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## Article

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## A Study of Asymmetrical Decision Support in Computerized Negotiation Support Systems (NSS)

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### ABSTRACT

This study examines an issue not considered to date by previous NSS studies—asymmetrical decision support in negotiating pairs. In this laboratory study, all buyer-seller bargaining pairs communicate electronically but access to the custom-built DSS is varied, with the goal of determining the impact of decision support asymmetry on decision outcomes and negotiator attitudes. The authors find that, especially in low conflict treatments, DSS support helps negotiators achieve higher joint outcomes even if only one participant has a DSS. The results also provide evidence for the argument that the DSS component in an NSS permits higher joint outcomes and more balanced contracts, while the electronic communication component impacts positively on negotiator attitudes.

*Keywords:* decision support system (DSS), e negotiation system (ENS), negotiation, negotiation support system (NSS)

### 1. Introduction

In the global economy of the 21st century, interorganizational and intraorganizational electronic communication is commonly used to facilitate decision making between and among employees and suppliers in dispersed locations, in the U.S. and around the world. Economic indicators from the U.S. Department of Commerce show that e-commerce and import/export figures continue to grow (U.S. Department of Commerce, 2012-2013). As this happens, the use of electronic communication for the completion of many organizational tasks by dispersed decision makers

will also continue to grow.

Negotiating is one of the major decisional roles played by many sales and purchasing managers, and an increasing proportion of these negotiations are being conducted over the Internet, including e-mail, instant messaging, or other online communication tools (Kersten & Lai, 2007; Damiani, 2011; Graf, Koeszegi, Pesendorfer, & Gettinger, 2012). Over the past three decades, researchers have explored the possibility of enhancing the effectiveness of negotiations in dispersed settings by providing a decision support system (DSS) to each of the parties in the negotiation (DeSanctis & Gallupe, 1987; Dennis et al., 1988; Jelassi & Foroughi, 1989; Anson & Jelassi, 1990; Kersten & Noronha, 1999; Kersten & Lai, 2007; Damiani, 2011). The combination of electronic communications and the use of a DSS is commonly called a negotiation support systems (NSS). More recently, an NSS is considered to

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be a type of e-negotiation system (ENS) (Kersten & Lai, 2007).

Currently, larger firms can afford to put the time and cost into negotiating agreements using computerized support, while small to medium-sized companies can often not afford to do this (DeMoor & Weigand, 2004). More insights into the value of a DSS in negotiations are needed to help organizations decide whether the development of an appropriate DSS is worth the effort and expense.

The present study represents a step in that direction by investigating whether or not both parties in a buyer-seller negotiation need to have access to a DSS in order to gain the benefits of a comprehensive NSS. It might be, for instance, that a manufacturer would find it worthwhile to develop a DSS that could be used in negotiations with several different buyers of its product, even though none of the buyers has a DSS

## II. Negotiation Support Systems: Theory and Research

Negotiation support systems (NSSs) were originally conceptualized as a special category of group support systems (GSSs) designed to support the activities of two or more parties in a negotiation (DeSanctis & Gallupe, 1987) by combining electronic communication, computers, and decision technology to support group work (Dennis et al., 1988). Lim and Benbasat (1992-1993) described the core components of an NSS as an individual decision support system (DSS) for each party in the negotiation plus an electronic communication channel between the parties. In addition, a comprehensive NSS could incorporate a structured negotiation process, computerized group process structuring techniques, and support for a facilitator (Jelassi & Foroughi, 1989).

More recently, NSS have been conceptualized as falling under the umbrella term of e-negotiation systems (ENS) (Kersten & Lai, 2007; Kersten, 2004). Kersten and Lai define NSS as offering one or more of the following functionalities: facilitation of communication, decision/negotiation analysis support, process organization and structuring, and access to information, negotiation knowledge, experts, mediators, or facilitators. Kersten

and Lai also classify computerized support for negotiations into three classes of systems: passive, active, and proactive. Passive systems facilitate communication between/among dispersed parties, but do not structure the negotiation process or intervene in the behavior of bargainers. Active facilitative-mediation systems provide structure for a negotiation and also allow negotiators to input preferences and evaluate feasible alternatives based on prescriptive decision and negotiation analysis models. Proactive intervention mediation systems use knowledge bases and intelligent software agents to coordinate the negotiation process, comment on actions, and make suggestions (Kersten, 2004). In terms of Kersten's classification scheme, the NSS used in the experimentation in the current study falls under the category of active facilitative-mediation systems. It should also be noted that the terms NSS and ENS are often used synonymously in the literature.

In their 1992-93 paper, Lim and Benbasat present a theory of negotiation support systems, suggesting that the impact of electronic communication will be that each party will perceive the commitment of the opponent to be greater, and that this greater perceived commitment will result in greater satisfaction with the process and a reduced time to settlement. Further, they suggest that the DSS will provide increased information-processing capacity and capability that result in joint solutions that are closer to the efficient frontier (the locus of achievable joint outcomes from which no joint gains are possible) and are closer to the Nash (or fair) solution and are solutions in which the parties are more confident. Many of the NSS experimental studies conducted since the publication of the Lim and Benbasat paper have focused on confirming or rejecting their suggestions (See review in Kersten & Lai, 2007). The present study goes one step further by investigating whether or not both parties in a buyer-seller negotiation need to have access to a DSS in order to gain the benefits of an NSS.

In 2007, Kersten and Lai's overview of negotiation support and e-negotiations highlighted the difficulty of comparing results of NSS research, due to differences in experimental design and research instruments. The following section presents a cumulative series of laboratory experiments that attempted to overcome this issue.

### III. A Cumulative Series of Laboratory Experiments

A series of five studies on the use of an NSS were conducted at Indiana University and Arizona State University, beginning in 1988. The primary research question asked by all of these studies is this: What is the effect of an NSS on negotiation outcomes and negotiator attitudes? Other research questions consider the effect of the individual NSS components (i.e., electronic communications, DSS) on negotiation outcomes and attitudes: Is NSS support equally effective in situations of high conflict and low conflict of interest; is NSS support equally effective in a face-to-face negotiation setting, in negotiation via telephone, and in negotiation via computer conferencing? All studies in this series are laboratory experiments in which the subjects play the roles of buyer and seller in an industrial bargaining situation. The studies build upon one another to provide an increasingly comprehensive view of the efficacy of using a negotiation support system to support both parties in a negotiation situation.

#### A. Study 1: Jones, 1988

In the initial study in this set, Jones (1988) conducts a laboratory study using student subjects in which computer support (a rudimentary NSS) is provided to the negotiators at one specific point in the negotiation process. After twelve minutes of face-to-face bargaining, contract suggestions that are optimal or near-optimal in terms of joint outcome are displayed on a video screen to both parties.

Students complete a manufacturing bargaining task involving negotiation of four issues (unit price, purchase quantity, time of first delivery, and warranty period) for a three-year purchase agreement for an engine subcomponent. High and low conflict of interest conditions are created by varying the weights assigned to the issues. The low-conflict treatments are simulated by assigning different weights to the issues for the buyer and the seller, creating a bargaining situation in which mutually beneficial trade-offs are possible. The high-conflict treatments feature the issues for both parties being weighted similarly, thus creating a near-zero-sum situation in which one party's

gain is nearly equal to the other party's loss. For both conflict levels, point sheets are constructed for the buyer and the seller using these weights. The task materials for both buyer and seller include an alternative contract, representing a contract offer by another company, which provides the subjects with a minimum point level to achieve in the negotiations. Note that the Jones task is used in all studies in this cumulative series and in the present study.

In Jones' (1988) study, the performance of subjects who received the computer contract suggestions is compared to subjects performing the same task, but without the computer suggestions. The results indicate that the computer suggestions lead to higher joint outcomes in low conflict, but require greater negotiation time. In the high-conflict treatments, negotiators perceive that there is a greater level of collaborative climate with computer support than without. However, this is not the case in the low-conflict treatments.

#### B. Study 2: Foroughi, Perkins, and Jelassi, 1995

The second study in this set, conducted by Foroughi, Perkins, and Jelassi (1995), uses Jones' (1988) task as outlined above—again with student subjects—but employs an interactive, comprehensive NSS that provides computer support throughout the negotiation process. Two kinds of software tools are used. First, Topic Commenter, a module of the GroupSystems GSS created at the University of Arizona, serves as a means of electronic communication between the bargainers to be used for entering their comments and proposals, displaying them on a public screen, and allowing viewing of each other's inputs on their private screens.

The second type of software is a decision support system (DSS) developed for this study to support alternative contract generation and evaluation. Each negotiator has a DSS, which consists of a spreadsheet with two windows, running on a standalone microcomputer placed beside the networked electronic communication device. Negotiators use Window #1, the Decision Tool, to input their own priorities for the issues as well as their perception of the other party's priorities based on what they learn during the statement of interests stage of the negotiation. During this stage of the structured integrative bargaining process, the negotiators provide each other with strong clues about

their respective rankings of the four issues, enabling each negotiator to estimate the opponent's ranking of the issues from 1 to 4. Based on the priorities input by the subjects, the Decision Tool estimates the point structure of the other party, generates all possible contract alternatives, and ranks them in descending order according to the joint outcome they will give. Then, the Decision Tool displays the three contract alternatives which give the highest joint outcome based on the estimated rankings of the issues. Window #2 contains a Contract Point Evaluator for alternative contract evaluation. It incorporates the complete point structure of the negotiator. The negotiator can plug in alternative contracts, and the algorithm determines the total points (for his or her side only) that can be achieved with each contract. The Decision Tool is used in all the studies that followed in this cumulative series, as well as in the present study.

Although all of the negotiating pairs use the same structured integrative bargaining process, only half of the negotiating pairs use the NSS. Each bargaining pair experiences the same steps in the bargaining process, with the facilitator playing the same role, in both NSS and non-NSS situations. The non-NSS bargaining pairs meet in a non-computer lab, with negotiators seated across from each other at the same distance as in the NSS treatments. The negotiators and the facilitator communicate orally, and the negotiators write their suggested contract proposals on a blackboard. In summary, data are collected for four cells (2 x 2 design): NSS, low conflict; NSS, high conflict; no NSS, low conflict; and no NSS, high conflict. The results show that the NSS does help bargainers achieve higher joint outcomes and more balanced contracts in both high- and low-conflict situations, but that NSS support significantly increases negotiation time. In terms of negotiator attitudes, satisfaction is greater for NSS negotiating pairs in both high and low conflict, and perceived negative climate is reduced for NSS bargaining pairs in low conflict.

### C. Study 3: Perkins, Hershauer, Foroughi, and Delaney, 1996

The third study, co-authored by Perkins, Hershauer, Foroughi, and Delaney (1996), is nearly a replication of Study 2 (Foroughi et al, 1995), but with two differences: First, there is no electronic communication between the

bargainers in the NSS condition; and second—and more important—the subjects are purchasing managers, not students. This study has the same focus on structured integrative bargaining as Study 2, the same task, the same two levels of conflict, the same two-person buyer-seller negotiations, the same procedures, and the same dependent variables. The negotiation sessions are conducted on-site at the host corporations, in the Phoenix and Indianapolis areas. Data for four cells are collected for this study (2 x 2 design): DSS only, low conflict; DSS only, high conflict; no NSS, low conflict; and no NSS, high conflict.

The sample size of this study is much smaller than Study 2, so there are few statistically significant results. Nevertheless, the direction of the results is consistent with the results found using student subjects. In both low- and high-conflict situations, managers with computer support (a DSS) have higher joint outcomes and better contract balance than those without computer support. Furthermore, managers with computer support make fewer offers and take less negotiation time than those without computer support. However, the results differ from Study 2 in that there are no significant differences in negotiator attitudes between bargaining pairs with computer support and those without. The key conclusion of Study 3 is that students and managers appear to have similar bargaining behavior, except that managers take less time to negotiate when they have computer support, while students take more time.

### D. Study 4: Delaney, Foroughi, and Perkins, 1997

The fourth study in the series, co-authored by Delaney, Foroughi, and Perkins (1997), investigates the impact of using the decision support system alone as compared to a comprehensive NSS (DSS and electronic communication). In this study, the data from Study 2 (Foroughi, Perkins, and Jelassi, 1995) are used and data from two additional cells are collected—high and low conflict, with each party having access to the DSS only. These additional data are collected in a later semester, using student bargaining pairs from the same undergraduate computer class as used in Study 2. In summary, data from six cells (3 x 2 design) are available: full NSS, low conflict; full NSS, high conflict; DSS only, low conflict; DSS only, high conflict; no NSS, low conflict; and no NSS, high conflict.

Compared with non-computer supported negotiating sessions, the DSS helps bargainers achieve higher joint outcomes for both levels of conflict but with longer negotiation times. The DSS improves contract balance (compared to no NSS) in the low-conflict situation. In terms of negotiator attitudes, however, the attitude measures for the DSS alone are not significantly different from those with no NSS, and the satisfaction measure is less for the DSS than for the full NSS for both conflict levels. The results seem to indicate that—at least for student subjects using this specific task—it is the DSS component of an NSS that permits higher joint outcomes and more balanced contracts, while the electronic communication component impacts positively on negotiator attitudes.

#### E. Study 5: Foroughi, Perkins, and Jessup, 2005

The fifth study, co-authored by Foroughi, Perkins, and Jessup (2005), compares the use of audio-conferencing (via telephone) and computer conferencing (via Lotus Notes) in a dispersed negotiation setting. In this study, no face-to-face bargaining takes place; the bargainers are located in separate rooms, with all bargaining taking place either by telephone or by computer conferencing. Once again, this study has the same focus on structured integrative bargaining as the previous three studies, the same task, the same two levels of conflict, the same two-person buyer-seller negotiations, the same procedures, and the same dependent variables. Subjects are students, and both parties in all bargaining pairs have the use of the DSS. The design is a 2 x 2, with data collected for four cells: audio-conferencing, low conflict; audio-conferencing, high conflict; computer conferencing, low conflict; and computer conferencing, high conflict.

The study result that stands out is that joint outcome is higher with the telephone in high conflict. Otherwise, it does not make any difference whether negotiations are conducted by computer conferencing or by telephone in terms of joint outcome and contract balance. As expected, negotiation time is greater with computer conferencing than with audio-conferencing. In terms of attitude measures, audio-conferencing enhances negotiator attitudes (higher perceived collaborative climate, higher satisfaction, and lower perceived negative climate) in low conflict and does not negatively impact attitudes in high conflict. When there is little conflict, the computer conferencing (e.g.,

the mechanics of using the system and the impersonality of communicating via the computer) just gets in the way, while the audio-conferencing lets the bargainers get the job done quickly and easily. In high conflict, the efficiency aspects of audio-conferencing—a richer medium in which more communication can take place more quickly (people can speak faster than they can type)—overshadows any negative social cues transmitted over the telephone, and the result is an improved joint outcome using less negotiation time. To summarize these conclusions in another way, efficiency matters to the bargainers! They are able to achieve outcomes that are just as good or better with audio-conferencing, with less bargaining time, and thus their attitudes toward audio-conferencing are either no different or more favorable than with computer conferencing.

#### F. Related Studies

Goh, Teo, Wu, and Wei (2000) carry out a laboratory experiment to investigate the impact of Web-based electronic messaging, a Web-based NSS, and an autonomous electronic bargaining agent on the outcomes of a multi-issue electronic commerce negotiation. This study uses the Jones manufacturing bargaining task, as described in Study 1 (Jones, 1998) and Foroughi, Perkins, and Jelassi's (1995) DSS, as described in Study 2. Goh et al. (2000) use two independent variables: level of conflict (low conflict and high conflict) and the tools available to assist in the negotiations (electronic messaging, an NSS including electronic messaging and Foroughi, Perkins, and Jelassi's (1995) DSS, and an electronic bargaining agent). The use of an electronic bargaining agent is a new twist; unfortunately, how the electronic bargaining agent works is not clearly explained in the paper.

The findings from Goh et al. (2000) confirm that the NSS significantly improves joint outcome and contract balance in the low-conflict situation. However, the findings do not confirm the same improvement in the high-conflict situation. The electronic bargaining agent is found to achieve outcomes comparable to, but not significantly better than, human bargaining pairs with electronic communication only.

Lim and Yang (2004) investigate the impact of level of conflict (low conflict and high conflict) and NSS support (having a DSS available or not) on negotiation outcomes—

where all communication between the bargainers takes place via videoconferencing. Lim and Yang use the Jones (1988) manufacturing bargaining task, and their own implementation of the Foroughi, Perkins, and Jelassi (1995) DSS. Student subjects are used, with from 8 to 10 bargaining pairs in each of the four cells of the experimental design. In effect, Lim and Yang replicate four of the six cells in the Goh et al. (2000) study (all but the electronic bargaining agent cells) except that they substitute videoconferencing for text-based electronic communication.

Lim and Yang's (2004) results are not as supportive of the value of an NSS as Delaney, Foroughi, and Perkins' (1997) results. In the high-conflict situation, the NSS does not improve joint outcomes or contract balance compared to the videoconferencing-only treatments. In low conflict, the NSS does improve joint outcome but does not improve contract balance. Bargaining pairs also spend more time in reaching agreements in the low-conflict situation, but not in the high-conflict situation.

Wang, Lim, and Guo (2010) study negotiator satisfaction in NSS-facilitated negotiations, finding that satisfaction is impacted by objective confirmation, perceive fairness, perceived control, and perceived collaborative atmosphere (2010). Jones' (1988) point sheet to assign weights to the negotiation issues is used in this study. Note: The authors' description of the three systems compared—a traditional NSS, a semi-auto negotiation agent, and an auto negotiation agent—is very sparse, but, no matter which type of NSS is used, it is important to ensure negotiators that the benefits of an NSS are equally shared among users.

#### IV. Summary of Past NSS Studies

The cumulative series of laboratory experiments described in this section—including the related studies—provides a useful and interesting perspective on the value of using a computerized negotiation support system. This series of studies suggests that it is the DSS component of an NSS that permits higher joint outcomes and more balanced contracts, while the electronic communication component impacts on negotiator attitudes positively.

The electronic communication component of an NSS can take different forms. Most of the studies use text-

based electronic communication, but two of them use different media: audio-conferencing (telephone) and videoconferencing. However, these two studies are so different, that comparisons between these alternative media cannot be made. Nevertheless, the results make it clear that both audio-conferencing and videoconferencing—which are richer media than text-based electronic communication—tend to enhance the negotiation process.

The DSS component of an NSS appears to be the driving force in improving negotiation outcomes. In the low-conflict situation, the studies all agree that the use of a DSS with electronic communication improves joint outcome and contract balance compared to the use of electronic communication only or compared to no computer support. The situation is not as clear for the high-conflict situations, with several studies suggesting that a DSS improves joint outcome and contract balance, although two studies do not find this result. In most cases—the notable exception being the study which uses purchasing managers as subjects—the use of a DSS or a DSS plus electronic communication NSS increases negotiation time compared to no computer support. There are, of course, costs and drawbacks to the use of an NSS; but the negative factors appear to be greatly outweighed by the potential benefits.

#### V. The Present Study

Previous NSS studies investigate the presence or absence of a DSS, the presence or absence of electronic communication, the electronic communication media employed, and combinations of these factors. However, all of these studies assume symmetry in terms of the use of a DSS: Either both parties have a DSS or neither party has a DSS. In these early laboratory experiments, it is reasonable to assume that both parties have a DSS. In the real world, however, the negotiating parties represent different organizations, and each organization would have to develop or procure its own DSS customized for its own priorities (DeMoor & Weigand, 2004). A large manufacturer which sells to a large number of buyers may reasonably develop a DSS, but smaller buyers may be unable to make a similar investment in a customized DSS. Similarly, it may be reasonable for a large multi-store

retailer to develop a DSS, but not for the various vendors from which it buys to make such an investment. The present study removes the symmetry requirement by investigating whether or not both parties in a buyer-seller negotiation need to have access to a DSS in order to gain the benefits of an NSS.

The present study is designed to answer the following research question: Is it necessary for both parties in the negotiation to have access to a DSS to gain the benefits of using an NSS?

To answer this research question, this study is designed with the level of DSS support as the key independent variable. The study uses four levels of DSS support: Both bargainers have DSS; seller only has DSS; buyer only has DSS; and neither has DSS. Further, the study uses the same task as described in Study 1, the same two-person buyer-seller negotiations, the same DSS as described in Study 2, the same focus on structured integrative bargaining as in Studies 2-5, the same two levels of conflict as in Studies 1-5, the same dependent variables as in Studies 2-5, and almost the same procedures as in earlier studies in this series. Electronic communication between the negotiating pairs is used for all experimental conditions. The dependent variables include four outcome measures—joint outcome (total benefits for both parties), contract balance (absolute value of the difference between the outcomes of the two bargainers in each negotiating pair), negotiation time, and the number of contracts proposed. It includes three post-bargaining attitude measures—perceived collaborative climate, perceived negative climate, and satisfaction. Individual differences are controlled by random assignment of subjects to the role of buyer or seller and to bargaining pairs, and with pairs randomly assigned to experimental treatments.

## VI. Research Hypotheses

Seven sets of hypotheses—one for each of the dependent variables—are formulated to address the research question. Each set consists of six hypotheses: For both low- and high-conflict tasks, one hypothesis compares the dependent variable when both bargainers have DSS support to when neither party has DSS support; a second hypothesis compares the dependent variable

when only the buyer has DSS support to when neither party has DSS support; and a third hypothesis compares the dependent variable to when only the seller has DSS support with when neither party has DSS support. Electronic communication between the negotiating pairs is used for all experimental conditions in this study, so the results will not be comparable to Studies 2-4 where comparisons are made to results when neither party is provided with any computer support.

### A. Joint Outcome

In both the low- and high-conflict treatments, joint outcome is expected to increase when both parties use the DSS, because communication between the parties becomes more effective; all four issues are considered simultaneously; cognitive difficulty is reduced; and premature closure is avoided because alternative generation and evaluation are much easier (See Foroughi, Perkins, and Jelassi, 1995, for further discussion.). Further, joint outcome is expected to increase when either one of the negotiating parties uses the DSS. The reasons provided earlier certainly apply to the party using the DSS. The party without the DSS is expected to be pushed toward simultaneous consideration of all the issues through the communications received from the party with the DSS.

*H1.1: In the low-conflict treatments, bargaining pairs who both have DSS support will achieve a higher joint outcome than bargaining pairs without DSS support.*

*H1.2: In the low-conflict treatments, bargaining pairs where only the buyer has DSS support will achieve a higher joint outcome than bargaining pairs without DSS support.*

*H1.3: In the low-conflict treatments, bargaining pairs where only the seller has DSS support will achieve a higher joint outcome than bargaining pairs without DSS support.*

*H1.4: In the high-conflict treatments, bargaining pairs who both have DSS support will achieve a higher joint outcome than bargaining pairs without DSS support.*

*H1.5: In the high-conflict treatments, bargaining pairs*



where only the buyer has DSS support will achieve a higher joint outcome than bargaining pairs without DSS support.

*H1.6: In the high-conflict treatments, bargaining pairs where only the seller has DSS support will achieve a higher joint outcome than bargaining pairs without DSS support.*

## B. Contract Balance

In both the low- and high-conflict treatments, contract balance is expected to be smaller when both parties use the DSSs, because each party will be aware of the approximate number of points received by the opponent for a particular solution. This awareness will help each bargainer find a contract which is perceived to be fair to both parties and not disproportionately advantageous to one side. On the other hand, contract balance is expected to be larger when only one party uses the DSS. In this case the bargainer using the DSS will have a distinct advantage and is expected to increase the share of the points at the expense of the bargainer without the DSS.

*H2.1: In the low-conflict treatments, contract balance will be lower for bargaining pairs who both have DSS support than for bargaining pairs without DSS support.*

*H2.2: In the low-conflict treatments, contract balance will not be lower for bargaining pairs where only the buyer has DSS support than for bargaining pairs without DSS support.*

*H2.3: In the low-conflict treatments, contract balance will not be lower for bargaining pairs where only the seller has DSS support than for bargaining pairs without DSS support.*

*H2.4: In the high-conflict treatments, contract balance will be lower for bargaining pairs who both have DSS support than for bargaining pairs without DSS support.*

*H2.5: In the high-conflict treatments, contract balance will not be lower for bargaining pairs where only the buyer has DSS support than for bargaining pairs without DSS support.*

*H2.6: In the high-conflict treatments, contract balance will not be lower for bargaining pairs where only the seller has DSS support than for bargaining pairs without DSS support.*

## C. Negotiation Time

Good arguments exist for expecting the use of a DSS to increase negotiation time, as do good arguments for expecting the use of a DSS to decrease negotiation time. In terms of increasing negotiation time, the use of a DSS introduces another layer of complexity into the negotiation process. The mechanics of using the DSS, including the use of the keyboard, can be expected to lengthen negotiation time. On the other hand, both parties are already using the keyboard for electronic communication; a bargainer needs only to switch from the electronic communication application to the DSS or vice versa by choosing a different tab. In terms of decreasing negotiation time, the DSS quickly provides reasonable contract alternatives to suggest in the negotiations, which may help the bargaining pair arrive at a contract more quickly than if such suggestions were not available. The authors believe that the increased negotiation time found in Study 2 (Foroughi, Perkins, and Jelassi, 1995) when comparing negotiation time using an NSS to time without an NSS is primarily the result of adding electronic messaging, which requires the use of the keyboard for all communications, rather than adding the DSS. Considering these arguments, no difference in negotiation time in any of the experimental conditions is expected; consequently, the six hypotheses are stated informally, but the results are shown in Table 1.

## D. Number of Contracts Proposed

Once again, there are good arguments for expecting the use of a DSS to increase the number of contracts proposed, as well as good arguments for expecting the use of a DSS to decrease the number of contracts proposed. In terms of increasing the number of contracts proposed, the use of a DSS facilitates the generation of reasonable alternatives and permits the efficient analysis of a large number of contract proposals. With the use of a DSS, there is no reason to limit the number of contracts proposed

—the party or parties with the DSS should keep proposing alternatives until arriving at an acceptable result. In terms of decreasing the number of contracts proposed, the use of a DSS should assist the party or parties to identify contracts which are relatively attractive to both parties by generating fewer alternatives than would be required without the DSS. Of course, if only one party has the DSS, then the contracts identified would certainly expect to be more attractive to the party with the DSS. Considering these arguments, no difference in number of contracts proposed in any of the experimental conditions is expected;

The six hypotheses for number of contracts proposed will not be stated formally, but the results are shown in Table 1.

E. Post-Bargaining Negotiator Attitudes (Perceived Collaborative Climate, Perceived Negative Climate and Satisfaction)

Post-bargaining negotiator attitudes are measured by a questionnaire (from Jones, 1988) administered at the end of the bargaining session. The subjects respond to

**Table 1.** Hypotheses/Results(Sample size: eight cells, 14 dyads per cell, total of 112 dyads, total of 224 subjects)

Hypotheses	Number parties have DSS	Both parties have DSS	Mean Only have DSS	Mean Only other has DSS	Both with DSS tr. adher with DSS Level of significance	Hypothesis supported	Both with DSS tr. adher with DSS Level of significance	Hypothesis supported	Both with DSS tr. adher with DSS Level of significance	Hypothesis supported
JOINT OUTCOME—LOW CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	115.00	128.14	125.50	123.64	p<0.01	YES	p<0.01	YES	p<0.02	YES
JOINT OUTCOME—HIGH CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	100.79	101.79	101.00	101.86	p<0.23	NO	p<0.78	NO	p<0.15	NO
CONTRACT FALTAANCE—LOW CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	11.00	5.29	8.07	9.21	p<0.02	YES	p<0.24	YES	p<0.49	YES
CONTRACT FALTAANCE—HIGH CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	5.96	3.64	4.43	3.71	p<0.26	NO	p<0.55	YES	p<0.32	YES
NEGOTIATION TIME—LOW CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	31.62	29.64	34.14	34.21	p<0.71	YES	p<0.66	YES	p<0.57	YES
NEGOTIATION TIME—HIGH CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	47.93	50.14	57.14	51.57	p<0.67	YES	p<0.10	YES	p<0.50	YES
NO. OF CONTRACTS—LOW CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	4.38	4.86	5.57	5.86	p<0.26	YES	p<0.55	YES	p<0.67	YES
NO. OF CONTRACTS—HIGH CONFLICT TASK H1.1 Both DSS=Neither DSS H1.2 Both DSS=Neither DSS H1.3 Both DSS=Neither DSS H1.4 Both DSS=Neither DSS H1.5 Both DSS=Neither DSS H1.6 Both DSS=Neither DSS	3.93	9.00	6.43	10.00	p<0.97	YES	p<0.77	YES	p<0.56	YES

each item in the questionnaire by circling a number from 1 to 7 on a seven-point Likert scale. Based on factor analysis of the questionnaire data collected in Study 2 (Foroughi, Perkins, and Jelassi, 1995), the items are condensed into three factors as perceived collaborative climate, perceived negative climate, and satisfaction.

For the following reasons, the authors hypothesize no difference in perceived collaborative climate or perceived negative climate in any of the experimental conditions. First, in the low- conflict treatments, bargainers' preferences for the issues differ, and there is room for tradeoffs. A minimum of nonrational escalation of conflict should occur, whether or not one or both users have access to a DSS; thus, the presence or absence of a DSS is not expected to affect perceived collaborative climate or perceived negative climate. Second, electronic communication will be used for all communications in all experimental conditions in this study; therefore, the attention of the negotiators is focused on the content of the negotiation rather than on any personal idiosyncrasies, thus tending to create a more collaborative climate and to minimize nonrational escalation of conflict and perceived negative climate. Third, the way this task is framed to the negotiators—they are to reach an agreement that gives their company as many points as possible but also maximizes joint outcome—and the structured integrative bargaining process that will be employed in all experimental conditions will lead to a generally positive climate at the beginning of the process that is expected to be maintained throughout the negotiation because all communication is carried out electronically.

Previous research (See Foroughi, Perkins, and Jelassi, 1995.) finds that when both parties have a comprehensive NSS (electronic communication and a DSS) they are more satisfied than if the bargaining pair has no computer support. This result is expected; Study 2 confirms that if negotiators achieve higher joint outcomes and better contract balance, they are likely to be more satisfied. However, Delaney, Foroughi, and Perkins (1997) find in Study 4 that providing both parties with a DSS—but no electronic communication—does not make them more satisfied than if they had no computer support. This results points to the possibility that the addition of electronic communication increases satisfaction in Study 2. Now the question is whether adding one or two DSSs to a situation where the bargaining pair already enjoys electronic communication will increase satisfaction.

Considering only the experimental conditions where one of the two parties is provided the use of a DSS, satisfaction is not expected to increase in either conflict level. In this case, the negotiating party with a DSS may be more satisfied—the first party has more control over the negotiation and can reasonably expect to do at least as well as the other negotiator—but it seems unreasonable to expect the other party to be more satisfied. In this case, the overall satisfaction measure, which is the average across all participants in that particular experimental condition, is unlikely to be significantly increased.

If both negotiating parties use a DSS, the impact on satisfaction is more difficult to predict. On the one hand if negotiators achieve higher joint outcomes and better contract balance, as hypothesized above, they should also be more satisfied. On the other hand, both negotiators are already using electronic communication and the addition of a DSS, helpful as it may be, may provide only an insignificant boost to the satisfaction measure. The latter argument is expected to prevail; therefore, no difference is expected in satisfaction between bargaining pairs when both bargainers have DSS support and bargaining pairs when neither has DSS support. Because no differences in any of the three attitude measures are expected, these three sets of hypotheses are not stated formally, but the results are shown in Table 2.

## VII. Experimental Procedures

This study employs a 4 x 2 experimental design, with 14 pairs of bargainers in each of the eight cells, for a total of 112 bargaining pairs or 224 individual subjects. One independent variable is the level of DSS support provided (neither party has DSS, both parties have DSS, only buyer has DSS, or only seller has DSS), and the second independent variable is the level of conflict (low conflict or high conflict). The subjects are volunteers from the junior-level operations and logistics management course at Arizona State University. To provide an incentive to subjects, participants receive five bonus exam points (1.43% of the student's grade in the course). In addition, subjects are told that each pair of bargainers should attempt to maximize their joint score, and that a monetary reward of \$20 per student will be given to the bargaining pair

**Table 2.** Hypotheses/Results(Sample size: eight cells, 14 dyads per cell, total of 112 dyads, total of 224 subjects)

Hypotheses	Means	Both with DSS vs. seller with DSS		Buyer with DSS vs. seller with DSS		Seller with DSS vs. seller with DSS				
		Level of significance	Hypothesis supported	Level of significance	Hypothesis supported	Level of significance	Hypothesis supported			
PERCEIVED/COOPERATIVE CLIMATE—LOW CONFLICT TASK	Neither party has DSS 5.38	Both parties have DSS 5.63	5.39	6.50	p<0.45	YES	p<0.96	YES	p<0.19	YES
PERCEIVED/COOPERATIVE CLIMATE—HIGH CONFLICT TASK	Neither party has DSS 5.08	Both parties have DSS 5.13	5.41	5.40	p<0.88	YES	p<0.36	YES	p<0.33	YES
PERCEIVED/NEGATIVE CLIMATE—LOW CONFLICT TASK	Neither party has DSS 2.62	Both parties have DSS 2.70	2.73	1.38	p<0.83	YES	p<0.79	YES	p<0.51	YES
PERCEIVED/NEGATIVE CLIMATE—HIGH CONFLICT TASK	Neither party has DSS 3.62	Both parties have DSS 3.31	3.32	3.42	p<0.39	YES	p<0.50	YES	p<0.61	YES
SATISFACTION—HIGH CONFLICT TASK	Neither party has DSS 5.41	Both parties have DSS 5.64	5.76	6.34	p<0.43	YES	p<0.62	YES	p<0.38	YES
SATISFACTION—LOW CONFLICT TASK	Neither party has DSS 5.11	Both parties have DSS 5.06	5.36	5.02	p<0.26	YES	p<0.31	YES	p<0.77	YES

with the highest joint outcome in each of the eight experimental conditions.

All bargaining sessions are conducted in one of the computer classrooms in the Computer Commons building at Arizona State University. One of the authors of this paper serves as the facilitator for all sessions, aided by a graduate assistant. The number of bargaining pairs in

each bargaining session varies from a low of one bargaining pair to a high of nine bargaining pairs, with most sessions involving two to six pairs. Each session includes a single level of DSS support (e.g., seller only had DSS) and a single level of conflict (e.g., high), but participants do not know this. When participating students arrive to class, they are randomly assigned to bargaining pairs and to

the buyer or seller role. Bargaining pairs are never seated near each other, and in many cases subjects do not even know with whom they are negotiating.

Each experimental session is conducted in three phases. During Phase 1, subjects fill out a consent form and a pre-negotiation attitude questionnaire, and a brief training session is held on the use of the electronics communication software, WebBoard. Subjects are then provided a two-page case study describing the negotiation in which they will be involved, as well as a page of confidential information about their company (either the buyer or the seller). An example of this information—in this case for the buyer in the low-conflict treatments—is provided in the Appendix. After these materials are read by the subjects, they are given point sheets for their respective companies. Subjects then complete a Point Sheet Exercise, in which they are asked to add up the points for each issue of the alternative (third party) contract and verify that the score given at the bottom of the point sheet is correct. This is done to make sure that the subjects understand how the total scores are computed.

The next step in Phase 1 varies, depending upon the level of DSS support provided in the particular session. For those sessions in which neither party uses the DSS, this step is omitted. Where both parties have the use of the DSS, approximately ten minutes of software training is given on the DSS, which is already running on their computers. For those sessions in which only the buyers or only the sellers have the use of the DSS, the group is split, with those subjects with the use of the DSS staying in the computer classroom with the facilitator and receiving approximately ten minutes of software training on the DSS. The subjects who did not have the use of the DSS are taken into an area outside the computer classroom by the graduate assistant; he discusses how the bargaining is going to take place and gives these subjects the opportunity to ask questions about the negotiations. (He is very careful not to give any hints about what the other participants are doing in the computer classroom.) As the last part of Phase 1, subjects fill out a pre-negotiation questionnaire to ensure that they understand the task.

In Phase 2, subjects are given a final instruction sheet with an outline of the negotiation process. They then proceed to negotiate, with all communications taking place via WebBoard. When an agreement is reached, they sign a final agreement form. In Phase 3, all subjects answer a post-bargaining attitude questionnaire. Throughout all

three phases of the experiment, the facilitator directs the activities of the bargaining pairs, following a detailed script.

## VIII. Statistical Analysis and Experimental Results

The SPSS statistical package analyzes the experimental results, using a fixed-effects two-way analysis of variance (2-way ANOVA) model for each of the seven dependent variables (both outcome and attitude variables), with DSS support level and conflict level as the main effects. The only significant interaction between DSS support level and conflict level occurs with the joint outcome measure. Next, for each dependent variable and each conflict level, a one-way ANOVA is performed, followed by a series of planned comparisons among the four levels of DSS support. The planned comparisons of the means are carried out using a t-test with an alpha of 0.05. Tables 1 and 2 summarize the hypotheses and the results.

## IX. Discussion of Results

### A. Joint Outcome and Contract Balance

For the low-conflict treatments, the joint outcome and contract balance hypotheses are all supported. When both parties employ the DSS, joint outcome is higher and contract balance is smaller than when neither party has the DSS. These results are consistent with earlier studies. The new result is that when either the buyer or the seller uses the DSS, the joint outcome is higher than when neither party uses the DSS. It is not necessary for both parties to have the DSS to gain the higher joint outcome from the DSS! As hypothesized, providing either the buyer or the seller with the DSS does not improve contract balance. The negotiating party using the DSS has a distinct advantage and is able to increase his/her share of the joint outcome at the expense of the party without the DSS.

For the high-conflict treatments, none of the joint outcome hypotheses is supported. While the use of the DSS by both parties or by one party does increase the

joint outcome, the increase is not statistically significant. Notice that the baseline “neither party has DSS” condition does include electronic communication, and that the baseline in previous Studies 2 (Foroughi, Perkins, and Jelassi, 1995) and 4 (Delaney, Foroughi, and Perkins, 1997)—where the results show an increase in joint outcome in the high-conflict treatment—does not include electronic communication. Perhaps this difference in communication is the key: In Studies 2 and 4 the negotiators can communicate orally, and the negotiators write their suggested contract proposals on a blackboard. Oral communication is a richer medium than electronic communication, and it is magnified in a high-conflict situation which requires more work, more cooperation, and more focus on simultaneous issue consideration than in low conflict. In Study 5 (Foroughi, Perkins, and Jessup, 2005), for instance, joint outcome in the high-conflict audio-conferencing treatment is higher than in the high-conflict computer conferencing treatment. Research could continue to determine whether providing the DSS to one of the negotiating parties in a high-conflict audio-conferencing treatment increases joint outcome compared to a high-conflict audio-conferencing treatment when neither party has the DSS.

Another reason for the lack of support of the joint outcome hypotheses in the high-conflict treatments may be an artifact of the experimental design in this study. Multiple negotiating pairs are negotiating at the same time in the same room in this study. Each pair does not use any oral or electronic communication with other pairs during the study, but they are certainly aware when other pairs complete negotiation and leave the room. This may cause some negotiating pairs to prematurely end their negotiation by adopting a satisficing contract rather than pressing for a better joint outcome. This situation appears not to become a problem in the low-conflict treatments, where arriving at a contract that is good for both parties is relatively easy, but it may well have been a problem in the high-conflict treatments where more effort and more cooperation are necessary to arrive at a good joint solution.

In the high-conflict treatment, the hypothesis that contract balance will be lower for bargaining pairs who both have DSS support than for bargaining pairs without DSS support is not supported. Contract balance is improved, but not enough to be significant. Again, the use of a lean medium of communication—electronic communication—may make it more difficult to carry out

the tougher negotiations necessary to achieve better contract balance in high conflict. As hypothesized, providing either the buyer or the seller with the DSS does not improve contract balance in the high-conflict treatments.

## B. Negotiation Time and Number of Contracts Proposed

As hypothesized, no differences are found in negotiation time—in either low conflict or high conflict—whether or not both negotiating parties use the DSS or either one of the negotiating parties uses the DSS. The earlier discussion of the hypotheses suggests that factors tending to increase negotiation time—such as the mechanics of using the DSS—and factors tending to decrease negotiation time—such as the DSS quickly providing reasonable contract alternatives—may tend to balance out, and that appears to be the situation.

Also as hypothesized, no differences are found in number of contracts proposed—in either low conflict or high conflict—whether or not both negotiating parties use the DSS or either one of the negotiating parties uses the DSS. The earlier discussion suggests that factors tending to increase the number of contracts proposed (the DSS facilitating the generation of reasonable contract alternatives and permitting the efficient analysis of a large number of contracts) and factors tending to decrease the number of contracts proposed (the DSS quickly identifying contracts which are reasonably attractive to both parties without the necessity of considering a large number of contracts) might tend to balance out; that, again, appears to be what happened.

## C. Perceived Collaborative Climate and Perceived Negative Climate

All of the hypotheses related to perceived collaborative climate and perceived negative climate are supported. No differences are found in perceived collaborative climate or in perceived negative climate, in either low conflict or high conflict, whether or not both negotiating parties use the DSS or either one of the negotiating parties uses the DSS. Because electronic communication is used in all experimental conditions, the attention of the negotiators is focused on the content of the negotiation and not on any personal idiosyncrasies, which tends to increase

perceived collaborative climate and minimize perceived negative climate. In addition, the structured integrative bargaining process and the way in which the task is framed to the negotiators—they are to reach an agreement that gives their company as many points as possible but also maximizes joint outcome—create a generally positive climate at the beginning of the process that is maintained throughout the negotiation because all communication is carried out electronically.

#### D. Satisfaction

All of the hypotheses relating to satisfaction are supported. Four of the hypotheses suggest that, in either low conflict or high conflict, no differences will appear in satisfaction between bargaining pairs when only the buyer or only the seller has DSS support and bargaining pairs that work without DSS support. While the negotiating party with the DSS may be more satisfied because of increased control over the negotiation, the other party has no reason to be more satisfied. As expected, the overall satisfaction measure, which is the average across all participants in that particular experimental condition, is not significantly increased. The other two hypotheses, which assert no differences in satisfaction between bargaining pairs when both bargainers have DSS support and bargaining pairs without DSS support, are also supported. As expected, the outcome gains (which occurs only in low conflict) are not sufficient to increase satisfaction to the bargainers when they already enjoy electronic communication.

### X. Discussion and Conclusions

In summary, this study shows that—for low-conflict treatments—negotiating pairs, when both bargainers have DSS support and negotiating pairs when only one bargainer (buyer or seller) has DSS support achieve higher joint outcomes than negotiating pairs without DSS support. For high-conflict treatments, joint outcomes increase when DSS support is provided to one or both participants but not enough to be statistically significant.

For low-conflict treatments, negotiating pairs when both bargainers have DSS support achieve a lower contract

balance than negotiating pairs without DSS support. For high-conflict treatments, contract balance is lowered when DSS support is provided to both participants but not enough to be significant. In both low- and high-conflict treatments, if only one participant is provided DSS support, contract balance is not lowered—the bargainer with the DSS has an advantage.

Furthermore, no significant differences appear in any of the other dependent variables— negotiation time, number of contracts offered, perceived collaborative climate, perceived negative climate, and satisfaction— across all experimental conditions. It is the authors' view that the lack of significant differences in the negotiation time and number of contracts occurs because forces tending to increase or decrease these measures essentially balance out. This balancing out may occur for the three negotiator attitude measures. In addition, the presence or absence of DSS support has very little impact on these attitude measures when the negotiators already enjoy electronic communication in all experimental conditions.

The results of this study confirm the idea that a decision support system can help in negotiations even if only one participant has a DSS. In low conflict, bargaining pairs where only one party has DSS support achieve higher joint outcomes than bargaining pairs without DSS support. In high conflict, joint outcomes go up, although not enough to be statistically significant. This result implies that it may be reasonable for a large manufacturer which sells to a large number of buyers to develop a DSS, even if smaller buyers do not opt to make a similar investment in a customized DSS; or it may be reasonable for a large multi-store retailer to develop a DSS even if the various vendors from which it buys do not make such an investment.

Second, this study—when considered in conjunction with Foroughi, Perkins and Jelassi, (1995) and Delaney, Foroughi, and Perkins (1997)—provides support for the notion that it is the DSS component of an NSS that primarily permits higher joint outcomes and more balanced contracts, while the electronic communication component impacts positively on negotiator attitudes. In this study, all experimental conditions include electronic communication, and there are no significant differences in the negotiator attitude measures across all treatments. This study varies the DSS component and finds significant improvement in joint outcomes in the low-conflict treatments when one or both bargainers use the DSS, as well as better contract balance when both bargainers use the DSS. In the high-

conflict treatments the results are not as strong, but still tend toward higher joint outcomes when one or both parties use the DSS and better contract balance when both bargainers use the DSS.

Finally, this study highlights the need for further research in the use of an NSS. A valuable follow-up to the present study would be an investigation of whether providing the DSS to one of the negotiating parties in audio-conferencing treatments (both low conflict and high conflict) increases joint outcomes compared to audio-conferencing treatments when neither party has the DSS. Studies also need to be conducted on the effects of an NSS on bargaining between negotiating teams (rather than individuals) and in different mixed-motive task environments. Also needed are experiments using different NSSs to assist in the same negotiating situation, so that comparisons can be made between the NSSs. Most important, researchers need to study the use of an NSS in actual negotiation situations. Building the NSS will be a very difficult task, because it involves translating the bargaining priorities of both sides into a point structure that makes sense, and requires the combined efforts of systems professionals and buying/selling professionals. Finally, as pointed out by DeMoor and Weigand (2004), Kersten and Noronha (1999), Kersten, Koeszegi, and Vetschera (2003), Koeszegi, Vetschera, and Kersten (2004), Koeszegi, Pesendorfer, and Stolz (2006), and Lim and Yang (2007), in order for the use of NSS to expand, many real-world issues like cultural norms, gender issues, language issues, legal aspects, standard and frame contracts, role assignments, document management, and integration with back-office systems need to be taken into account in the design and implementation of NSS.

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## Appendix

Note: The following materials were provided to the Roberts negotiator (the buyer) in the low-conflict treatments. Variations of these materials were provided to the Simo negotiator (the seller) in the low-conflict treatments, and to both parties in the high-conflict treatments.

### GENERAL NEGOTIATION CASE INFORMATION Turbocharger Negotiation

Assumption: Date is now December 2012

#### Background information on buyer

Roberts Enterprise, Inc. is a major U.S. engine manufacturer. During the first two quarters of 2012, total sales (adjusted for seasonal fluctuations) increased slightly; however, as a percent of market share, sales do not look good. Roberts' market share remained constant during the first quarter and has dropped slightly during the second, despite vigorous sales efforts.

In an effort to reverse this trend, the marketing research department has proposed introducing a lower priced engine which would sell for approximately \$3,000. An important subcomponent for this engine is the turbocharger, which Roberts can purchase for *substantially* less than they can

manufacture themselves. The negotiation in which you are about to participate concerns the specific terms of a *three-year* contract to purchase this subcomponent.

Roberts' marketing department is flowing with enthusiasm, sure that the market will respond to this new product. They are hopeful that turbocharger delivery can begin within five months in order to penetrate the spring 2013 boating market. This will be possible only if the parts begin arriving by the first of the year.

The engineering department estimates that \$200.00/unit is a reasonable price to pay for the turbocharger. Marketing has advised the purchasing department that a contract which guarantees purchase of more than 5,000 units per year would be risky. In addition, it is very desirable to Roberts to obtain a full four-year warranty (parts and labor) on turbochargers, as they have just lengthened their engine warranty to four years. Although in previous contracts with suppliers, Roberts has often accepted shorter warranties, their new sales policy requires a four-year warranty agreement from suppliers.

Roberts deal regularly with three major suppliers, All offer quality parts and good service, and all have made good on all aspects of previous purchase agreements. Roberts is confident that it can expect the same good performance in the future from these companies.

#### Background information on supplier

Simo Parts Distributor has enjoyed a good working relationship with Roberts Enterprise for several years. The company began as a small engine parts supplier, with pistons and connecting rods accounting for the majority of their sales. Over the past several years, the small engine parts market has become extremely competitive due to the increase in foreign imports. Simo has responded by expanding its product line to include more expensive engine subcomponents such as crankshafts and turbochargers. They have found that they can be very competitive in this area, because they have the technical skill to build components to buyers' specifications and can use existing distribution channels.

Both marketing and production are in agreement that several less profitable small parts should be dropped from their production line in order to place more emphasis on the specialty subcomponent market. Simo is building a good reputation in this area and the company's future looks bright.

When a Roberts purchasing agent first mentioned the special turbocharger to Simo’s sales representatives, the representatives called a meeting with major department heads to discuss what would be—in Simo’s terms—a “fair agreement.” During the meeting, the vice-president of production explained that a significant investment in research and development would be required to finalize the design of the turbocharger. Additionally, the company would incur setup costs and lost production costs on the small parts lines which would have to be converted for turbocharger processing. The production VP is confident, however, that the first ship could be ready within eight months. The company is also very willing to offer a full one-year warranty on parts and labor.

In order to recoup costs, the production, marketing, and finance departments agree that the absolute minimum price which they would be willing to commit to over the next three years is \$224.00/unit. Further, they could only agree to this low price if Roberts agreed to purchase a minimum of 8,000 units per year. Considering the quality of the product which they will be delivering and the development and production costs which they will incur, Simo considers this to be a very reasonable offer.

In summary, the companies have a good working relationship with each other, and both would like to come to agreement on the terms of the purchase/sales contract. At the present time, however, their stands on the four issues of *minimum purchase quantity, warranty period, price, and first shipment delivery* are not compatible. It may be difficult to negotiate a compromise. Neither side should enter into an agreement where they feel they are “being taken”; conversely, neither side should be so inflexible that compromise is impossible.

**CONFIDENTIAL INFORMATION FOR ROBERTS’ PURCHASING AGENTS**

The marketing department projects the following sales for the new engine:

1 <sup>st</sup> year	8,000 units
2nd year	10,000 units
3 <sup>rd</sup> year	12,000 units

As a general rule, in this industry, manufacturers try not to sign agreements to buy more than half of the parts which they project they will need, especially when a new product is involved. ( $1/2$  of  $8,000 + 10,000 + 12,000 = 15,000$  or  $5,000$  per year.)

The problem with these projections is that the time estimates may be optimistic. It could take as long as two years for the new engine to catch on, and Roberts cannot afford to buy parts it does not currently need. It does not have the money or the inventory space. Although inventory purchase of 5,000 units per year could be managed, it is of **CRITICAL IMPORTANCE** that the quantity agreed upon not exceed this figure significantly.

Roberts is also concerned about the delivery time of the first shipment. In order to capitalize on spring boat sales, Roberts desires an early shipment date, the earlier the better. This is **VERY IMPORTANT**.

Of course, warranty time period and the price are **IMPORTANT** to Roberts. The less paid and the longer the warranty, the better. These issues, however, are not as critical as quantity and delivery time. Thus, if the minimum quantity can be kept low and the product delivered quickly, Roberts would be willing to pay a higher price and sign a contract with a shorter warranty period.

As shrewd purchasing agents, you have explored possible agreements with your two other major suppliers. One could not make delivery before next May, so you ruled that company out. The other has made the following final bid (and this is what you will take if you do not reach agreement with Simo):

Quantity	7,000 units per year
Warranty	3 years
Price	\$208/unit
Delivery	7 months

Roberts’ point sheets (buyer/LC): possible terms for the contract

*Possible terms for the three-year contract:*

Quantity Units = Points	Warranty Period Years = Points	\$Price \$ = Points	Delivery Time Months = Points
5000 = 39	7000 = 13	4 years = 16	\$200 = 16
5500 = 33	7500 = 7	3 years = 10	\$216 = 5
6000 = 27	8000 = 0	2 years = 5	\$220 = 3
6500 = 20	1 year = 0	1 year = 0	\$224 = 0
		\$212 = 8	5 months = 29
			6 months = 16
			7 months = 10
			8 months = 0

The total points on your alternative contract = 44.