Effects of Task Types and Communication Support Tools on E-Negotiation Performance: A Task-Technology Fit Perspective

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Abstract
The rapid growth of the Internet has made computer-mediated communication popular and the use of e-negotiation systems (ENS) has attracted great attention from researchers and practitioners. Whilst most studies of ENS have emphasized their importance in decision support, few have provided suggestions regarding how to choose communication channels while negotiating online so as to maximize the intended benefits. To bridge this knowledge gap, this study integrated theories of Task-Technology Fit, social presence and media richness and empirically examined a research model investigating the effects of different types of negotiation task (more/less analyzable) and communication support (text/video) on e-negotiation performance. A laboratory experiment with a 2 x 2 factorial design and 80 participants was conducted. Findings suggested that greater negotiation efficiency, ENS satisfaction, perceived usefulness and process satisfaction, as well as lower cognitive effort, will be generated when the negotiation task and communication support are well-matched: text-based ENS could meet negotiators’ requirements better with the more readily analyzable negotiation tasks, whilst video-based ENS was better able to meet their requirements when they were faced with less-analyzable tasks. Managerial implications are proposed accordingly.

1. Introduction
The Internet has changed the way that people communicate with each other and the manner in which members of an organization share and interpret information [21]. Traditionally, the participants involved in a negotiation needed to get together in a meeting room and hold a face-to-face discussion. However, the cost of such meetings has increased dramatically and has become a heavy burden for companies today as the rapid growth of multinational organizations has generated the need for frequent negotiations across countries. Realizing the possibility of long-distance real-time negotiation, the Internet has become a powerful communication medium, attracting the interest of scholars and practitioners. Kersten [8] defined this process as “e-negotiation” and referred to the information systems that support e-negotiation as e-negotiation systems (ENS).

Being an increasingly important issue, many researchers have investigated ENS from a system perspective. Whilst most of them have focused on the functions of decision support or automatic negotiations, the aspects of process or communication support have been neglected [36]. As communication is crucial and probably the most essential activity in the negotiation [24], revealing the effects of computer-mediated communication (CMC) on negotiation is the focus of this study. Short et al.’s [30] social presence theory and Daft and Lengels’ [4] media richness theory have been commonly used to reveal how communication media may influence task performance. For example, Mennecke et al. [24]) examined the effects on the negotiation performance of dyads communicating through face-to-face, videophone or telephone (i.e., audio-only) communication or synchronous computer-mediated communication. Their findings largely supported the task-media fit hypothesis and demonstrated how differences in task processes and communication media may influence task performance. However, a more recent study has indicated contrasting results. Yuan et al. [36] investigated the impact of multimedia communication in an e-negotiation situation, and revealed that the inclusion of video and audio communication in the negotiation process did not yield any benefits. In other words, this finding did not confirm the task–media fit proposition [23]; nor did it support the media richness theory. This study argued that such differing and inconsistent conclusions resulted from neglect of the issue of task-technology fit.

Goodhue and Thompson [15] proposed the task–technology fit theory, arguing that task performance can only be enhanced if the task fits the supporting technology. That is, negotiators’ cognitive effort may be reduced whilst their satisfaction toward ENS
may increase if a fit is found between the negotiation tasks to be dealt with and CMC supported by ENSs. In support of this, Lim and Benbasat [21] examined the influence of different media on reducing users' perceived equivocality while dealing with different tasks. Findings indicated that for tasks that were highly analyzable, text- and multimedia-based communication support were found to be equally effective in reducing perceived equivocality, whilst only the multimedia-based forms of support were found to be effective for less-analyzable tasks. By integrating the key issues from these three important theories - task-technology fit, social presence and the media richness - a research model proposing that the fit between negotiation tasks and CMC support critically influences the negotiation process and negotiators' perceptions was developed and empirically examined in this study.

In the following sections, these three theories, the research hypotheses, research method, data analysis and conclusion are discussed in sequence.

2. Literature Review

2.1. Task–technology fit theory

Goodhue and Thompson [15] proposed task-technology fit (TTF) theory (see Figure 1) and demonstrated that TTF not only has significant effects on task performance but can also serve as a useful indicator predicting users' utilization of an information system. Specifically, tasks are defined as the actions undertaken in order to convert inputs into output and technology is defined as the tools required while performing tasks. The latter term is often used to refer to information systems (IS) or service support in the discipline of information science.

![Figure 1. Task-Technology Fit Model](image)

TTF emphasizes the level of assistance that technology is able to provide when users wish to perform certain tasks. TTF has been regarded as a critical factor in improving task performance [15, 31, 34, 35] and a high TTF will lead to a positive effect on task performance. For example, Dennis et al. [9] indicated that decision makers were likely to select group decision systems according to tasks they had to perform. If the group decision systems matched the task requirements, the decision quality would increase. Having developed a task–representation fit model based on TTF theory, Lim and Benbasat [21] reported that multimedia support was able to reduce users’ perceived equivocality and therefore improved task performance while dealing with more equivocal tasks. In a longitudinal experiment conducted by Fuller and Dennis [12], teams with good TTF possessed higher task effectiveness, efficiency, and satisfaction compared to teams with poor TTF. In support of this, Dishaw and Strong [10] argued that a fit between tasks and systems positively impacted on software maintainers’ intentions to use the system in future. Having demonstrated its critical influence on task performance, the properties of TTF should not be overlooked in ENS research: better negotiation performance may be achieved when there is a fit between the ENS and the negotiation task.

2.2. Social presence theory and media richness theory

Short et al. [30] proposed the social presence theory (SPT), suggesting that the level of the social emotion a media comprised was determined by its social presence. That is, the level of social presence has a critical influence on the way negotiators think of their opponents (e.g., traits, ability, mental condition). For example, Tanis [32] contended that media with a high level of social presence can elicit a more sensitive perception of others.

Social presence can be measured via attributes such as sociability, sensitivity, warmth, and personality. According to SPT, face-to-face communications possess the highest level of social presence because people are able to convey cues other than oral language, such as facial expressions, intonation and body language, in a face-to-face situation. As communication mediums are argued to convey other cues in addition to oral language and symbols [29], the interactions between participants will increase when the amount of interpersonal information conveyed through the medium increases (i.e., when there is a higher level of social presence).

Daft and Lengel [4] further proposed the media richness theory (MRT), arguing that different media possess different levels of media richness. Levels of media richness are classified on the basis of feedback, multiple cues, language variety, and personal focus.
As in TTF theory, face-to-face communication was regarded to possess the highest level of media richness, because it not only provides immediate feedback and multiple cues (e.g., facial expressions and body language), but also enables people to talk in different languages with a high degree of personal focus between people. However, some empirical studies have failed to confirm the MRT. For example, Kinney and Dennis [19] examined the effects of media richness on two types of decision-making task: high and low equivocality. Findings indicated that media richness ad no effect on the decision quality, time taken to reach a consensus, or user satisfaction. Valacich et al. [33] examined four media support types of interaction (i.e. face-to-face, video, audio, and text-based) in a dyadic communication context and revealed their impact on the communication performance. Findings failed to indicate that these four media support types had significantly different levels of influence on performance.

McGrath and Hollingshead’s [23] “task–media fit” theory may shed some light on these conflicting results. Consistent with TTF theory, they extended the MRT and proposed the “task–media fit” hypothesis, asserting that a task can be effectively performed only when it fits the medium transmitting the information, as media that possess an inordinately high level of media richness would end up distracting users during task performance and consequently lead to unnecessary communication. In contrast, media with inadequate media richness would restrict users from communicating and performing their tasks. In this way, Mennecke et al. [24] indicated that distraction and restriction can exert a negative influence on task performance. In line with Mennecke et al.’s arguments, McGrath and Hollingshead [23] used the terms “marginal fit” and “poor fit” to refer to situations in which the information is too rich or too lean for the identified task requirements, respectively. Further, they proposed the task–media fit circumplex to show when a good fit can be achieved among different combinations of media richness levels (text-based, audio, video, and face-to-face) and task types (idea generation, intuitive task, judgment task and conflicts of interests).

3. Research Model and Hypotheses

As tasks can be divided into different analyzable level [5], this study argues that “task–media fit” is a crucial issue in developing CMC support and planning for the implementation of ENS. More analyzable tasks are those in which processes are clearly defined and have predefined solutions [25]. Moreover, more analyzable tasks can be performed using objective data and information. In contrast, less-analyzable tasks are those in which processes are non-linear, more equivocal and more personalized [6]. Consequently, less-analyzable tasks are more likely to confuse people in communication. That is, when the CMC support of ENS fits the negotiation task properly, the negotiation performance, such as users’ involvement effort or satisfaction, will be significantly improved. Past studies have suggested that text-based CMC is not suitable for negotiation tasks that have relatively low analyzability, involving social activities, intuition and emotions, although text-based CMC is appropriate for highly analyzable negotiation tasks such as the exchange of information (e.g. [16]). Lim and Benbasat [22] have recently developed a task–representation fit model to reveal the different effects that text-based information and multimedia information may have on users’ decision-making. Findings indicated that text-based and multimedia information support did not differ in their impact on reducing users’ perceived equivocality when dealing with highly analyzable tasks. In contrast, only multimedia information support is able to reduce users’ perceived equivocality when dealing with less-analyzable tasks. Further, Yuan et al. [36] designed an experiment to examine the task–media fit hypothesis in the context of e-negotiation. Three types of media - text-based; text- and audio-based; and text-, audio-, and video-based media - were used and their effects on negotiation outcomes were investigated. It was shown that employing a medium with an excessive level of media richness for the ongoing task actually distracted users’ attention during the negotiation process and resulted in inferior negotiation outcomes, thus demonstrating the importance of task-media fit.

In some negotiations, the information required for task performance is clearly known and defined (i.e. highly analyzable negotiation tasks). Negotiators thus do not need to make decisions on the basis of their personal judgment or subjectively interpret the ongoing information [21]. In such circumstances, ENS with low media richness, such as text-based media, will satisfy the users’ requirements and be able to assist their decision-making by providing essential information [4]. However, if an ENS with excessively high media richness is employed in such cases, negotiators may be distracted from the important negotiation goals during the process [36]. Consequently, a research model (see Figure 2) is
proposed below and hypotheses are presented in the following section.

![Research Model](image)

**Figure 2. Research Model**

**3.1. Efficiency and process satisfaction**

Efficiency is the time taken to complete a task [2, 11]. Dennis et al. [9] argued that when the technology fits the task, the time taken to complete the task will be reduced. In support of this, using longitudinal data, Fuller and Dennis [12] revealed that the lower the level of fit between the technology and the task, the lower will be the levels of effectiveness, efficiency and satisfaction. Further, Goodhue [14] asserted that a higher level of task–technology fit, meeting users’ requirements more effectively and improving the functions and information communication provided by the information system, would in turn generate greater user satisfaction and better task performance.

As prior studies have indicated that text-based CMC is more suitable for highly-analyzable tasks involving information exchange only [27, 28], whilst multimedia CMC is more effective for less-analyzable tasks [21], this study contends that when performing the highly-analyzable negotiation tasks, a text-based ENS will generate greater efficiency and user satisfaction as compared to that generated by a multimedia ENS. In contrast, while performing the less-analyzable negotiation tasks, a multimedia ENS will achieve greater efficiency and user satisfaction than a text-based ENS. Consequently, it is hypothesized that:

H1: The time to accomplish the negotiation task will be shorter when there is a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task).

H2: The negotiators’ satisfaction with the ENS will be higher when there is a fit between the ENS and the negotiation task (i.e., the text-based ENS and the higher-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task).

H3: The negotiators’ satisfaction with negotiation process will be higher when there is a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task).

**3.2. Perceived usefulness**

Perceived usefulness is “the degree to which a person believes that using a particular system would enhance his or her job performance” [7]. In an e-commerce context, Klopping and McKinney [20] suggested that task-technology fit was positively related to perceived usefulness. Consistently, Dishaw and Strong [10] argued that the level of task-technology fit would positively enhance users’ perceptions of the usefulness of the system. Given that the CMC support of ENS can also be seen as a technology, it is hypothesized that:

H4: The negotiators’ perceived usefulness of the ENS will be higher when there is a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task).

**3.3. Cognitive effort**

Cognitive effort is the psychological cost incurred while processing information [26]. As the cognitive resources of human beings are limited [13], individuals seek ways to reduce their cognitive effort in making decisions or performing tasks. The task–media fit circumplex [23] suggests that excessively rich media are likely to distract negotiators from performing ongoing tasks by supplying too much unnecessary information. In other words, excessively rich media reduce task performance by increasing the negotiator’s cognitive effort in carrying out the negotiation. In contrast, using a CMC that is too lean to clearly present the essential information generates negative or misleading effects during the negotiation. Consequently, Yuan et al. [36] argued that task-media fit is crucial for negotiators performing an e-negotiation process. It is thus hypothesized that:
H5: The negotiators’ cognitive effort will be lower when there is a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task).

4. Research Methodology

4.1. Subjects and incentives

In this study, a 2 × 2 (ENS × Negotiation task) factorial design experiment was undertaken. A total of 80 graduate and undergraduate students were recruited for this experiment, and all participation was voluntary. The average age was 23 years, and 67.5% of the participants were male. Each participant was randomly assigned into one of the four groups. Each participant was paid NT$100 (US$1 = NT$30.5) at the end of the experiment.

4.2. Experimental design and procedures

The experiment was designed to evaluate and compare the interaction effects of negotiation task types and the CMC support of ENSs on e-negotiation performance. An ENS was developed exclusively for this study. Two types of CMC support for the ENS were designed:

- Text-based ENS: Negotiators used text only to communicate and negotiate (see Figure 3).
- Multimedia ENS: Negotiators could use audio and video through a webcam to communicate and negotiate (see Figure 4).

Two types of negotiation task were designed:

- Highly-analyzable negotiation task: Negotiators conducted price bargaining on a 3C product.
- Less-analyzable negotiation task: Negotiators conducted salary bargaining.

Subjects were randomly assigned in pairs to conduct one-to-one negotiation. Each pair of participants sat in different rooms during the negotiation process. At the beginning of the experiment, each subject received complete instructions and was asked to read them thoroughly and carefully. Subjects were also asked to complete the negotiation task independently. After filling in the demographic characteristics in the pre-experiment questionnaire, each subject was randomly assigned to one of two groups: (1) In the highly-analyzable negotiation task, one subject from each pair acted as the seller of a 3C product and the other as the buyer, and each pair would carry out price bargaining via the ENS (text-based or multimedia). (2) The less-analyzable negotiation task was an experimental task in which one subject acted a company that had to recruit a qualified employee and the other as a candidate who wanted the job, and each pair would perform a job interview to determine the salary of the new employee using the ENS (text-based or multimedia). All the text and videos generated during negotiation were recorded for future analysis.
4.3. Measures

Previously validated scales for information systems satisfaction, perceived usefulness, process satisfaction and cognitive effort were employed in this study, with the exception of negotiation efficiency, which was defined as the duration of the negotiation phase (in seconds). These items used 7-point Likert scale or semantic difference scales, with the exception of negotiation efficiency. Specifically, ENS satisfaction was defined as the negotiators’ satisfaction with the ENS and the measurement was adapted from Bhattacherjee [3]. Perceived usefulness was defined as the negotiators’ perceptions of the usefulness of the ENS and the measures were adapted from Klopping and McKinney [20]. Process satisfaction was defined as the negotiators’ satisfaction with the negotiation process and the measurement was adapted from Pereira [26] and Kahai and Cooper [17]. Finally, cognitive effort was defined as the effort expended while using the ENS to negotiate. The measures were adapted from Pereira [26].

The initial versions of the scales were pre-tested for content validity by two professors, who served as expert judges. A pilot study was then undertaken to investigate the questionnaire. The wording of each individual item was examined, and unclear items were reworded where necessary. Table 1 provides the scale items for these constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Item Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiation efficiency</td>
<td>Duration of the negotiation phase (in seconds).</td>
<td></td>
</tr>
<tr>
<td>ENS Satisfaction</td>
<td>How do you feel about your overall experience of the ENS system usage:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very dissatisfied / Very satisfied</td>
<td>0.933</td>
</tr>
<tr>
<td></td>
<td>Very displeased / Very pleased</td>
<td>0.922</td>
</tr>
<tr>
<td></td>
<td>Very frustrated / Very contented</td>
<td>0.938</td>
</tr>
<tr>
<td></td>
<td>Absolutely terrible / Absolutely delighted</td>
<td>0.930</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>By the use of the ENS, information is either obvious or easy to find out.</td>
<td>0.893</td>
</tr>
<tr>
<td></td>
<td>I can get information quickly and easily through the ENS when I need it.</td>
<td>0.919</td>
</tr>
<tr>
<td></td>
<td>The information that I use or would like to use is accurate enough for my purposes.</td>
<td>0.880</td>
</tr>
<tr>
<td></td>
<td>The information is up-to-date enough for my purposes.</td>
<td>0.823</td>
</tr>
<tr>
<td>Process Satisfaction</td>
<td>My level of satisfaction with the negotiation process is very high.</td>
<td>0.939</td>
</tr>
<tr>
<td></td>
<td>I am not at all satisfied with problem solving process I went through today*.</td>
<td>0.967</td>
</tr>
<tr>
<td></td>
<td>Overall, I am satisfied with the negotiation process.</td>
<td>0.932</td>
</tr>
<tr>
<td>Cognitive Effort</td>
<td>Negotiation using this system required too much effort.</td>
<td>0.822</td>
</tr>
<tr>
<td></td>
<td>The task of negotiation using this system was easy*.</td>
<td>0.865</td>
</tr>
<tr>
<td></td>
<td>The task of negotiation using this system was too complicated.</td>
<td>0.781</td>
</tr>
</tbody>
</table>

Reversed coding

5. Research Results

Analysis results of the manipulation and control check indicate that experimental manipulations were successful for all four experimental conditions.

The mean and standard deviation of each dependent variable are presented in Table 2. Multivariate analysis of variance (MANOVA) was
sequentially applied to further examine the research hypotheses. Box’s M test for equality of covariance matrices showed that the variance of dependent variables was homogeneous across treatment groups \( (F = 1.350, p > 0.05) \). A MANOVA test (see Table 3) presented a significant interaction effect between the ENS and the negotiation tasks (Wilks’s Lambda = 0.734; \( F = 5.216, p < 0.001 \)).

For negotiation efficiency, the interaction effect \( (F = 4.646, p = 0.034) \) was significant. The time to accomplish the negotiation task was shorter when there was a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task). Thus, the results partially support H1. Figure 5 portrays the mean levels of negotiation efficiency in the four treatment groups.

For ENS satisfaction, the interaction effect \( (F = 14.063, p < 0.001) \) was significant. Figure 6 illustrated the mean levels of negotiators’ satisfaction with ENS among the four treatment groups. That is, subjects who were given ENS that matched their assigned negotiation task had higher levels of satisfaction with the ENS than subjects who received mismatching ENS. Thus, H2 was supported.

For process satisfaction, the interaction effect \( (F = 7.052, p < 0.01) \) was significant. That is, subjects who were given ENS that matched assigned negotiation task had higher levels of negotiation process satisfaction than subjects who received mismatching ENS. Hence, hypothesis H3 was supported. Figure 7 shows the mean levels of negotiators’ satisfaction with the negotiation process among the four treatment groups.
For perceived usefulness, the interaction effect ($F = 5.343, p = 0.024$) was also significant. That is, the negotiators’ perceptions of the usefulness of the ENS was higher when there was a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task). Thus, the results support H4. Figure 8 presents the mean levels of negotiators’ perceived usefulness of the ENS in the four treatment groups.

For cognitive effort, the interaction effect ($F = 21.600, p = 0.000$) was significant. Figure 9 portrays the mean levels of negotiators’ cognitive effort in the four treatment groups. Negotiators’ cognitive effort was lower when there was a fit between the ENS and the negotiation task (i.e., the text-based ENS and the highly-analyzable negotiation task or the multimedia ENS and the less-analyzable negotiation task). Thus, H5 was supported.

6. Conclusion and Implications

This study has empirically confirmed that a good fit between ENS and negotiation task will result in significant improvements in e-negotiation performance and user perceptions. When negotiators are performing highly-analyzable negotiation tasks, the text-based ENS may meet their needs better,
leading to higher ENS satisfaction, greater perceived usefulness of the ENS, greater satisfaction with the negotiation process, lower cognitive effort, and most importantly, less time spent completing their negotiation tasks. On the contrary, employing a mismatching ENS results in negative consequences such as lower ENS satisfaction, perceived usefulness of the ENS and negotiation process satisfaction. Further, negotiators must also suffer expend greater cognitive effort in undertaking the negotiation task. These finding suggest that for a given negotiation task, supporting different CMC of ENS would help negotiators to achieve a better negotiation performance and perceptions.

The theoretical contribution of this study is thus three-fold: (1) Although many studies have investigated issues of e-negotiation, most of them are limited in terms of decision support and automatic negotiation. Little attention has been paid to the issue of helping negotiators to choose a form of communication support to enhance the negotiation process; (2) Whilst the social presence and media richness theories have mainly been applied to the group decision domain in past research, this study has integrated these two paradigms with the task-technology fit perspective and has appropriately demonstrated the importance of task-media fit in an e-negotiation domain; (3) While previous studies reported that adding decision support tools to the negotiation process would improve efficiency and decision quality, this study has added value to the existing literature by revealing that only when the CMC support of ENS fits the negotiation task can negotiation performance and perception be significantly improved.

This study also provides fruitful implications for ENS designers in terms of designing practical interfaces. By providing appropriate CMC support, negotiators’ satisfaction with ENS and with the negotiation process could both be enhanced. Further, this study’s findings could serve as useful guidance for negotiators in choosing CMC support to perform specific negotiation tasks online in order to save time and personal cognitive cost whilst achieving better negotiation outcomes.

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7. References


