theories, two propositions were stated. The two propositions predicted that the use of negotiation support tools will facilitate the negotiators to use a more integrative approach so as to reach an integrative agreement and the use of negotiation support tools will be

more helpful to CMC groups than to FtF groups. Then, six hypotheses were generated to test the applicability of the two propositions. The negotiation process variables utilized here are the conflict management behavior, negotiators' perception accuracy, and time to reach a negotiation agreement. The negotiation outcome variables include the joint profit, the equality of resource distribution, and satisfaction.

The six hypotheses proposed to answer the research questions: "How do different communication modes affect the negotiation process and outcomes?" and "How do negotiation aids affect the negotiation process and outcomes?". The next chapter describes a research methodology to test these hypotheses.

Chapter IV

RESEARCH METHOD

4.1 Introduction

A controlled 2 x 2 factorial design was used to examine the effects of communication mode and negotiation support tools on negotiators' behavior. This chapter describes the experimental task, the variables and their measurements, experimental design, subjects, and the experiment procedures.

4.2 Experimental Task

This experiment used a transfer-pricing negotiation task adapted from previous works (Chalos and Haka, 1990; Thompson, 1991; Arunachalam, 1991) (see Appendix A.1). The negotiation situation involved three managers, two buying division managers and one selling division manager negotiating transfer prices of four components. There were four issues (components W, X, Y, and Z) with five alternatives (A, B, C, D, and E) for each issue. Within each of the

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four components, the alternatives represented different combinations of price, quality, and timeliness of delivery. Each party had different preferences for the different alternatives defined by the points the manager would receive if that alternative was agreed upon. Among the four issues, three issues provided different priorities to the three participants and one issue gave equal priority to all participants. The task presented logrolling potential and provided an opportunity for distributive compromise as well as integrative agreement.

There were four negotiation sessions. Each negotiation session had a different set of payoff matrices (see Appendix A.2). The four sets of payoff matrices were similar in that three of the four components provided different priorities to the three managers and one component had the same priority for all managers. The difference between these sets of payoff matrices was that each payoff matrix requires negotiators to use a different strategy to derive the fully integrative agreement.

Consider payoff matrices set 1. In this set, each of the managers has one component which generates the largest amount of profit, assuming the appropriate alternative is chosen. The component-alternative condition that generates the largest payoff for each manager are as follows: for Manager 1 Component W and alternative B; for Manager 2, Component X and alternative D; and for Manager 3, Component Y and alternative C. Component Z indicates the alternative E is the best choice for all three managers. Also notice that the difference between the best alternative for the above component and the next best is the highest ($1,200) amongst all the components. Therefore, to reach the

fully integrative agreement, the combination of alternative B,D,C,E for component W,X,Y,Z respectively need to be chosen by the group.

Given the payoffs in payoff matrices set 2, it requires group members to use a different approach to achieve the fully integrative agreement. In this set, for each manager, the component with the highest payoff and the component with the largest difference between alternatives are different. For example, alternative B for Component W has the highest amount of profit ($50,000) for Manager 1 and the differences between alternatives within Component W is $450. While, Alternative C for Component Y for Manager 1 has $15,500 profit but the differences between alternatives for Component Y is $1,500. Similarly, the differences between alternatives for Component Z for Manager 1 is $800. Component X has the same priority for all three managers. Therefore, Component Y for Manager 1 has the largest difference between alternatives. In this negotiation situation, to reach the fully integrative agreement, each manager has to realize that the goal is to reach the best alternative for the component having the largest difference between alternatives for a component rather than the one with the highest payoff as in the earlier case. Thus, the integrative combination of alternatives for this set is D, B, C, B.

The payoff matrices set 3 applies the second best rule. To reach the fully integrative agreement, negotiators need to consider either the second best of the alternatives in a component with the highest amount of payoff or the second best of the alternatives in a component with the largest difference between alternatives.

For example, for Manager 1, his largest payoff ($21,000) is in the alternative B in Component W and Component X has the largest difference ($900) between alternatives in the component. Similarly, Manager 2 has his largest payoff in the alternative D for Component W, and the largest difference between alternatives in Component Y. Manager 3 has his largest payoff in the alternative A for Component Y and the largest difference between alternatives in Component W. By agreeing the second best alternative either in component with the highest amount of profit or in component with the largest difference between alternatives provides the fully integrative agreement. Thus the integrative combination of alternatives for the set 3 is E,A,C,C.

In the payoff matrices set 4, there is no consistent difference between alternatives in any of the four components. Considering the component with the highest payoff, the highest payoff $5500 can be found in the alternative D of Component W for Manager 1, in the alternative E of Component X for Manager 2, and in the alternative A of Component Z for Manager 3. The Component Y produces the same order of payoff amount for all three managers. By agreeing the third largest alternative in the component with the highest payoff, negotiators can reach the integrative agreement. Therefore, the integrative solution for this set is A,A,B,E.

The presentation of these payoff matrices was counterbalanced. All participants had equal power and were required to come to agreement by unanimity. Agreement entailed choosing one alternative for each of the four issues. Negotiators were also allowed to have an impasse (no agreement).

4.3 Variables and Measures

Figure 4.1 is a graphical representation of the relationship between the independent variables, dependent variables, and controlled variables in this experiment.

4.3.1 The Independent Variables

There are two independent variables: communication mode and negotiation aids.

Communication Mode: Negotiators using CMC were physically separated in a university micro computer lab and communicated with each other by using a computer terminal (with a keyboard and a monitor) connected to the other parties' computers. Their discussions were performed using interactive software for on-line, synchronous communication. The program was written in Clipper, a fourth generation language.

The computer screen is divided into three small windows: payoff window, outgoing message window, and public message window (Figure 4.2). The payoff window displays each negotiator's payoff matrix. The outgoing message window allows a manager to type his (her) outgoing messages. This system uses a "sequential mode" to send or receive messages. With this mode, after one negotiator has completely finished typing his (her) comments and pressure the

enter key, then the messages were sent to the others' public message board. To read the other group members' messages, this CMC system required to place the cursor the public message window. Discussions with the CMC were automatically recorded in a log file along with the time of each remark. The public message board window displays all the messages followed by the manager number indicating the source of the message. The users can scroll the public message board to see a previous screen by typing *S.

Negotiators in FtF communication mode were seated around a table in a regular meeting room. The FtF sessions were videotaped.

Negotiation Aids: The negotiation aids were Historical Feedback and "what-if" analysis (Figure 4.3). HF provides a tabular representation of offers made between negotiators during a negotiation session. For example, if Manager 1 offers alternative A for Component W, then alternative A was listed in the column of Manager 1 and Component W. In addition to the list of alternative, if Manager 1 reveals his profit along with an alternative for a particular component, the profit amount was also listed in the parenthesis next to the alternative. "What-if" capability allows the negotiators to analyze different alternatives before making an offer and also to calculate profits for an offer made by other parties.

4.3.2 The Dependent Variables and Measures

The dependent variables can be categorized into two groups: Negotiation Process variables and Negotiation Outcomes variables.

4.3.2.1 The Negotiation Process Variables and Measures

The negotiation Process variables are conflict management behavior, judgment accuracy, and negotiation time. Conflict management behavior refers to the negotiators' approach toward the conflict and negotiation. This takes three general forms defined in chapter 2: avoidance, distributive, and integrative approach. To identify conflict management behavior, Sillars' (1987) Interpersonal Conflict Interaction Coding System (ICICS) was used. The ICICS codes seven major categories of conflict behavior. Table 4.1 shows how these seven categories indicate each of the three types of conflict management behavior.

Table 4.1 Conflict Management Behavior (Coded with ICICS)

Conflict Management Behavior	Categories
Avoidance	• Denial and Equivocation • Topic Management • Noncommittal Remarks • Irreverent Joking
Distributive	• Confrontative Remarks • Disagreement
Integrative	• Analytic Remarks • Conciliation
Mixed Avoidance & Distributive	• Interaction sequences which combine Avoidance and Distributive acts
Mixed Avoidance & Integrative	• Interaction sequences which combine Avoidance and Integrative acts
Mixed Integrative & Distributive	• Interaction sequences which combine Integrative and Distributive acts
Uncodeable	• Message which can not be coded in any of the above categories.

Avoidance behavior includes (1) denial and equivocation (denying conflict or making evasive and ambiguous statements), (2) topic management (shifting or terminating a topic in an evasive manner), (3) noncommittal remarks (neither

acknowledging, denying, or evading conflict), and (4) irreverent remarks (making light of the conflict in a friendly manner). Distributive behavior is revealed in statements classified as (1) confrontative remarks (statements that are verbally competitive and individualistic, such as insults, criticism, hostile jokes, and demands) or as (2) disagreement. Integrative behavior is revealed in (1) analytic remarks (providing or seeking information about a conflict in a nonconfrontative manner), or (2) conciliatory remarks (expressing supportiveness or a desire for reconciliation, such as compliments or concessions).

With this coding manual, two independent coders categorized each message exchanged by negotiators in the same group. Then, for the each category, the ratio of conflict management behavior was calculated dividing the number of messages categorized in that particular type of conflict management behavior with the total number of messages exchanged.

Judgment accuracy was measured by examining the negotiators' perceived ranking of their opponents' priorities between alternatives in each issue (see Appendix B.1). Accuracy scores were computed by assigning a score of 1 or 0 depending on whether one correctly perceived the other parties' preferences. To create a group measure of judgment accuracy, each negotiator's score was summed within each group.

Negotiation time was defined as the length of time it took the group to reach a consensus. The time recording was started when the group members

began to interact each other. In terms of stopping the recording of time, the measurement of time was stopped when a consensus was reached. The negotiators were informed that there would be no time limit for the negotiation and their payment for the participation would be calculated on the basis of the points they accumulated over the four negotiation sessions. Negotiators were also free to remain at an impasse (i.e., no consensus).

4.3.2.2 The Negotiation Outcomes Variables and Measures

The negotiation outcomes variables studied are joint profit, inequality of resource distribution, and satisfaction with the communication medium and negotiation agreements.

Joint (total) profit was measured by summing the payoff points each group member achieved over the four negotiation sessions. This criterion is called the joint-sum criterion (Pruitt, 1981). In addition to the joint profit measure, this study also measured deviation from the most possible integrative agreement. It is the difference between the joint outcome (based on the joint-sum criterion) and the fully integrative outcome.

Inequality of divisional resource distribution refers to the absolute difference between each group member's payoff points and the group's average payoff point in each given negotiation session. For the analysis the absolute difference numbers were added within each group.

For the satisfaction measure, two questions were asked to measure the negotiators' satisfaction on communication mode (Satisfaction 1) and group agreement (Satisfaction 2). A seven-point Likert scale was used to measure the satisfaction (Appendix B.2).

4.3.3 Controlled Variables

The major controlled variables in this experiment were group size and time pressure. Other variables, for example, individual characteristics and group composition, were controlled through the random assignment of subjects to a group and group to treatments.

Group size was kept constant at three in each group. A time limit was not set for the experimental conditions. Hiltz et al.(1986) suggest that lower agreement on the group decision in CMC can be attributable to a time constraint. Time pressure is a situational variable which influences the negotiation behavior substantially (Carnevale et al., 1979; Hamner, 1974; Yukl, 1974). Arunachalam (1991) reports that CMC groups felt more time pressure than FtF groups with the same length of time limit (25 minutes).

4.4 Experimental Design

The experimental design consists of a completely randomized factorial design with two treatments, each with two levels (Figure 4.4). Treatment A is the type of communication mode with two levels: (1)Computer-Mediated Communication (CMC) and (2)Face-to-Face (FtF). Treatment B is the presence of negotiation aids: (1)with HF and "what-if" analysis and (2)no negotiation aids. Thus, there are four experimental conditions.

The units of analysis are the groups. Individuals were assigned randomly to a group and each group was randomly assigned to one of the four combinations of the two treatment experimental situations.

The experimental model for this design is as follows:

$$Y(i,j,k) = u + a(i) + b(j) + ab(ij) + e(ijk)$$

where:

i =	1,2 is the type of communication mode
j =	1,2 is the presence or absence of negotiation aids
k =	1,..,10 is the number of groups in each cell
Y(i,j,k) =	are negotiation measures judgment accuracy, joint profit,etc. for the ith type of communication mode, the jth level of negotiation aid, and kth group in a cell.

u	is a constant for each measure (overall mean of the measure).
a(i)	is the effect on a measure of ith type of communication mode
b(j)	is the effect on a measure of the jth level of negotiation aid
ab(ij)	is the interaction effect on the ith type of communication mode and jth level of negotiation aid
e(ijk)	is the error term, or the effects on the measure not accounted for by the group factors.

4.4 Subjects and Procedures

4.4.1. Subjects

120 undergraduate students from the College of Business at The Ohio State University participated in this study. The subjects were randomly assigned to groups of size three and each group was randomly assigned to one experimental condition.

The subjects were solicited in accounting, marketing, management science, and economic classes. Participation in this experiment was voluntary. The subjects were informed that a minimum of $16 and upto $22 would be awarded to each participant based on the payoff points they earned. The next section describes the experimental procedures that were used.

4.4.2 Procedures

The experiment was conducted in the university micro computer lab for the subjects with CMC conditions, and in a regular meeting room (seminar room) for the subjects with FtF. The experiment for FtF groups with support tools condition was performed also in the micro computer lab, however, computer did not served as a communication medium. Each experimental session was allocated 3 hours for the four negotiation sessions. No explicit time limit was set.

The actual experiment consisted of the following steps:

< For Computer-Mediated Communication groups >

1. Upon arrival at the laboratory, subjects were told that they were going to participate in a simulated negotiation task. All of the participants had been randomly preassigned to one of the four experimental conditions, one of the ten groups in each experimental condition, and one of the three managers role.

2. When all members of the groups arrived (at least 9 subjects (three groups) were assigned for the same time slot), a computer terminal was randomly assigned to each group member. Since the university computer lab has 27 terminals, 9 or 12 group members were able to be physically separated so that they could not determine who their

fellow group members were or see other subjects' terminals.

3. Each group members was given a four digit experiment ID with the experimental material which explained the negotiation task and the payment calculation process. The experiment ID number indicates treatment condition, group number, and manager number. Subjects were told that the last digit of their experiment ID indicates their manager role (i.e., manager 1, 2 or 3).

4. After the group members read all information given, they were provided with their role and payoff information for the negotiation session and allowed to ask any questions.

5. With an experiment assistant, the researcher demonstrated how to use the computer-mediated communication system. The CMC system was designed so that a user with no experience using E-mail can use it easily. A 15 minute exercise session was used to acquaint subjects with this CMC facility. For CMC with negotiation support tools groups, a brief instruction course in the use of negotiation support tools was given.

6. When the group members were satisfied that they could use the support tools, they were told that the use of the negotiation aids was voluntary but that they were encouraged to use them. They were told that they could use the support tools at any time.

7. Group members could ask any questions regarding the use of system. The experiment assistant answered these questions.

8. The only means of communicating between group members was through a computer terminal and keyboard. The communications were recorded in a file on the computer.

9. When the group ended a session, by typing *end, each manager was given a postsession questionnaire. The postsession questionnaire had questions measuring a negotiator's judgment accuracy on the other parties' preferences for the four components.

10. Answering the last question of the postsession questionnaire automatically allowed a negotiator to proceed to the next negotiation session. This process was repeated until all negotiation sessions were completed.

11. After the group answered the postsession questionnaire at the end of the forth negotiation session, each group member was asked to fill out a post-test questionnaire to measure negotiators' satisfaction with the communication medium and group agreement as well as to gather other background data such as sex, age, and so on.

12. The final step was a debriefing session for each group. In this debriefing session, the participants were asked if they had any

questions or comments. The cash payments were made based on the profit each negotiator earned.

13. Finally, the group was asked not to reveal or discuss any aspect of this experiment with any other person.

< For Face-to-Face Communication groups >

1. Upon arrival at the seminar room, subjects were told that they were going to participate in a simulated negotiation task.

2. When all three members of the group had arrived, if that group was preassigned to a FtF without support tools group, they were seated across the table from each other in the seminar room or the group members for FtF with support tools condition was guided to the micro computer lab. A four digit of experiment ID along with the experiment material was distributed to the each group member to explain the negotiation task and the payment calculation process.

3. After the group members read the information provided, they were given their role and payoff information for the negotiation session and allowed to ask any questions.

4. When the group members were satisfied that they understood the negotiation task, the first experimental session was started. FtF groups with support tools were instructed on how to use the support tools and a 15 minute exercise session was given. FtF groups with support tools were given a brief instruction course in the use of the negotiation aids and told that the use of the negotiation aids was voluntary but that they were encouraged to use them. They were told that they could use the support tools at any time.

5. Group members could ask any questions regarding the use of system. The experiment assistant answered these questions.

6. When the group reached a consensus, a postsession questionnaire was given to measure a negotiator's judgment accuracy on the other parties' preferences for the four components.

7. After each negotiator answered the postsession questionnaire, the payoff matrix for the next session was given and the negotiation was begun. Answering the last question of the postsession questionnaire allowed a negotiator to proceed to the next negotiation session. This process was repeated until all four negotiation sessions were completed .

8. Each session was video-taped.

9. After the group answered the postsession questionnaire at the end of the forth negotiation session, each group member was asked to fill out a post-test questionnaire to measure negotiators' satisfaction for the communication medium and group agreement as well as to gather other background data such as sex, age, and so on.

10. The final step was a debriefing session for each group. In this debriefing session, the participants were asked if they had any questions or comments. The cash payments were made based on the profit each negotiator earned.

11. Finally, the group was asked not to reveal or discuss any aspect of this experiment with any other person.

CHAPTER V

ANALYSIS OF STATISTICAL RESULTS

5.1 Introduction

This chapter presents the results of the statistical analysis. The interpretation, evaluation, and implication of the findings are discussed in the chapter 6.

For explanatory convenience, the following abbreviations are used to refer to the four experimental conditions in this study: FtF-Spt (Face-to-Face communication with the negotiation support tools), and FtF-Nspt (Face-to-Face without the negotiation support tools). CMC-Spt (Computer-Mediated Communication with the negotiation support tools), CMC-Nspt (Computer-Mediated Communication without the negotiation support tools).

5.2   Statistical Methods

The major statistical method this study used for the data analysis is Analysis of Variance (ANOVA). The research model used in this study is the fixed-effect two-way ANOVA model described in Chapter 4.

Follow-up analysis was done on the data when the results indicate that such analysis would be beneficial. A number of correlations were run to see if relationships existed between the negotiation process variables and the negotiation outcome variables to give a possible explanation on how or why certain groups performed the way they did. The statistical method for this correlation analysis was the Pearson correlation method.

5.3   Statistical Results and Tests of Hypotheses

The presentation of results of the data analysis is divided into two groups depending on the category of the dependent variables: (1) negotiation process variables and (2) negotiation outcome variables.

5.3.1   Negotiation Process Variables

For the negotiation process variables, Conflict management behavior, Judgment accuracy, and Negotiation time were considered.

5.3.1.1 Conflict Management Behavior and Hypothesis 1

On the basis of Sillar's ICICS described in section 4.3.2.1, seven possible conflict management behavior categories were selected (see Table 4.1). Videotaped discussions for FtF groups were first transcribed. The transcripts were then coded with the ICICS. The log files were used to code the discussions for CMC groups. The two independent coders who are seniors at the college of business coded all groups' messages and their agreement for coding was as high as .9173.

Hypothesis 1a states that computer-mediated communication groups will use a more "distributive approach" than FtF groups. The analysis of variance result supports this hypothesis. The data in Table 5.1 show that 9.82% of the total number of messages the CMC groups exchanged were categorized as distributive approach while only 5.68% of the total number of messages the FtF groups were categorized as distributive one. The difference on the number of distributive messages between CMC groups and FtF groups was statistically significant ($F(1, 36) = 23.1138$, $p < .001$) (see Table 5.2).

Table 5.1: MEANS FOR CONFLICT MANAGEMENT BEHAVIOR
(Distributive Approach)

Medium		N-Spt(B$_1$)	Spt(B$_2$)	Average
FtF	(A$_1$)	0.0538	0.0598	0.0568
CMC	(A$_2$)	0.1019	0.0946	0.0982
Average		0.0778	0.0772	0.0775

Table 5.2: ANALYSIS OF VARIANCE TABLE FOR CONFLICT MANAGEMENT BEHAVIOR (Distributive Approach)

Source	SS	df	MS	F ratio	p value
A medium	0.04801	1	0.04801	23.1138	.000
B support	0.00000	1	0.00000	0.0047	.946
AB	0.00127	1	0.00127	0.6109	.440
S/AB	0.07479	36	0.00208		

Hypothesis 1b states that negotiators with the negotiation support tools will use a more "integrative approach" than negotiators without the negotiation support tools. This hypothesis was not supported. Table 5.3 shows that the ratio of using the integrative messages between the two groups, the groups without negotiation supports (M_{B1} =66.7%) and groups with the negotiation supports (M_{B2} =66.0 %) is not significantly different. In terms of communication modes, there was a significant difference between FtF groups (M_{A1} =68.7%) and CMC groups (M_{A2} =64.0 %) (F(1,36) =4.4512, p < .05) (see Table 5.4 and Figure 5.1).

Table 5.3: MEANS FOR CONFLICT MANAGEMENT BEHAVIOR (Integrative Approach)

Medium		N-Spt(B1)	Spt(B2)	Average
FtF	(A₁)	0.6819	0.6929	0.6874
CMC	(A₂)	0.6524	0.6277	0.6401
Average		0.6671	0.6603	0.6637

Table 5.4: **ANALYSIS OF VARIANCE TABLE FOR CONFLICT MANAGEMENT BEHAVIOR (Integrative Approach)**

Source	SS	df	MS	F ratio	p value
A medium	0.06274	1	0.06274	4.4512	.042
B support	0.00130	1	0.00130	0.0919	.768
AB	0.00895	1	0.00895	0.6346	.431
S/AB	0.50749	36	0.01410		

Although a hypothesis on the Avoidance approach was not proposed, the analysis of variance result indicates a significant difference in the use of Avoidance approach between the two communication modes. The data in Table 5.5 show that 6.0% of the total numbers of messages CMC groups were avoidance approach, while 8.4% of the total numbers of messages FtF groups were categorized as avoidance approach. The number of avoidance messages between CMC groups and FtF groups is significantly different $(F(1, 36) = 6.4139, p < .05)$ (see Table 5.6 and Figure 5.2).

Table 5.5: **MEANS FOR CONFLICT MANAGEMENT BEHAVIOR (Avoidance Approach)**

Medium		N-Spt(B₁)	Spt(B₂)	Average
FtF	(A_1)	0.075	0.092	0.084
CMC	(A_2)	0.067	0.053	0.060
Average		0.071	0.073	0.072

Table 5.6: ANALYSIS OF VARIANCE TABLE FOR CONFLICT MANAGEMENT BEHAVIOR (Avoidance Approach)

Source	SS	df	MS	F ratio	p value
A medium	0.01544	1	0.01544	6.4139	.016
B support	0.00006	1	0.00006	0.0231	.880
AB	0.00647	1	0.00647	2.6861	.110
S/AB	0.08666	36	0.00241		

All other categories of Conflict Management Behavior, Mixed Avoidance and Distributive, Mixed Avoidance and Integrative, Mixed Integrative and Distributive and Uncodeable did not show any significant difference with any treatment condition.

5.3.1.2 Judgment Accuracy and Hypothesis 2

To score the judgment accuracy for each manager, 0 or 1 was assigned depending on whether one correctly recognized the other managers' preference for alternatives of each component, then all three managers' scores over the four negotiation sessions were added for the analysis. Three hypotheses H2a, H2b, and H2c were proposed in terms of judgment accuracy. These hypotheses state: (H2a) negotiators with CMC mode will perceive their opponents' priorities less accurately than negotiators with FtF mode. (H2b) Negotiators with negotiation support tools will perceive their opponents' priorities more accurately than negotiators without support tools. (H2c) negotiation support tools will help CMC negotiators more than they will help FtF negotiators.

The statistical results support all of these hypotheses (see Figure 5.3). The two-way analysis of variance results for the judgment accuracy is presented in Table 5.7. In support of Hypotheses 2a and 2b, there were significant main effects for communication medium indicating that FtF groups perceived the other parties' priorities more accurately than CMC groups $(F(1,36)=6.855, p<.05)$. For the negotiation support tools, groups with negotiation tools had higher judgment accuracy than groups without negotiation support tools $(F(1,36) =11.421, p<.01)$. The data in Table 5.8 show that the mean scores of perception accuracy in FtF condition $(M_{A_1}=16.26)$ and negotiation support tools condition $(M_{B_2}=17.08)$ were substantially higher than in CMC condition $(M_{A_2}=10.61)$ and without negotiation support tools condition $(M_{B_1}=9.79)$ respectively.

Table 5.7:   ANALYSIS OF VARIANCE FOR JUDGMENT ACCURACY

Source	SS	df	MS	F ratio	p value
A medium	3825.05	1	3825.05	6.855	.013
B support	6372.92	1	6372.92	11.421	.002
AB	4643.85	1	4643.85	8.322	.007
S/AB	20088.592	36	558.02		

Table 5.8:   MEANS FOR JUDGMENT ACCURACY

Medium	N-Spt(B$_1$)	Spt(B$_2$)	Average
FtF (A$_1$)	15.73	16.79	16.26
CMC (A$_2$)	3.86	17.37	10.61
Average	9.79	17.08	13.44

Analysis of variance also reports that a significant interaction effect exists between communication mode and negotiation support tools ($F(1,36) = 8.322$, $p < .01$). The results of the analysis of variance for simple main effects indicate when there were no support tools, CMC-Nspt groups ($M_{A_2B_1} = 3.86$) performed worse than FtF-Nspt groups ($M_{A_1B_1} = 15.73$) did on their judgment accuracy performance ($F(1,36) = 15.14$, $p < .001$). However, when the negotiation support tools were provided, no significant difference existed between CMC-Spt groups ($M_{A_2B_2} = 17.37$) and FtF-Spt groups ($M_{A_1B_2} = 16.79$).

Similarly, Table 5.8 illustrates that in the FtF communication mode, groups with negotiation support tools ($M_{A_1B_2} = 16.79$) and groups without negotiation support tools ($M_{A_1B_1} = 15.73$) did not have a significant difference in their judgment accuracy, whereas in the CMC communication mode, groups with support tools ($M_{A_2B_2} = 17.37$) performed significantly better than groups without support tools ($M_{A_2B_1} = 3.86$) on their judgment accuracy performance ($F(1,36) = 19.62$, $p < .001$). Even CMC-Spt groups outperformed FtF-Spt groups (see Figure 5.3). It indicates that the negotiation support tools were significantly more valuable in the CMC condition than in the FtF condition in terms of negotiators' judgment accuracy performance.

5.3.1.3 Negotiation Time

The analysis of negotiation time was based on the time elapsed between the starting point of group interaction and the point of a group agreement. Hypotheses 3a and 3b relate to the negotiation time.

Hypothesis 3a states that negotiators with CMC mode will take longer to reach group agreement than negotiators with FtF communication mode. This hypothesis was supported $(F(1,36)=53.985, p<.001)$ (Table 5.9). Referring to Table 5.10, it can be noticed that CMC groups (M_{A_2} =25.10) took significantly longer than FtF groups (M_{A_1} =13.76). In terms of the four negotiation sessions, CMC groups ($M_{A_2C_1}$=51.90, $M_{A_2C_2}$=20.40, $M_{A_2C_3}$=13.70, $M_{A_2C_4}$=14.40) took more time than FtF groups ($M_{A_1C_1}$=21.60, $M_{A_1C_2}$=13.50, $M_{A_1C_3}$=11.75, $M_{A_1C_4}$=8.20) on all four negotiation sessions (see Figure 5.4).

Hypothesis 3b states that negotiators with the negotiation support tools will take less time than negotiators without the negotiation support tools. The result in Table 5.10 shows a conflicting finding. Negotiation support tools groups (M_{B_2} =21.63) took more time to reach an agreement than did groups without negotiation support tools groups (M_{B_1} =17.2) $(F(1,36)=8.085, p<.01)$. Although this finding is contradictory to the hypothesis 3b, Table 5.10 shows that, groups with support tools took less time than groups without support tools in the last two sessions.

There were also significant interaction effects between sessions and communication medium $(F(3,36)$ =19.694, $p<$ .001), and negotiation support tools $(F(3,36)$ =7.461, $p<$ .001). Specially, in the first session, groups with the CMC mode and groups with negotiation support tools took significantly more time than FtF groups and groups without support tools respectively. The negotiation time differences between CMC groups and FtF groups and between groups with support tools and groups without support tools were reduced

gradually over the four negotiation sessions.

Table 5.9: ANALYSIS OF VARIANCE FOR NEGOTIATION TIME

Source	SS	df	MS	F ratio	p value
A medium	5141.56	1	5141.56	53.985	.000
B support	770.01	1	770.01	8.085	.007
AB	294.31	1	294.31	3.090	.087
S/AB	3428.63	36	95.24		
C Session	16687.47	3	5562.49	66.557	.000
AC	4937.87	3	1645.96	19.694	.000
BC	1870.72	3	623.57	7.461	.000
ABC	234.62	3	78.21	0.935	.426
CS/AB	9026.07	108	83.57		

Table 5.10: MEANS FOR NEGOTIATION TIME (in minutes)

<u>**All Cells**</u>

Condition		Sess 1	Sess 2	Sess 3	Sess 4	Average
FtF-Nspt	(A_1B_1)	17.40	10.80	14.40	9.10	12.93
FtF-Spt	(A_1B_2)	25.80	16.20	9.10	7.30	14.60
CMC-Nspt	(A_2B_1)	41.20	17.10	13.20	14.70	21.55
CMC-Spt	(A_2B_2)	62.60	23.70	14.20	14.10	28.65
Average		36.75	16.95	12.73	11.30	19.43

<u>**Medium**</u>

Condition		Sess 1	Sess 2	Sess 3	Sess 4	Average
FtF	(A_1)	21.60	13.50	11.75	8.20	13.76
CMC	(A_2)	51.90	20.40	13.70	14.40	25.10

Table 5.10 (Continued)

<u>Support</u>

Condition		Sess 1	Sess 2	Sess 3	Sess 4	Average
Nspt	(B_1)	29.30	13.95	13.80	11.90	17.24
Spt	(B_2)	44.20	19.95	11.65	10.70	21.63

5.3.2 Negotiation Outcome Variables

For the negotiation outcome variables, Joint profit, Inequality of resource distribution, and Satisfaction with communication medium and group agreement were considered.

5.3.2.1 Joint Profit

The analysis of joint profit was based on the sum of the payoff points each group earned over the four negotiation sessions. Summary data on joint profit is shown on the Table 5.11. According to Table 5.11, FtF groups (M_{A_1} =508,602) achieved higher joint profit than CMC groups (M_{A_2} =503,577), and groups with negotiation support tools (M_{B_2} =507,209) also scored higher than groups without negotiation support tools (M_{B_1} =504,971). When cell means of all four conditions are considered, CMC-Nspt groups ($M_{A_2B_1}$ =499,497) performed poorly compared to the groups in the other experimental conditions ($M_{A_2B_2}$ = 507,658; $M_{A_1B_1}$ =510,445; $M_{A_1B_2}$ =506,761).

Table 5.11:   MEANS FOR JOINT PROFIT

Medium		N-Spt(B₁)	Spt(B₂)	Average
FtF	(A₁)	510,445	506,761	508,602
CMC	(A₂)	499,497	507,658	503,577
Average		504,971	507,209	506,090

Table 5.12:   ANALYSIS OF VARIANCE FOR JOINT PROFIT

Source	SS	df	MS	F ratio	p value
A medium	252,581,630	1	252,581,630	3.080	.088
B support	50,097,630	1	50,097,630	0.611	.440
AB	350,789,675	1	350,789,675	4.278	.046
S/AB	2,951,583,237	36			

The analysis of variance in Tale 5.12 indicates a significant main effect for communication mode ($F(1,36)$ =3.08, $p < .05$ one tail) and non significant main effect for negotiation support tools. The hypothesis 4a: CMC groups will achieve lower joint profit than FtF groups, was supported. In other words, the negotiators with FtF communication mode achieved higher joint profit than negotiators with CMC mode. Hypothesis 4b: Negotiators with the negotiation support tools will achieve higher joint profit than negotiators without the negotiation support tools was not supported (see Figure 5.5).

As an interaction hypothesis, hypothesis 4c states that negotiation support tools will help CMC groups to achieve higher joint profit more than it will help FtF groups. The results presented in Table 5.12 support this hypothesis ($F(1,36)$

$= 4.278$, p $<.05$). When negotiation support tools were not presented, CMC groups ($M_{A_2B_1}$ $=499,497$) achieved significantly lower joint profit than FtF groups ($M_{A_1B_1}$ $=510,445$) ($F(1,36)=7.31$, p$<.05$). However, with the negotiation support tools, there was no significant difference between CMC groups ($M_{A_2B_2}$ $=507,658$) and FtF groups ($M_{A_1B_2}$ $=506,761$) on joint profit score. The result of analysis of variance for simple main effect on CMC groups indicates that a significant difference between CMC-Nspt ($M_{A_2B_1}$ $=499,497$) and CMC-Spt ($M_{A_2B_2}$ $= 507,658$) on their joint profit performance ($F(1,36)$ $=4.06$, p $<.05$ one tail).

5.3.2.2 The Inequality of Resource Distribution

The inequality of resource distribution was measured by summing the absolute difference between each group member's profit and the group's average profit over the four negotiation sessions. The results of primary analysis are shown in Table 5.13. Table 5.13 summarizes the mean score of inequality of resource distribution in each treatment condition. A higher number indicates more inequality between group members in terms of profit (see Figure 5.6).

Table 5.13: MEANS FOR INEQUALITY OF RESOURCE DISTRIBUTION

Medium		N-Spt(B_1)	Spt(B_2)	Average
FtF	(A_1)	2,843	6,337	3,497
CMC	(A_2)	7,773	8,525	8,149
Average		5,308	6,338	5,823

**Table 5.14: ANALYSIS OF VARIANCE TABLE FOR INEQUALITY
OF RESOURCE DISTRIBUTION**

Source	SS	df	MS	F ratio	p value
A medium	216,434,300	1	216,434,300	8.503	.006
B support	10,595,614	1	10,595,614	0.416	.523
AB	772,006	1	772,006	0.030	.863
S/AB	916,311,016	36			

Hypotheses 5a and 5b correspond to the inequality of resource distribution variable. The hypothesis 5a states that the CMC negotiators will distribute their resources more unequally than the FtF negotiators. Analysis of resource distribution within groups (see Table 5.14) revealed a significant relationship between communication mode and inequality of resource distribution ($F(1,36)$ = 8.503, p <01). CMC groups (M_{A_2} =8,149) distributed resources significantly more unequally than FtF groups (M_{A_1} =3,497) (see Figure 5.6). Hypothesis 5b states that the negotiators with the negotiation support tools will distribute their resources more equally than the negotiators without the negotiation support tools. The results in table 5.14 do not support this hypothesis. Groups with negotiation support tools (M_{B_2} =6,338) show more unequal resource distribution than groups without negotiation support tools (M_{B_1} =5,308). However, the difference was not statistically significant. Based on the analysis of variance results, it is concluded that the interaction between communication medium and negotiation support tool had no significant effect on the inequality of resource distribution.

5.3.2.3 Satisfaction

Two questions were asked to measure negotiators' satisfaction with communication modes (Satisfaction 1) and the group agreement (Satisfaction 2) in the post experiment questionnaire (see Appendix B.2). Tables 5.15 and 5.16 summarize each treatment condition's mean score of negotiators' satisfaction on the communication medium and the group agreement. A higher number indicates a greater satisfaction. Tables 5.17 and 5.18 show the analysis of variance results for the two satisfaction questions.

Table 5.15: MEANS FOR SATISFACTION WITH COMMUNICATION MEDIUM (Satis #1)

Medium		N-Spt(B_1)	Spt(B_2)	Average
FtF	(A_1)	17.50	16.50	17.00
CMC	(A_2)	13.60	15.30	14.45
Average		15.55	15.90	15.73

Table 5.16: MEANS FOR SATISFACTION WITH GROUP AGREEMENTS (Satis #2)

Medium		N-Spt(B_1)	Spt(B_2)	Average
FtF	(A_1)	17.70	17.90	17.80
CMC	(A_2)	15.60	17.00	16.30
Average		16.65	17.45	17.05

Table 5.17: ANALYSIS OF VARIANCE TABLE FOR SATISFACTION WITH COMMUNICATION MEDIUM (Satis #1)

Source	SS	df	MS	F ratio	p value
A medium	65.025	1	65.025	8.884	.005
B support	1.225	1	1.225	.167	.685
AB	18.225	1	18.225	2.490	.123
S/AB	263.500	36	7.319		

Table 5.18: ANALYSIS OF VARIANCE TABLE FOR SATISFACTION WITH GROUP AGREEMENTS (Satis #2)

Source	SS	df	MS	F ratio	p value
A medium	22.500	1	22.500	4.145	.049
B support	6.400	1	6.400	1.179	.285
AB	3.600	1	3.600	.663	.421
S/AB	195.400	36	5.428		

Analysis of variance results indicate a significant difference between FtF groups and CMC groups for satisfaction with communication medium ($F(1,36)$ =8.884, p <.05) and for satisfaction with the group agreement ($F(1,36)$ =4.145, p<.05). These results are consistent with hypothesis 6a states that satisfaction on their communication medium and group agreements by CMC negotiators will differ from those of FtF negotiators. FtF groups were satisfied significantly more in terms of their communication medium (M_{A_1} Satis#1 =17.0) and group agreement (M_{A_1} Satis#2 =17.80) than CMC groups (M_{A_2}

Satis#1 $=14.45$, M_{A_2} Satis#2 $=16.30$) (see Figure 5.7).

Hypothesis 6b states that groups with negotiation support tools will be more satisfied than groups without support tools in terms of their communication medium and their group agreement. Tables 5.15 and 5.16 indicate that groups with support tools show higher satisfaction on the communication medium ($M_{B_2}=15.90$ for Satis#1) and the group agreement ($M_{B_2}=17.45$ for Satis#2) than groups without support tools (M_{B_1} Satis#1 $=15.55$, M_{B_1} Satis#2 $=16.65$). However, the difference was not significant. The analysis of variance results indicate no significant interaction effects between communication mode and negotiation support tools where satisfactions with the communication medium and the group agreement were considered. Although there is no significant interaction between communication mode and negotiation support tools, CMC groups satisfied more with their communication medium when negotiation support tools were provided.

5.3.3 Additional Measures

Two additional measures were also used in the analyses conducted to compare negotiators behavior across conditions. These included the deviation from the most integrative agreement and the number of messages communicated.

5.3.3.1 Deviation from the Fully Integrative Agreement

Deviation from the integrative agreement means the difference between the joint profit the group actually earned and the fully integrative outcome. Referring to Table 5.19, CMC groups deviated more (M_{A_2} =12,183) than FtF groups (M_{A_1} =7,157), and groups without support tools deviated more (M_{B_1} =10,789) than groups with support tools (M_{B_2} =8,551) from the fully integrative agreement.

Table 5.20 shows that the difference between the means for the two communication modes are significant ($F(1,36)$ =3.080, $p<.05$, one tail). There is also a significant interaction effect between communication medium and negotiation support tools ($F(1,36)$ =4.278, $p<.05$). When the negotiation support tools were not presented, there was a significant difference between communication medium ($F(1,36)$ =7.31, $p<.05$). In other words, CMC-Nspt groups ($M_{A_2B_1}$ =16,264) deviated significantly further from the fully integrative solution than FtF-Nspt groups ($M_{A_1B_1}$ =5,315). However, with the negotiation support tools, there was no significant difference between CMC-Spt groups and FtF-Spt groups. In fact, CMC-Spt groups($M_{A_2B_2}$ =8,103) reached toward to the fully integrative agreement more than FtF-Spt groups ($M_{A_1B_2}$ =9,000) (see Figure 5.8).

Table 5.19: MEANS FOR DEVIATION FROM THE INTEGRATIVE AGREEMENT

Medium		N_Spt(B_1)	Spt(B_2)	Average
FtF	(A_1)	5,315	9,000	7,157
CMC	(A_2)	16,264	8,103	12,183
Average		10,789	8,551	9,670

Table 5.20: **ANALYSIS OF VARIANCE TABLE FOR DEVIATION FROM THE INTEGRATIVE AGREEMENT**

Source	SS	df	MS	F ratio	p value
A medium	252,581,630	1	252,581,630	3.080	.088
B support	50,097,630	1	50,097,630	0.611	.440
AB	350,789,675	1	350,789,675	4.278	.046
S/AB	2,951,583,237	36			

5.3.3.2 The Number of Messages exchanged

The number of messages exchanged between the group members during four negotiation sessions are summarized in Table 5.21. Table 5.22 presents analysis of variance results. It shows that there is a significant main effect on the communication medium $(F(1, 36) = 4.837, p < .05)$ such that FtF groups $(M_{A1} = 105.8)$ exchanged more messages than the CMC groups $(M_{A2} = 83.3)$. There is also a significant relationship between the sessions and the number of messages exchanged $(F(3,105) = 23.085, p < .001)$. Table 5.21 indicates that the groups in each condition exchanged more messages in the first session $(M_{C1} = 149.5)$ than in the other sessions $(M_{C2} = 86.21, M_{C3} = 77.04,$ and $M_{C4} = 65.54)$. The number of messages exchanged were gradually reduced over the four negotiation sessions. An interaction effect between communication medium and negotiation session was also significant $(F(3,108) = 4.002, p < .05)$. An analysis on simple main effect reports a significant difference in the number of messages between CMC groups and FtF groups for session two and session

three.

Table 5.21:   MEANS FOR THE NUMBER OF MESSAGES EXCHANGED

<u>All Cells</u>

Condition		Sess 1	Sess 2	Sess 3	Sess 4	Average
FtF-N_spt	(A_1B_1)	132.57	81.57	119.14	59.71	98.25
FtF-Spt	(A_1B_2)	156.28	142.71	81.43	73.00	113.35
CMC-N_spt	(A_2B_1)	141.14	56.14	57.14	72.57	81.75
CMC-Spt	(A_2B_2)	168.00	64.43	50.43	56.86	84.93
Average		149.50	86.21	77.04	65.54	94.57

<u>Medium</u>

Condition		Sess 1	Sess 2	Sess 3	Sess 4	Average
FtF	(A_1)	144.43	112.14	100.29	66.36	105.80
CMC	(A_2)	154.57	60.29	53.79	64.71	83.34

<u>Support</u>

Condition		Sess 1	Sess 2	Sess 3	Sess 4	Average
N_spt	(B_1)	136.86	68.86	88.14	66.14	90.14
Spt	(B_2)	162.14	103.57	65.93	64.93	90.00

Table 5.22: ANALYSIS OF VARIANCE FOR THE NUMBER OF MESSAGES EXCHANGED

Source	SS	df	MS	F ratio	p value
A medium	14130.04	1	14130.04	4.837	.034
B support	2340.57	1	2340.57	0.801	.377
AB	996.04	1	996.04	0.341	.563
S/AB	105,163.92	36	2921.22		
C Session	118651.79	3	39550.60	23.085	.000
AC	29568.89	3	6856.30	4.002	.010
BC	14035.21	3	4678.40	2.731	.047
ABC	7064.04	3	2354.68	1.374	.255
CS/AB	185,029.92	108	1713.24		

5.3.4 Questionnaire Data

A questionnaire was administered to each of the 120 participants at the end of the last negotiation session (see Appendix B.2 for the questions of the questionnaire). The questionnaire collected background data such as age, gender, major, and computer experience. Using 7-point Likert-type scales, the questionnaire also collected data aimed at eliciting individuals' attitude toward the task, group interaction, and experiment itself. This included questions such as how interesting or difficult the negotiation task was. This was followed by questions on the group process itself, such as how cooperatively or competitively group members negotiated with one another. There were also questions on the negotiators' familiarity with one another, and how satisfied they were with the medium, and group agreement. Finally there were some questions on the

negotiators' risk orientations.

To examine differences on the questionnaire data across the four treatment conditions, one-way analysis of variance (FtF-Nspt, FtF-Spt, CMC-Nspt, and CMC-Spt) was conducted. On the item " Rate yourself in terms of how you negotiated with the other members of your group " (Question No.15), FtF groups (FtF-Nspt = 17.10, FtF-Spt = 15.70) tend to rate themselves more cooperative than CMC groups (CMC-Nspt = 13.80, CMC-Spt = 15.20) (see Table 5.23).

Table 5.23: MEANS FOR QUESTION NO.15

Condition	FtF-Nspt	FtF-Spt	CMC-Nspt	CMC-Spt
Mean	17.10	15.70	13.80	15.20

Table 5.24: ANALYSIS OF VARIANCE TABLE FOR QUESTION NO. 15

Source	SS	df	MS	F ratio	p value
A Condition	55.70	3	18.567	2.062	.1226
S/A	324.20	36	9.006		

Similarly, on the item "Rate the other two members of your group in terms of how they negotiated with you." (Question No. 16), FtF negotiators

(FtF-Nspt =17.10, FtF-Spt =15.20) rated the other group members more cooperative than CMC negotiators (CMC-Nspt =12.80, CMC-Spt =14.50) did (see Table 5.25). One way analysis of variance table (Table 5.26) shows a significant difference across the treatment conditions (F(3,36) =3.844, p<.05). The Tuckey test reports a significant difference between FtF-Nspt and CMC-Nspt at α =.05 level and no significant difference with any other combination of conditions.

Table 5.25:   MEANS FOR QUESTION NO.16

Condition	FtF-Nspt	FtF-Spt	CMC-Nspt	CMC-Spt
Mean	17.10	15.20	12.80	14.50

Table 5.26: ANALYSIS OF VARIANCE TABLE FOR QUESTION NO. 16

Source	SS	df	MS	F ratio	p value
A Condition	95.50	3	31.667	3.844	.0174
S/A	296.60	36	8.239		

A descriptive analysis for age, gender, and major was performed. The modal age was 20, with the mean 22.23. Males constituted a slight majority(61.7%) over females(38.3%) in their participation in this study. The majority of participants were college of business undergraduate student(87%).

5.3.5 Correlation Analysis

In addition to the analysis of variance for the dependent variables and questionnaire data, a correlation analysis was conducted to determine if any statistically significant relationships existed between negotiation process variables and negotiation outcome variables that might help to account for any differences that were found. Table 5.27 provides the statistically significant results that were found.

TABLE 5.27 : CORRELATION BETWEEN NEGOTIATION PROCESS VARIABLES AND NEGOTIATION OUTCOME VARIABLES

Negotiation Process Variables	Negotiation Outcome Variables				
	Distributive Approach	Integrative Approach	Avoidance Approach	Judgment Accuracy	Negotiation Time
Joint Profit	-.1378	.1341	-.1885	.3802*	-.0350
Inequality of Resource Distribution	.0212	.0636	-.1427	-.2892	.2672
Satisfaction with Communication Medium	.0626	.2429	.0368	.3797*	-.1938
Satisfaction with Group Agreement	.0562	.3906*	.0222	.3782*	-.2207
Deviation from The Fully Integrative Agreement	-.1378	.1341	.1885	-.3802*	.0357
Message Numbers	.4501	-.1566	-.3108	-.1304	-.2039

* p < . 05

This analysis indicates that "Judgment Accuracy" was positively correlated with "Joint Profit", "Satisfaction with communication medium", and "Satisfaction with the group agreement". These correlation were significant at a $\alpha = .05$ level. Table 5.27 also shows that a significant negative correlation between "Judgment Accuracy" and "Deviation from the Fully Integrative Agreement". The number of "Integrative Approach" was positively correlated with negotiators' satisfaction with group agreement.

5.4 Summary

This chapter has presented a statistical analysis of the data derived from the experiment. A number of statistically significant findings can be summarized in terms of the two independent variables utilized in this study, Communication medium and Negotiation support tools.

Those groups that communicated through computer were found to perceive the other group members' priorities less accurately and took more time to reach a group agreement than groups with face-to-face communication medium. CMC communication groups achieved lower joint profit, distributed divisional resource more unequally, and deviated further from the fully integrative agreement than FtF communication groups. It was also found that CMC communication groups show less satisfaction in terms of communication medium and the group agreement than FtF communication groups.

In terms of negotiation support tools, some of the findings are consistent with what this study expected ,but on the other hand, some of the findings are in conflict with the hypotheses this study proposed. By providing negotiation support tools, negotiators in both communication modes perceived the other group members' priorities more accurately and showed nonsignificant but higher joint profit, and satisfaction on the communication medium as well as their group agreement. They also tended to deviate less from the integrative outcome than the groups without negotiation support tools. However, groups with the support tools took more time. There was no significant difference due to the negotiation support tools for the variable inequality of resource distribution.

Several interesting interaction effects were detected in this analysis. The results of this analysis showed the negotiation support tools were valuable, specially, for the computer-mediated communication groups. When the negotiation support tools were provided, CMC negotiators showed a significant increase in judgment accuracy performance. CMC-Spt groups surpassed even FtF-Spt groups on the judgment accuracy performance. CMC-Spt groups also showed a significant increase on the joint profit. They achieved joint profit as high as FtF-Spt and FtF-Nspt groups' performances. Deviation from the integrative agreement was also significantly reduced when the negotiation support tools were provided.

The questionnaire data indicated a significant difference between the CMC groups and FtF groups in terms of cooperativeness rating. FtF negotiators rated themselves as well as other members in the same groups more cooperative

than CMC negotiators did.

The correlation analysis also illustrated some interesting correlations among the variables. The higher the judgment accuracy, the greater the joint profit, and the higher satisfaction with communication medium and the group agreement. The higher the judgment accuracy, the lower deviation from the integrative agreement. Finally, the higher use of the integrative approach, the higher satisfaction with the group agreement.

The next chapter interprets and discusses these findings.

CHAPTER VI

DISCUSSION, IMPLICATION, AND CONCLUSIONS

6.1 Introduction

The next section of this chapter is an interpretation and discussion of the statistical findings presented in Chapter 5. Some limitations and possible extensions of this study are then discussed in the third section. The last section of this chapter discusses the implications of this study and concludes this research work.

6.2 Discussion and Interpretations of Results

This study compared the performance of computer-mediated communication groups and face-to-face communication groups with or without negotiation support tools in a negotiating situation. A tabular summary of statistically significant results related to the hypotheses proposed are presented in Table 6.1.

Table 6.1: Summary of Statistically Significant Research Findings

Hypothesis	Findings
1. Conflict Management Behavior	• CMC groups exchanged distributive messages more than FtF groups.*** • FtF groups exchanged integrative messages more than CMC groups.* • FtF groups exchanged avoidance messages more than CMC groups.*
2. Judgment Accuracy	• FtF groups perceived their opponents' priorities more accurately than CMC groups.* • Groups with Support tools perceived their opponents' priorities more accurately than CMC groups.** • Negotiation support tools helped CMC groups more than they helped FtF groups in terms of perception accuracy.**
3. Negotiation Time	• CMC groups took longer to reach group agreement than FtF groups.*** • Groups with Negotiation support tools took longer to reach group agreement than groups without Negotiation support tools.** • Groups in all conditions took longer in the first session than in the other three sessions.*** • CMC groups took longer than FtF groups specially in the first session.*** • Groups with Negotiation support tools took longer than groups without support tools in the first two sessions.***

Table 6.1 (continued)

Hypothesis	Findings
4. Joint Profit	• Negotiation support tools helped CMC groups more than FtF groups to achieve higher joint profit.[*]
5. The Inequality of Resource Distribution	• CMC negotiators distributed resources more unequally than FtF negotiators.[**]
6. Satisfaction	• FtF groups were more satisfied with their communication medium than CMC groups.[**] • FtF groups were more satisfied with their group agreement than CMC groups.[*]
Deviation from the Fully Integrative Agreement	• Negotiation support tools helped CMC groups to deviate less from the fully integrative agreement more than they helped FtF groups.[*]
The Number of Messages Exchanged	• CMC groups exchanged fewer messages than FtF groups.[*] • Groups in each condition exchanged more messages in the first session than in the other sessions.[***]

* $p < .05$
** $p < .01$
*** $p < .001$

The communication-medium factor results in several distinguishable differences in the negotiators' performances. Table 6.1 shows significant main effects on judgment accuracy, negotiation time, joint profit, inequality of

resource distribution, and satisfaction due to the communication medium. Analysis revealed that computer-mediated groups did not perform as well as the face-to-face groups on all of these measures.

The results also show that the negotiation support tools contribute towards obtaining better solutions. Negotiation support tools not only helped negotiators perceive the other parties' priorities more accurately, they also helped to achieve higher joint profit. This was specially the case for CMC negotiators. The support tools also helped CMC negotiators more than it helped FtF negotiators in reaching a fully integrative agreement.

The next subsections discuss and interpret these findings in each hypothesis.

6.2.1 Conflict Management Behavior

There was a significant association between communication modes and conflict management behavior. CMC negotiators exchanged more distributive messages and less integrative messages and avoidance messages than FtF negotiators. This finding is consistent with the property of 'De-individuation" which is one of the major properties of CMC. The negotiators with CMC submerged into the group resulting in anonymity and reduced self-regulation; therefore, expressing more affective comments (Kiesler et al., 1984). Another characteristics of CMC, "Communication Inefficiency", may provide an explanation for this finding too. In addition to the novelty factor of CMC, by

limiting written   text exchanges as the only means of communication, negotiators get frustrated when they do not receive an instantaneous answer to a message they have sent. This feeling of frustration seemed to increase the use of confrontative remarks such as competitive and individualistic comments, and disagreement.

The Conflict management behavior was not significantly affected by the presence of negotiation support tools.   In terms of conflict management behavior, it has been hypothesized that the presence of the negotiation support tools would increase the use of the integrative approach. Groups with support tools and groups without support tools appeared to use the integrative approach approximately the same amount. This lack of difference between the two groups was also found on the usage of distributive and avoidance approaches as well.

One interesting finding is that FtF negotiators exchanged integrative and avoidance messages more than CMC negotiators and also rated themselves and their opponents as more cooperative than CMC negotiators.   During experiments, FtF negotiators show concern for the other members' profit more than CMC negotiators. FtF negotiators seemed more satisfied if other group members also earn as much profit as they did. CMC negotiators seemed to be less concerned with equality of profit and tried to maximize their own profit. According to Ruble and Thompson (1976)'s view, this relationship between cooperativeness and positive evaluation can be explained with the socialization process: a negotiator may internalize norms which equate "good" behavior with concern for the welfare of others.

6.2.2 Judgment Accuracy

One of major findings of this study is the significant effect of the communication medium and negotiation support tools on the negotiators' judgment accuracy performance. FtF negotiators perceived the other parties' priorities more accurately than CMC negotiators. This finding is consistent with the result in the previous research. Arunachalam (1991) found that computer-mediated communication groups and unstructured groups possessed more inaccurate perceptions than FtF and structured groups respectively.

The use of negotiation support tools also aid in improving negotiators' perception accuracy significantly. In general, groups with negotiation support tools significantly outperformed groups without negotiation support tools. This difference was most apparent with the CMC groups. Without support tools, CMC groups' perception accuracy was significantly lower than that of other groups. However, when the negotiation support tools were provided, CMC groups' performance on the perception accuracy was remarkably increased and even surpassed FtF-Spt groups.

One possible explanation for the judgment accuracy differences between the two communication mediums can be found in the low efficiency of CMC. Communication efficiency is defined as the group members' ability to function, or to communicate data, ideas, opinions, and feelings among themselves in the least wasteful manner (Siegel, 1986). A computer-mediated written form of communication eliminates all the kinds of cues such as facial expression,

vocalizations and body movement which are available in a face to face communication medium. These missing cues seemed to make CMC an inefficient medium so that lower judgment accuracy performance results.

In this study, the use of NSS seemed to help the group to perceive the other parties priorities more accurately. In particular, "Historical Feedback" together with the function to scroll the public message board seemed to provide "group memory" and enabled the groups to analyze the other group members' preferences between the components and between alternatives within each component. This appeared to compensate for the inefficiency of CMC which in turn seemed to improve judgment accuracy.

6.2.3 Negotiation Time

The findings related to the communication medium effect on the negotiation time indicated that CMC groups took a longer time than FtF groups in all four negotiation sessions. Since CMC groups need to type their responses, this finding can be explained with William's (1977) proposition. He explained the slowness of written media with the following two reasons: (1) speaking is faster than writing or typing, and (2) one can engage in other activities (e.g., searching) while speaking, but not while writing or typing. This slowness was more noticeable in the first negotiation session. Negotiation time decreased over the four sessions. This decrease in negotiation time was more prominent between the first two sessions, specially for CMC groups. It indicates a learning

effect on the usage of computer-mediated communication system as well as the negotiation task environment involved in this experiment.

Findings with respect to the NSS effect on the negotiation time were somewhat inconsistent with the hypothesis proposed earlier. Hypothesis 3b proposed that negotiators with the negotiation support tools will take less time than negotiators without negotiation aids. However, the findings indicated that groups with NSS took a longer time than groups without NSS.

A possible explanation for this inconsistent finding can be the negotiators' interest in the NSS. Groups with NSS were found to bring up the NSS screen very often. It seemed that negotiators just wanted to explore the features of the NSS rather than try to utilize it for improving their performances. However, once the negotiators became accustomed to the features of the NSS, then the NSS seemed to help negotiators to reduce negotiation time. The significant interaction effect between negotiation support tools and negotiation sessions on negotiation time supports this claim. Although NSS-support groups took a longer time than groups without NSS in the first two sessions, particularly in the first session, NSS-supported groups took less time than groups without the NSS in the last two sessions. All groups reduced their negotiation time significantly over the four negotiation sessions.

6.2.4 Joint Profit

FtF groups achieved a higher joint profit than CMC groups. This finding is consistent with the previous work. Arunachalam (1991) also reported a higher joint profit score in FtF groups than CMC groups. Based on the observation, FtF groups seemed to consider the issues simultaneously while CMC groups seemed to consider the issues sequentially. This finding confirms Thompson's (1991) claim that greater joint profit was achieved if the issues were considered simultaneously rather than sequentially.

Although, overall, groups using NSS showed a tendency towards higher joint profit than groups without support tools, there was no statistically significant associations. However, a significant interaction effect was found. Providing NSS to CMC negotiators helped negotiators to improve their joint profit significantly more than it helped FtF negotiators. One possible reason for this differential effect of NSS to communication medium is due to the number of usage of these support tools. CMC groups used NSS significantly more often than FtF groups did ($F(1,18) = 11.114$, $p < .01$)

These findings are interesting. Because correlation analysis between the negotiation process and outcome variables indicated a highly significant correlation between judgment accuracy scores and joint profit scores ($r = .3802$, $p = .016$). This result support Hare's claim (1976). He argued that the first step toward reaching agreement is to see the nature of the disagreement clearly. Higher perception accuracy was correlated with greater joint profit.

6.2.5 The Inequality of Resource Distribution

The communication modes were significantly associated with the inequality of resource distribution. CMC groups distributed resources more unequally between group members than FtF groups. An interesting correlation was observed between judgment accuracy and the inequality of resource distribution. Groups with a higher judgment accuracy showed less unequal distribution of resources ($r = -.2892$, $p = .070$).

6.2.6 Satisfaction

Another difference between the two communication modes was found to be significant in terms of satisfaction with the communication medium and group agreement. FtF groups were significantly more satisfied with their communication medium as well as their group agreement than were CMC groups. Possible reasons for this difference are communication inefficiency of CMC and the novelty factor of CMC. Although the CMC group members had an exercise session to familiarize them with the CMC, CMC was still a pretty new communication medium compared to the traditional communication medium, FtF. This novelty factor with formality of the channel may have produced more frustration which resulted in less satisfaction.

Groups with support tools were expected to be more satisfied than groups without support tools. NSS-supported groups showed a higher satisfaction for

communication medium and group agreements, but not high enough to be significant.

There were significant correlations between judgment accuracy and satisfaction on the communication medium and group agreement. The higher the judgment accuracy, the higher the satisfaction on the communication medium (r= .3797, p= .016) and the higher the satisfaction on the group agreements (r= .3782, p=.016).

6.2.7 Deviation from the Fully Integrative Agreement

Overall, Deviation from integrative agreement, was significantly higher in CMC groups than FtF groups. This is consistent with Arunachalam's finding (1991). He found that FtF groups deviated significantly less than CMC groups. Groups with support tools also deviated less compared to groups without support tools.

One interesting finding is a significant interaction between communication medium and support tools. When negotiation support tools were not presented, CMC groups deviated significantly more than FtF, but with negotiation support tools, there was no significant difference between the two communication mediums. This means that the NSS helped CMC negotiators more than it helped FtF negotiators. It seems that CMC groups with the NSS were able to perceive where conflicts between group member's interests existed and try to find a

compromise among the four negotiation issues. A correlation analysis confirms this view. Deviation score was highly correlated with judgment accuracy performance. Higher judgment accuracy was correlated with less deviation from the integrative agreement ($r = -.3802$, $p=.016$).

6.2.8 The Number of Messages exchanged

There was a significant difference between the two communication medium in terms of number of messages exchanged. CMC groups exchanged significantly less messages than FtF groups. It seems that CMC groups tried to cut redundancy of communication to compensate for inefficiency of CMC.

Groups in all four conditions exchanged more messages in the first session than in the other three sessions and the number of messages was continuously reduced as the negotiation sessions progressed. This is consistent with findings on the negotiation time.

A significant positive correlation exists between the number of messages and the use of the distributive approach. A higher number of messages exchanged is correlated with a more distributive approach ($r=.4501$, $p= .016$).

6.3 Limitations and Extensions

This study performed a laboratory experiment to study the impact of a negotiation support system on the negotiation process and outcomes. The results found in this study were summarized and discussed in the previous section. This section discusses limitations and extensions of this study.

One limitation of this research resides in the low external validity normally associated with laboratory experiments. While laboratory experiments permit precise measurement of effects, deliberate manipulation of presumed causes, and strong inferences about cause-effect relationships, they also have flaws related to artificial settings and procedures.

Another limitation related to laboratory work is the use of student subjects. Students may have different level of experience and motivation from managers in the real world. In terms of incentive, subjects were informed that they would be paid cash upto $22 based on their performance. The average payment was $20 and it was believed that $22 would be a reasonable amount to encourage student subjects to do their best.

Another factor related to this experimental setting is that it is difficult to capture the group dynamics based on a continuous working relationship. The group members were formed just for this experiment and they did not have any past experience as a group member or an expectation to be a group member in the near future.

In spite of these drawbacks, one of the main reasons this research used a laboratory experiment is due to the exploratory nature of this study. Since there is little research findings to date on the impact of features of a NSS on the negotiators' behavior, it was believed that a laboratory experiment which allows researchers to manipulate factors of interests and to make concise inferences about cause-effect would be appropriate. However, because of the issue of artificiality, caution is required in generalizing the findings of this study to different situations. A possible extension related to this matter will be to conduct a field study and compare the research findings to those in the laboratory work.

The features of a NSS have a lot of potential to be extended. Currently the communication is done in a sequential fashion. Therefore, if one member needs to send a message to the other group members, a cursor has to be on the outgoing message box, in which the public message board is not updated for that member.

Second, for the negotiation support tools, this study used "Historical feedback" and "What-if" analysis. Considering different features of NSS such as a private channeling of communication between group members, modeling tools, agenda, and some arbitrator function for negotiators is certainly an important extension to this work.

Regarding the negotiation setting, this study compared a local decision network environment (i.e., connected through computer terminals) to the

traditional way of meeting (sitting around a table without a computer terminal). Although FtF-Spt groups used a computer, it was for using negotiation support tools not for communication medium. So it would be interesting to explore the effects of the NSS in a decision room environment which uses a computer for negotiation support tools as well as for communication medium in addition to the face-to-face communication medium features.

Finally, other types of negotiation task needs to be considered. This particular task was chosen because it had been tested previously; therefore, it was believed in terms of external validity and it could be manipulated to provide a clear way of measuring dependent variables such as judgment accuracy, joint profit, etc. This study, however, did not consider level of task difficulty or conflict level. For example, varying the number of issues and alternatives, using different incentive scheme, and removing the logrolling possibility may generate different levels of conflict and difficulty of the negotiation task. An extension of this work may consider the nature and different levels of complexity or conflict.

6.3   Implications of the Research and Conclusions

Nunamaker(1992) states that a major motivation in computing and computer application research is, "What can be automated and how can it be done efficiently and effectively?". This research attempts to serve as a starting point for future NSS works attempting answer the above question.

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Computer-mediated communication mode was an inferior communication medium to the face-to-face communication mode. Therefore, limiting means of communication to sorely computer-mediated communication may result in lower performance of negotiators. One of the main reason for this inferiority of computer-mediated communication is attributable to the low efficiency of communication medium. Therefore, further study is needed to identify different features of CMC, for example, video pen and voice input, which can improve it's efficiency.

This study has demonstrated that two features of a NSS, "Historical Feedback" and "What-if" analysis, are useful and important parts of a NSS. Those features helped negotiators to perceive the other group member's preferences more accurately, to achieve higher joint profit, and to distribute division resources more equally.

This study also has shown that use of a NSS increased the time taken to reach a group agreement for the first two sessions, but later the use of the NSS tended to reduce the time to reach a group agreement. This is likely to happen when the users are not familiar with the system and indicates the learning effect on the usage of computer-mediated communication system as well as support tools. This study also demonstrated that the use of the NSS was specifically helpful on the CMC environment. It suggests that two features of negotiation support tools help to compensate for inefficiency of CMC.

This dissertation covered an entire research life cycle. It first proposed a research framework for studying the impact of negotiation support system on the negotiation process and outcomes. Then it developed a negotiation support system which has a group communication support feature and group negotiation support features. Finally, it proposed research questions and hypotheses based on the research framework this study described earlier and conducted an experiment to test the effectiveness and efficiency of the developed NSS. It is believed that this dissertation may provide a useful insight for future work and for NSS design.

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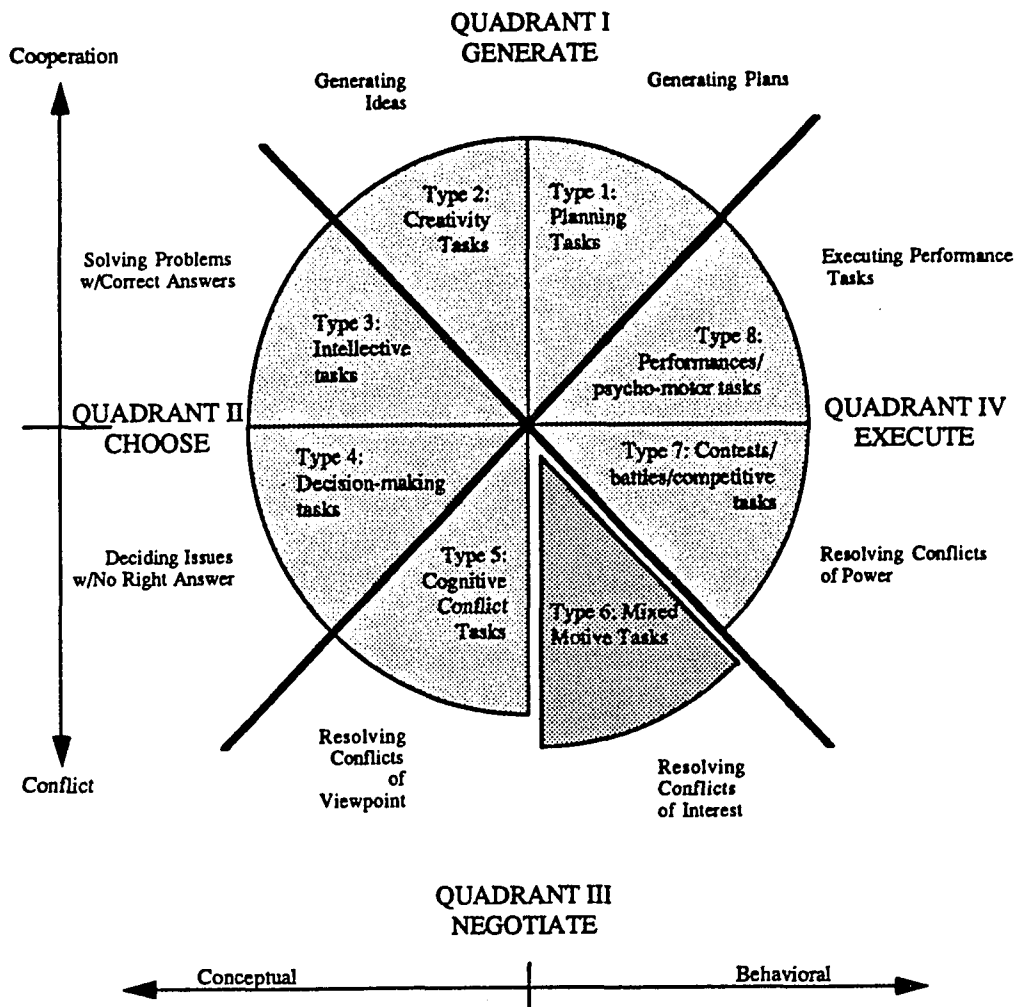
Figure 2.1 : The Group Task Circumplex
(Source: McGrath, 1984)

Contextual Variables

		Task Related Outcomes
Personal Factors • attitude • abilities • individual motives • background	**Group Process**	

Personal Factors
- attitude
- abilities
- individual motives
- background

Situational Factors
- reasons for group membership
- stage in group development
- existing social networks

Group Structure
- work group norms
- power relationships
- status relationships
- group cohesiveness
- density
- anonimity
- facilitator

Technological Support
- degree
- type (GDSS vs. GCSS)

Task Characteristics
- complexity
- nature
- degree of uncertainty

Group Process

I. Decision Characteristics
- depth of analysis
- participation
- consensus reaching
- time to reach the decision

II. Communication Characteristics
- clarification efforts
- efficiency of the commun.
- exchange of information
- nonverbal communication
- task-oriented commun.

III. Interpersonal Characteristics
- cooperation
- domination of a few members

IV. Structure Imposed by GDSS/GCSS

Task Related Outcomes

I. Characteristics of the Decision
- quality
- variability of the quality over time
- breadth

II. Implementation of the Decision
- cost
- ease
- communication of the group members

III. Attitude of Group members toward the Decision
- acceptance
- comprehension
- satisfaction
- confidence

Group Related Outcomes

I. Attitude toward the Group Process
- satisfaction
- willingness to work with the group in the future

Figure 3.1 : A Framework for Analyzing the Impacts of GDSS and GCSS on Group Processes and Outcomes

Source: Pinsonneault and Kraemer (1989)

<Contextual Factors> <Negotiation Process> <Negotiation Outcomes>

Personal Factors

• Aspiration Level
• Motivational Orientation
• Background
• Risk Taking Behavior
• Individual Characteristics

Group Structure

• Power and status
  between negotiators
• Cohesiveness
• Commonality of Goals
• History and Expectation
  of future work

Situational Factors

• Accountability
• Time Pressure
• Mediator
• Negotiation Settings

Task Characteristics

• Complexity
• Nature
• Degree of Uncertainty
• Conflict Level

Technological Support

• NSS   GCSS: Level 1
         GNSS: Level 2
                Level 3

• Conflict Management
  Behavior

• Judgement Accuracy

• Time to reach Agreement

Task Related Outcomes

• Joint Profit
• Satisfaction on the
  Agreement
• Impasse Rate
• Choice Shift

Group Related Outcomes

• Satisfaction on the Group
  Negotiation Process

• Willingness to work with
  the group again

Figure 3.2 : A Framework for Studying Negotiation Support Systems

Figure 4.1 : Relationships between Variables

Comp. W	Comp. X	Comp. Y	Comp. Z
Alt. Pts	Alt. Pts	Alt. Pts	Alt. Pts
A 4800	A 1200	A 1200	A 300
B 6000	B 1800	B 1500	B 100
C 3600	C 3000	C 300	C 200
D 1200	D 600	D 900	D 400
E 2400	E 2400	E 600	E 500

Figure 4.2 : Computer Mediated Communication System Screen
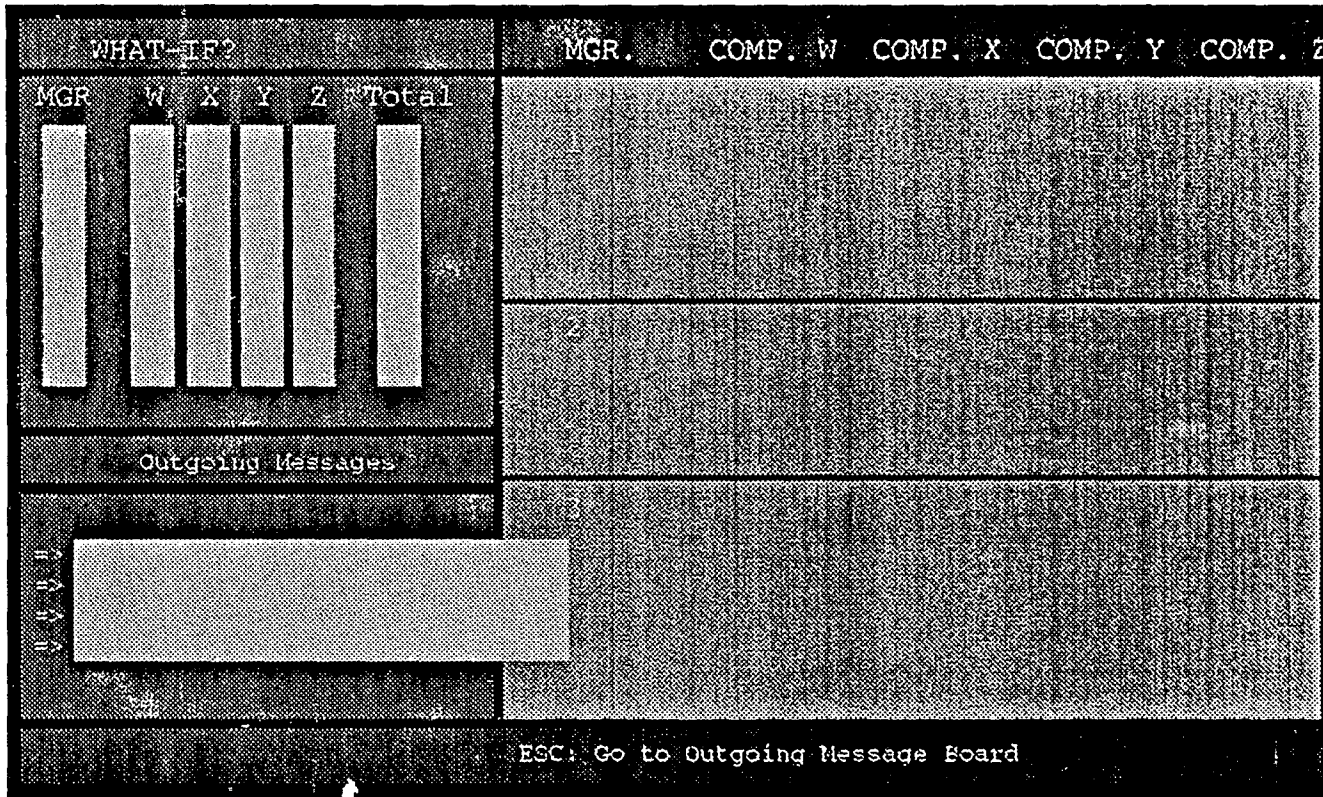
Figure 4.3 : Negotiation Support Tool Screen

Treatment B
Negotiation Aid

	No Negotiation Aid	Negotiation Aid
Face-to-Face		
Computer-Mediated Communication		

Treatment A
*Type of
Communication Mode*

Figure 4.4 :Experimental Design

ratio of using distributive approach

H1a   p < .001

0.098

0.057

FtF   CMC

ratio of using integrative approach

H1b

0.667   0.660

No Support   Support
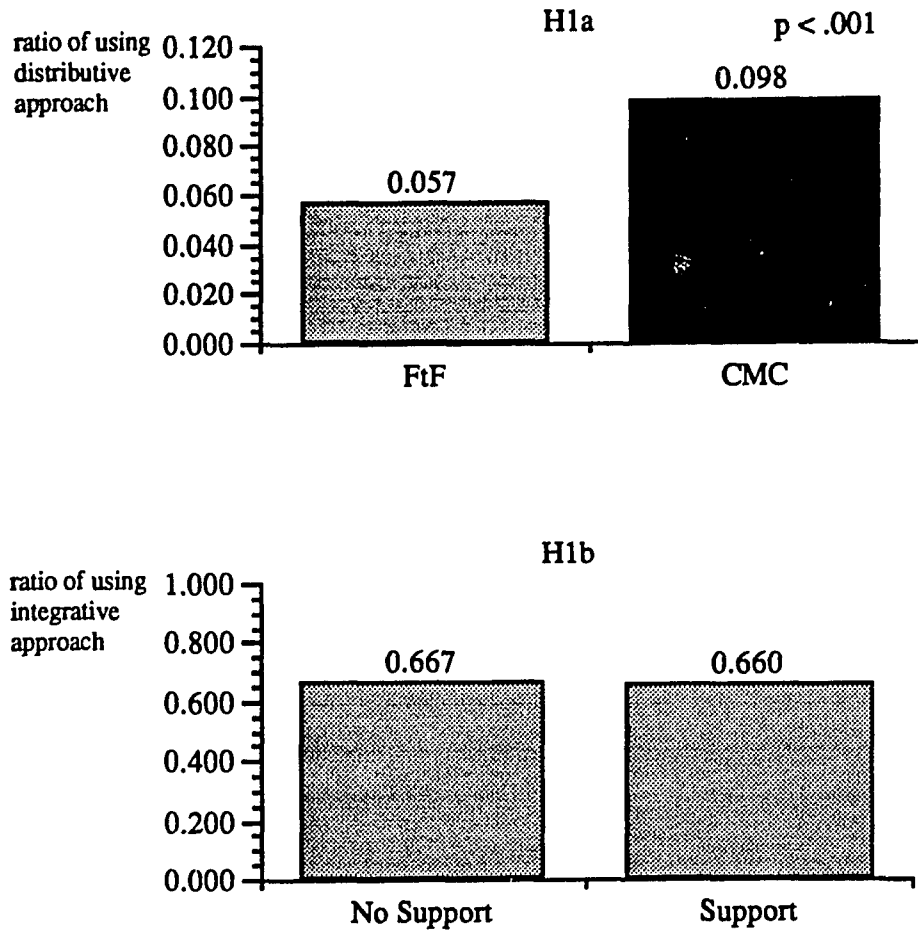
Figure 5.1 : Hypothesis 1:   Conflict Management Behavior
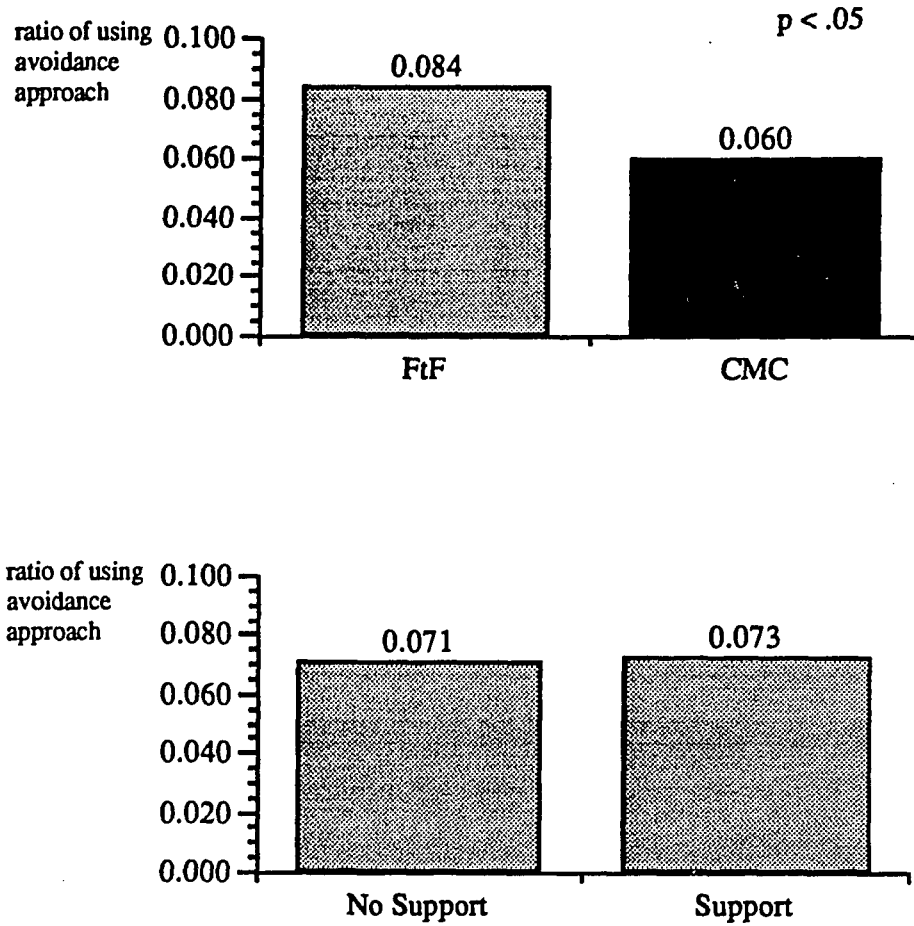
Figure 5.2 : Conflict Management Behavior (Avoidance Approach)

(H2a)

points

p < .025

20

16.26

15

10.61

10

5

0

FtF   CMC

(H2b)

points

p < .01

20

17.08

15

9.79

10

5

0

No Support   Support

(H2c)

p < .01

20

15.73   16.79 17.37

15

10

5   3.86

0

No Support ▨ FtF   Support

■ CMC
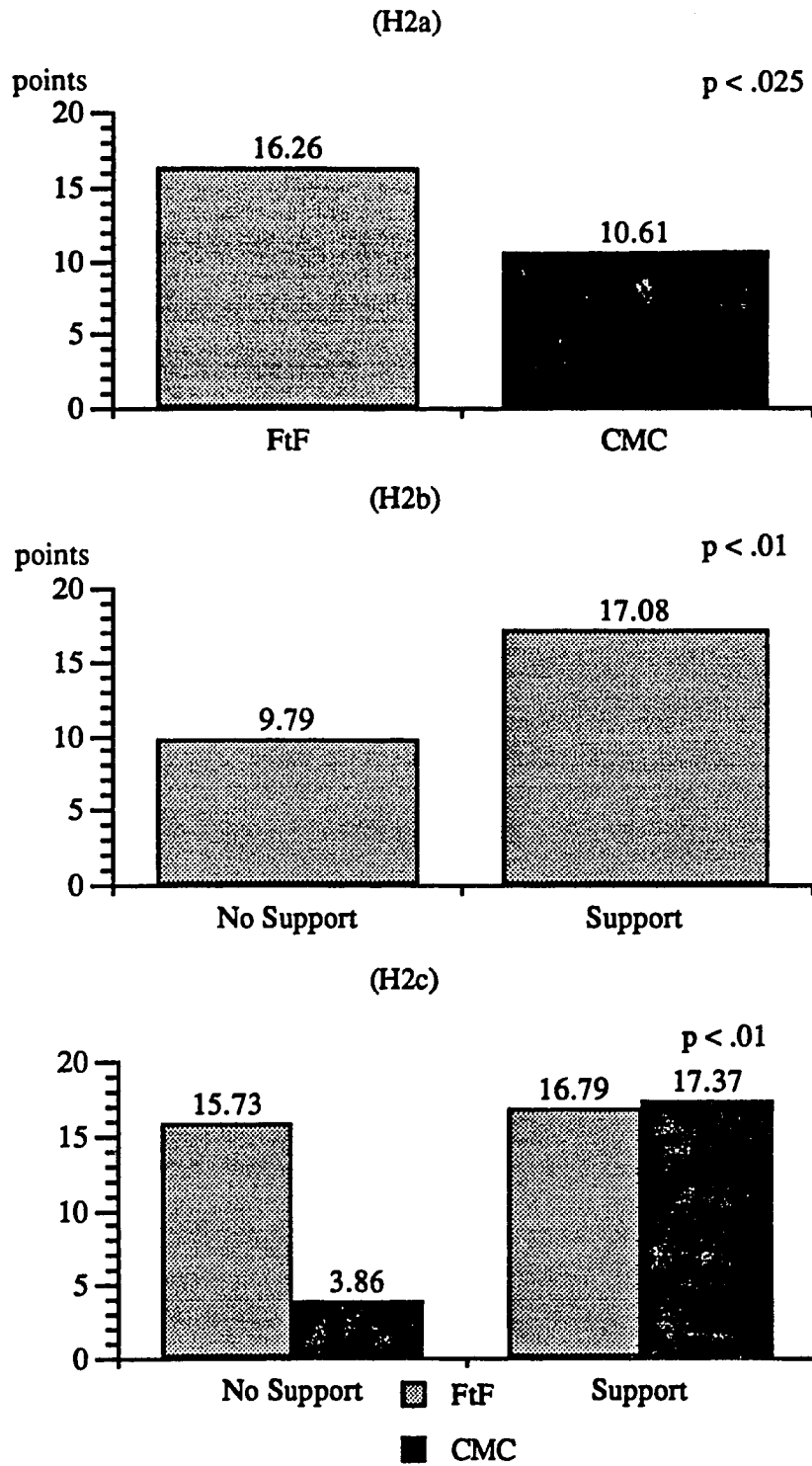
Figure 5.3 : Hypothesis 2: Judgment Accuracy about the Other Parties' Priority

(H3a)

time (min)

p < .001

(H3b)

time (min)

(H3c)

time (min)
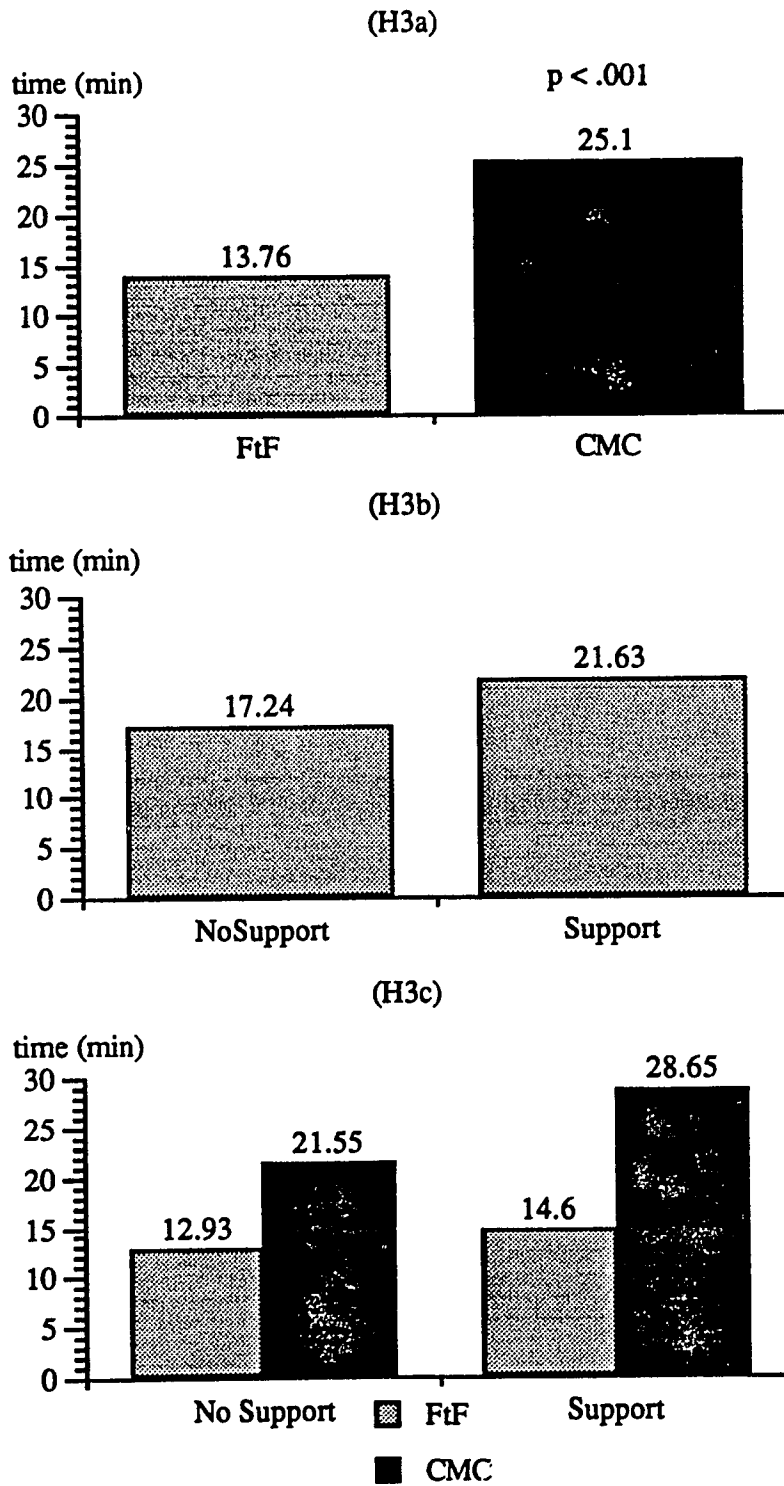
Figure 5.4 : Hypothesis 3: Time to Reach Negotiation Agreement

(H4a)

(H4b)

(H4c)
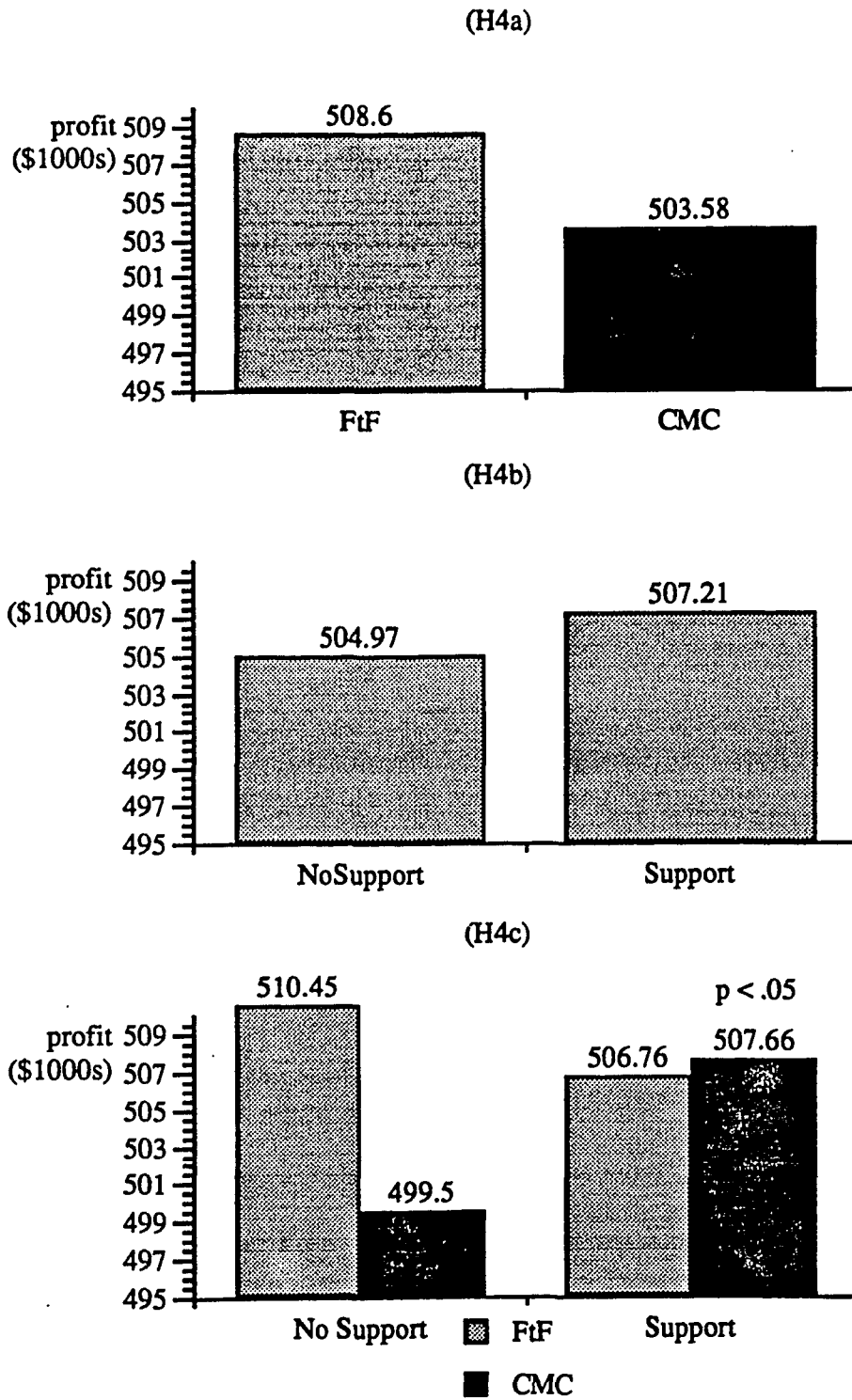
Figure 5.5 : Hypothesis 4: Joint Profit

(H5a)

profit ($s)

p < .01

8149

8250

7250

6250

5250

4250

3497

3250

FtF   CMC

(H5b)

profit ($s)

8250

7250

6338

6250

5308

5250

4250

3250

No Support   Support
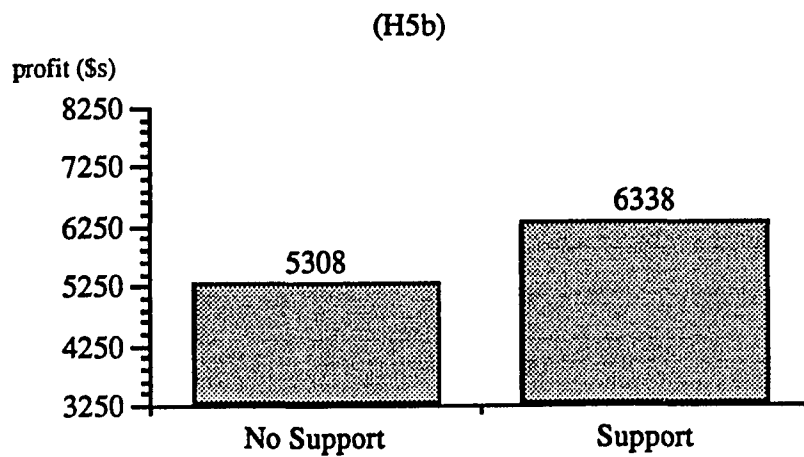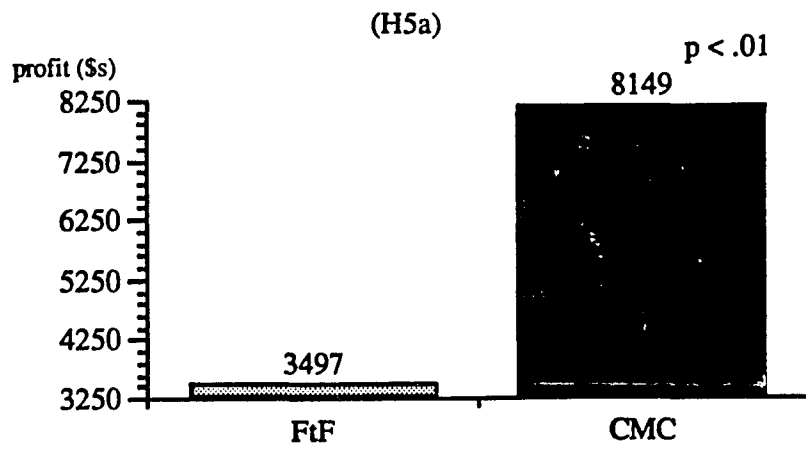
Figure 5.6 : Hypothesis 5: The Inequality of Resource Distribution
(Higher numbers indicate more inequal resource distribution.)

(H6a)

$p < .01$ points

$p < .05$

18.00	17.00		17.80
17.00			16.30
16.00		14.45	
15.00			
14.00			
13.00	Satisfaction 1		Satisfaction 2

▨ FtF

■ CMC

(H6b)

points

18.00			17.45
17.00		16.65	
16.00	15.55	15.90	
15.00			
14.00			
13.00	Satisfaction 1		Satisfaction 2

▨ No Support

■ Support
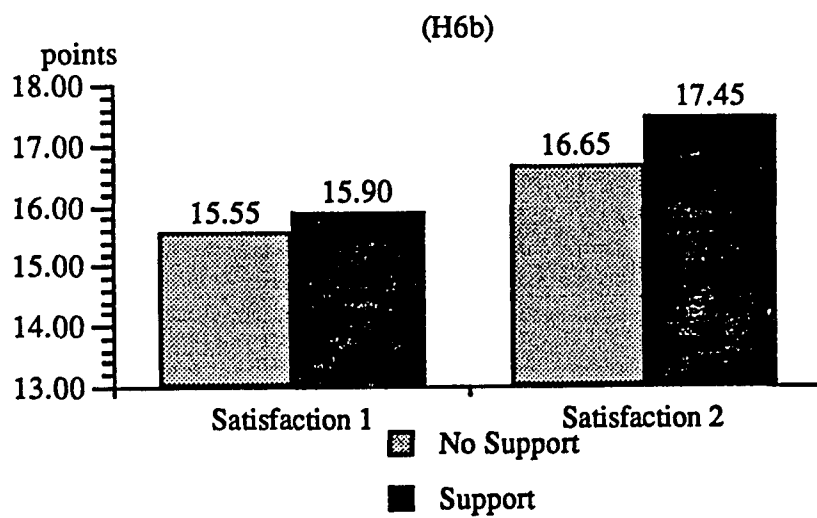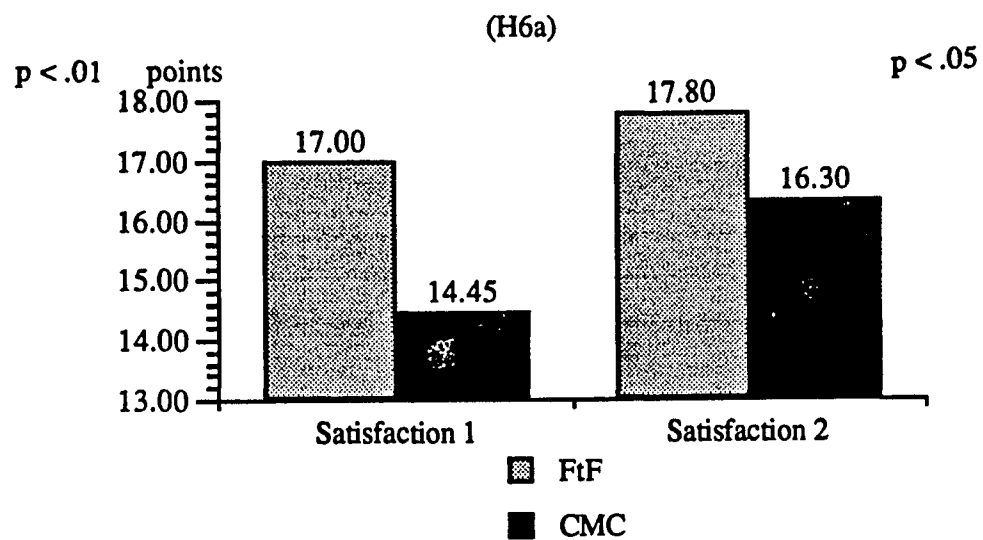
Figure 5.7 : Hypothesis 6: Satisfaction
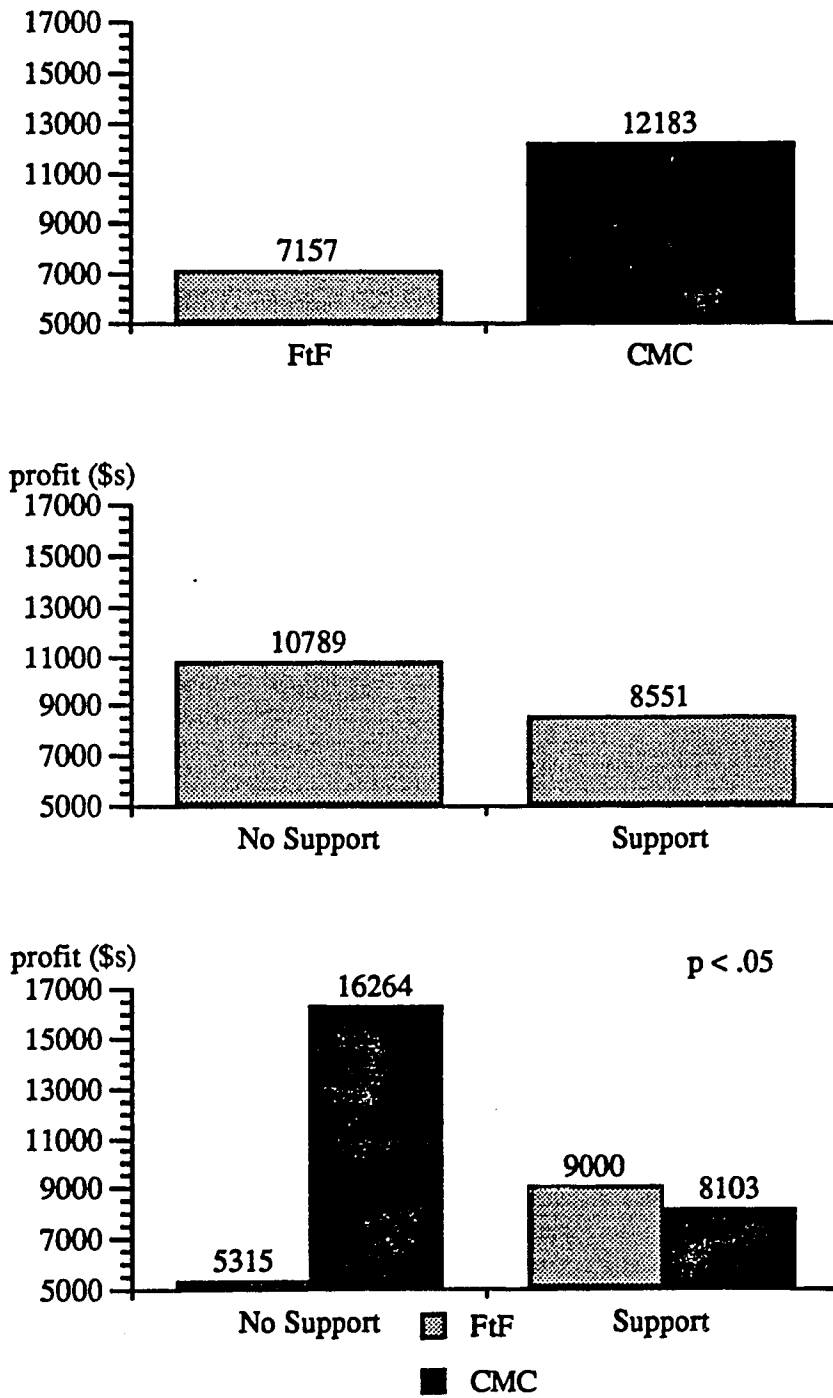
Figure 5.8 : Deviation from the Integrative Agreement
(Higher numbers indicate larger deviation from the integrative agreement)

APPENDIX A.1 : EXPERIMENTAL TASK
(This task is adapted from Arunachalam's work (1991).)

ABC, Inc, has three divisions: Anderson, Benner, and Columbia. The three divisions are organized as profit centers and have their own sales force and production facilities. The corporate management of ABC evaluates the performance of these divisions primarily on the basis of profits. Given the overall organizational objective of maintaining cohesion and long-term profitability, corporate management also weights divisional productivity, product initiative, market position, employee satisfaction and attention to long-term goals in making its evaluation. In line with its support of the decentralization concept, however, corporate management is strongly committed to providing as much operating freedom as possible to its divisions.

Anderson Division and Benner Division have recently been awarded separate contracts for products that use components manufactured by Columbia Division as well as some outside suppliers. They both need four components, all of which Columbia can provide, in order to fill their separate contracts. The final products may be marketable in the future not only to their original contractors but also to other retail outlets.

Separate market analysts by Anderson and Benner have shown that outside suppliers of the four components are charging prices that are higher than their tight divisional budgets can accommodate. Columbia Division, in the meanwhile, has production capacity with an option to sell outside if intra-organizational terms are not adequately favorable, and its sales force is continually soliciting new prospects with projections of higher sales. However, the outside market for these components has of late been sluggish and special design requirements by buyers have sometimes increased processing costs. Therefore, the divisions are considering transacting internally.

Suggested prices of the four components for these transfers are summarized below.

Division	Transfer Price Suggestion
• Anderson	Actual variable cost (supplied by Columbia). Represents standard variable manufacturing cost plus variable selling and distribution expense.
• Benner	Standard variable manufacturing cost plus 20%.
• Columbia	Regular selling prices less variable selling and distribution expense.
• VP Finance	Standard full manufacturing cost, no selling and distribution expenses, plus 15%.

However, these prices have been rejected by one or more of the division managers as being unfair - and, so far, the three divisions have been unable to agree on transfer prices. Corporate management has been silent on the issue and has not issued any rigid transfer pricing guidelines for interdivisional transactions. Given its continued commitment to divisional autonomy, it prefers not to get involved in the controversy at this time. Outside markets exist in some form or another for all divisions are each, if it so desires, has the freedom to transact outside the firm (though under prevailing market conditions). Therefore, corporate management has recommended that the division managers negotiate transfer pricing terms. It has recently publicized this recommendation, with the note that division management should keep in mind the "health of ABC" at all times.

Divisional management appears agreeable to Corporate's recommendations. All three divisions share the desire to standardize and decide the transfer pricing terms for the four components. So they are presently considering a joint arrangement with regard to transfer pricing terms that include price, quality, and timeliness for the four components.

You, as a participant in this study, will be playing one of three roles: Anderson Manager (Manager 1), Benner Manager (Manager 2), or Columbia Manager (Manager 3). In your role as a divisional manager, you will be negotiating a transfer pricing agreement with the two other divisional managers. There will be four separate negotiation sessions.

Sample Payoff Schedule and Agreement Process

This sheet describes a sample payoff schedule and agreement process. This is only a sample for explanatory purposes -- and is not for actual negotiation session.

Assume for this practice session that your role is that of Buying Division 1, Anderson's Manager (Manager 1), in charge of negotiation with Buying Division 2, Benner's Manager (Manager 2) and Selling Division, Columbia's Manager (Manager 3).

An example is provided on the next page of profits to your division related to four components W, X, Y, and Z. This divisional profit matrix is private information and are not to be handed over to other group members. Also, divisional profits can differ by division and negotiation session.

Your profits are basically a function of the agreement that you negotiate. Any of the four components may be negotiated at any of the five alternative levels (representing different transfer pricing terms such as price, quality, and timeliness): A, B, C, D, or E. For example, you may negotiate for alternative A on Component W, alternative B on Component X, alternative C on Component Y, and alternative D on Component Z. You do not have to agree on alternative A for all components (though that would still constitute a valid agreement).

To come a final agreement, you should have negotiated a unanimous agreement on all issues with the other divisions. Incomplete agreements (for example, alternative A for Component W, B for Component X, and C for Component Y but no agreement on Component Z) are equivalent to non-agreement. In the event that a complete agreement is not reached in a negotiation session, none of the divisions will earn any profits. If you come to a complete and negotiated agreement, you will be paid on the basis of the number of points you accumulate for your division in the negotiation. Points will be converted into cash which will be paid to you at the end of experiment. It would be to your monetary advantage, therefore, to maximize these points.

Payoff Matrix for Manager 1 (Sample)

Component W		Component X		Component Y		Component Z	
Alternatives	Points	Alternatives	Points	Alternatives	Points	Alternatives	Points
A	1200	A	2500	A	600	A	3700
B	1500	B	3000	B	800	B	4000
C	1800	C	3500	C	400	C	2600
D	2100	D	4000	D	200	D	5000
E	2900	E	4500	E	1000	E	6000

APPENDIX A.2: PAYOFF MATRICES SETS

Manager 1's Payoff Matrix - Set 1

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	4800	A	1200	A	1200	A	300
B	6000	B	1800	B	1500	B	100
C	3600	C	3000	C	300	C	200
D	1200	D	600	D	900	D	400
E	2400	E	2400	E	600	E	500

Manager 2's Payoff Matrix - Set 1

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	600	A	4800	A	2400	A	300
B	300	B	3600	B	3000	B	100
C	900	C	1200	C	600	C	200
D	1500	D	6000	D	1800	D	400
E	1200	E	2400	E	1200	E	500

Manager 3's Payoff Matrix - Set 1

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	1200	A	600	A	2400	A	300
B	600	B	900	B	1200	B	100
C	1800	C	1500	C	6000	C	200
D	3000	D	300	D	3600	D	400
E	2400	E	1200	E	4800	E	500

Payoff Matrix Set 1

Manager 1's Payoff Matrix - Set 2

| Component W | | Component X | | Component Y | | Component Z | |
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	49550	A	12500	A	11000	A	29200
B	50000	B	16250	B	12500	B	30000
C	49100	C	15000	C	15500	C	26800
D	48200	D	11250	D	9500	D	28400
E	48650	E	13750	E	14000	E	27600

Manager 2's Payoff Matrix - Set 2

| Component W | | Component X | | Component Y | | Component Z | |
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	27600	A	12500	A	49550	A	14000
B	26800	B	16250	B	49100	B	15500
C	28400	C	15000	C	48200	C	9500
D	30000	D	11250	D	50000	D	12500
E	29200	E	13750	E	48650	E	11000

Manager 3's Payoff Matrix - Set 2

| Component W | | Component X | | Component Y | | Component Z | |
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	11000	A	12500	A	27600	A	48650
B	9500	B	16250	B	28400	B	48200
C	12500	C	15000	C	30000	C	50000
D	15500	D	11250	D	26800	D	49100
E	14000	E	13750	E	29200	E	49550

Payoff Matrix Set 2

Manager 1's Payoff Matrix - Set 3

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	20400	A	13300	A	5900	A	1500
B	21000	B	10600	B	6700	B	3000
C	20100	C	14200	C	7100	C	3750
D	19800	D	12400	D	7500	D	2250
E	20700	E	11500	E	6300	E	750

Manager 2's Payoff Matrix - Set 3

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	6300	A	20700	A	12400	A	1500
B	5900	B	20400	B	14200	B	3000
C	7500	C	19800	C	13300	C	3750
D	6700	D	21000	D	10600	D	2250
E	7100	E	20100	E	11500	E	750

Manager 3's Payoff Matrix - Set 3

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	11500	A	7100	A	21000	A	1500
B	12400	B	7500	B	19800	B	3000
C	10600	C	6700	C	20700	C	3750
D	14200	D	5900	D	20400	D	2250
E	13300	E	6300	E	20100	E	750

Payoff Matrix Set 3

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Manager 1's Payoff Matrix - Set 4

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	3000	A	3400	A	450	A	1500
B	2500	B	1500	B	820	B	1125
C	1500	C	2250	C	300	C	2975
D	5500	D	3750	D	270	D	750
E	4000	E	750	E	400	E	2500

Manager 2's Payoff Matrix - Set 4

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	2500	A	3000	A	450	A	750
B	1125	B	4000	B	820	B	2250
C	2975	C	2500	C	300	C	3750
D	1500	D	1500	D	270	D	1500
E	750	E	5500	E	400	E	3400

Manager 3's Payoff Matrix - Set 4

Component W		Component X		Component Y		Component Z	
Alternative	Points	Alternative	Points	Alternative	Points	Alternative	Points
A	3400	A	2500	A	450	A	5500
B	2250	B	750	B	820	B	2500
C	3750	C	1125	C	300	C	1500
D	750	D	2975	D	270	D	4000
E	1500	E	1500	E	400	E	3000

Payoff Matrix Set 4

APPENDIX B.1: POSTSESSION QUESTIONS

< For *MANAGER 1* >

Experiment ID#:_____

Negotiation Session#:_____

1. Did your group reach a complete agreement ?   Yes___ No___

    If Yes, please describe your group agreement below:

    Component___   Alternative Chosen

    1) W   _____
    2) X   _____
    3) Y   _____
    4) Z   _____

2. For Component W,

    1) What was your priority order for this component?

        _____

    2) What is your estimate of Manager 2's priority order for
        this component W?

        _____

    3) What is your estimate of Manager 3's priority order for
        this component W?

        _____

3. For Component X,

     1) What was your priority order for this component?

        _____

     2) What is your estimate of Manager 2's priority order for this component X?

        _____

     3) What is your estimate of Manager 3's priority order for this component X?

        _____

4. For Component Y,

     1) What was your priority order for this component?

        _____

     2) What is your estimate of Manager 2's priority order for this component Y?

        _____

     3) What is your estimate of Manager 3's priority order for this component Y?

        _____

5. For Component Z,

     1) What was your priority order for this component?

        _____

     2) What is your estimate of Manager 2's priority order for this component Z?

        _____

     3) What is your estimate of Manager 3's priority order for this component Z?

        _____

< For MANAGER 2 >

Experiment ID#:_____

Negotiation Session#:_____

1. Did your group reach a complete agreement ?   Yes___ No___

    If Yes, please describe your group agreement below:

    <u>Component</u>   <u>Alternative Chosen</u>

    1) W   _____
    2) X   _____
    3) Y   _____
    4) Z   _____

2. For Component W,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for
       this component W?

    _____

    3) What is your estimate of Manager 3's priority order for
       this component W?

    _____

3. For Component X,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for this component X?

    _____

    3) What is your estimate of Manager 3's priority order for this component X?

    _____

4. For Component Y,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for this component Y?

    _____

    3) What is your estimate of Manager 3's priority order for this component Y?

    _____

5. For Component Z,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for this component Z?

    _____

    3) What is your estimate of Manager 3's priority order for this component Z?

    _____

< For *MANAGER 3* >

Experiment ID#:_____

Negotiation Session#:_____

1. Did your group reach a complete agreement ?   Yes___   No___

    If Yes, please describe your group agreement below:

Component	Alternative Chosen
1) W	_____
2) X	_____
3) Y	_____
4) Z	_____

2. For Component W,

    1) What was your priority order for this component?

        _____

    2) What is your estimate of Manager 1's priority order for
        this component W?

        _____

    3) What is your estimate of Manager 2's priority order for
        this component W?

        _____

3. For Component X,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for
       this component X?

    _____

    3) What is your estimate of Manager 2's priority order for
       this component X?

    _____

4. For Component Y,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for
       this component Y?

    _____

    3) What is your estimate of Manager 2's priority order for
       this component Y?

    _____

5. For Component Z,

    1) What was your priority order for this component?

    _____

    2) What is your estimate of Manager 1's priority order for
       this component Z?

    _____

    3) What is your estimate of Manager 2's priority order for
       this component Z?

    _____

APPENDIX B.2: POST EXPERIMENT QUESTIONNAIRE

* Please answer the following questions.

Your Age:_____   Sex:_____

Your Major:_____

1. Have you participated in a decision making experiment before?
          Yes:_____   No:_____

          If your answer is yes, When? _____
                         What kind? _____

2. Have you ever used a computer-based Decision Support System before?
          Yes:_____   No:_____

          If your answer is yes, name of system?_____
          Where used?_____   When used?_____

3. How comfortable did you feel working with computer ?

1	2	3	4	5	6	7
extremely uncomfortable			neutral			extremely comfortable

4. Have you ever used E-mail system?   Yes:_____   No:_____
          If your answer is yes, How long?_____
                         How often? _____

5. This exercise was very interesting.

1	2	3	4	5	6	7
extremely no			neutral			extremely yes

6. I thought this exercise was:

1	2	3	4	5	6	7
very difficult			neutral			very easy

7.The instruction of this study were easy to follow:

1	2	3	4	5	6	7
definitely no			neutral			definitely yes

8. I understood the task

1	2	3	4	5	6	7
very poor			neutral			very well

9.I had sufficient information about my own payoffs.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

10.I had sufficient information about the payoffs of the other members of my groups.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

11 My own payoffs were important to me in making my decisions.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

12. The payoffs of the other 2 members of my group were also important to me in making my decisions.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

13. I felt I could increase my payoffs by being cooperative with the other members of my groups.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

14. I felt I could increase my payoffs by being competitive with the other members of my groups.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

15. Rate yourself in terms of how you negotiated with the other members of your group.

1	2	3	4	5	6	7
very competitive			neutral			very cooperative

16. Rate the other 2 members of your group in terms of how they negotiated with you.

1	2	3	4	5	6	7
very competitive			neutral			very cooperative

17. How did you know the other members of your group before you got here today?

1	2	3	4	5	6	7
not at all		neutral				very well

18. If all our communication were not recorded, I would have behaved differently than I did.

1	2	3	4	5	6	7
strongly disagree			neutral			strongly agree

19. How satisfied were you with your communication medium?

1	2	3	4	5	6	7
very dissatisfied			neutral			very satisfied

20 How satisfied were you with your group agreement?

1	2	3	4	5	6	7
very dissatisfied			neutral			very satisfied

21. How satisfied were you with your negotiation support tools?

1	2	3	4	5	6	7
very dissatisfied			neutral			very satisfied

22. Imagine that you have the opportunity to play a gamble which offers a 50% chance of winning $100 and a 50% chance of winning $0. Would you accept a sure payment of $50 in exchange for this gamble?

    Circle one.   Yes No Indifferent

If yes, how low the sure payment have to be so you would be indifferent? (write an amount less than $50) $_____

If no, how high the sure payment have to be so you would be indifferent? (write an amount greater than $50) $_____

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