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Satisfaction of E-Negotiation System Users

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Abstract

User's satisfaction has been used as a key variable for e-negotiation assessment. Previous research has identified various types of satisfaction in e-negotiation and attempted to develop the measurement for three of them: satisfaction with outcome, process and relationship. While the result indicated that the items might need to be purified, neither the relationships among these three categories of satisfaction were examined. The present study uses new data sample to conduct a confirmatory factor analysis to refine the measures for user's satisfaction. Then, structural equation modeling is used to investigate the potential relationships among the three categories. The results prove that the three categories of user's satisfaction are highly correlated but theoretically different. A group analysis shows that three types of negotiators exist in e-negotiations: outcome-oriented, process-oriented, and relationship-oriented.

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1. Introduction

With the rapid development of e-business, e-negotiation has emerged in the past decade and various types of e-negotiation systems (ENSs) have been developed. Research on e-negotiations has focused on users' acceptance of ENSs and the impact of ENSs on negotiators and negotiations [1]. As mixed results have been found in users' perceptions to different system features [2, 3], their assessment of the systems and thus future adoption of ENSs remain unreliable. A recent review of research on negotiation support and ENSs has identified several key variables for e-negotiations assessment. Among them, user's satisfaction is a promising one, which has been widely used in other fields [4].

The present study continues with a previous series of experimental studies on ENSs, in which three categories of user's satisfaction have been investigated: satisfaction with outcome (SO), satisfaction with process (SP), and satisfaction with relationship (SR) [4]. An exploratory factor analysis (EFA) has been done in a previous study to purify the initial instrument measuring these three categories [5]. With a new sample data, this study aims to further refine the measures through a confirmatory factor analysis (CFA). Moreover, the relationships among the three categories will be identified through a structural equation modeling (SEM) analysis.

The paper is organized as following: Next section first introduces the background of this study and gives a brief description of the sample data. Then, the key concepts are defined and the research models are proposed. This is followed by the methodology. The results are then summarized and discussed. The paper concludes with the key findings and implications to future research.

2. Background

In the past several years, InterNeg Research Center conducted a series of experimental studies about ENSs. Several categories of satisfaction have been identified through an intensive literature review [4, 5]. An initial instrument measuring SO, SP and SR have been developed and applied in such series of lab and online experiments as exploratory studies. This initial instrument needs to be confirmed by further testing against the theory of satisfaction.

The present work thus extends the past series of studies by collecting a new sample of data in order to refine the measures for user's satisfaction and investigate the potential relationships among the three categories. Each category was measured by four items with a 7-point Likert scale (from -3 to 3). People from all over the world could participate in the experiments. Total 362 university students registered and participated in the negotiations, and the effective data finally was obtained from 283 respondents. From a descriptive analysis of their response in the pre-negotiation questionnaire, 44% was female and 56% was male. Also, the age of most of the participants was from 20 to 40 while around 7% from other age groups. The participants were originally from various countries over the world, most of them from North America, Europe, and Asia.

3. Research Models

Both literature and empirical evidence indicate that the three categories of user's satisfaction

(SO, SP, and SR) are correlated but theoretically different with each other. The relationships among them still remain unknown. This study proposes three possible orientations that may exist: 1) *outcome-oriented* negotiators perceive that their negotiation outcomes are attributed to their performance during the process and the relationship built with the counterparts; 2) *process-oriented* negotiators focus more on the negotiation process while they relatively overlook the outcome and the relationship with the counterpart; and 3) *relationship-oriented* negotiators value more with the relationship built with the counterpart. Nevertheless, the relationships among the three categories may indicate how user's perceptions and attitudes evolve by using ENS. Thus, the present study proposes six models (See Table 2) to test the possible relationships among SO, SP and SR in e-negotiations.

4. Methodology

In line with the objectives of this study, a dual-stage approach is followed: 1) further test the measures of user's satisfaction by CFA; 2) explore the underlying structure of user's satisfaction by SEM.

Stage 1: CFA to purify the measures

With the new data sample, a CFA is first conducted to test and refine the measures for the three categories of user's satisfaction. The CFA model is initially tested with the Maximum Likelihood (ML) method in EQS 6.1. In order to catch the sources of the model misspecifications, the Lagrange Multiplier (LM) test was also used, particularly the PEE (which indicates error items associated with two or more of the indicator variables may be correlated) and the GVF (which catches the model misspecifications if one or more of the items cross-loaded on another factor).

After running the CFA model, the output indicated an acceptable overall goodness of fit (CFI=.962, SRMR=.055, RMSEA=.089). However, the univariate statistics showed relatively high kurtosis values for two variables (SO_1=3.5361 and SP_2=4.8261) and the Mardia's normalized estimate was 46.1167, indicating some degree of non-normality for the data. Concerning the relatively large sample, this suggests that the Robust statistics may be appropriate for estimation. Before making change of the method, several multivariate outliers were further identified with normalized multivariate kurtosis and checked by reviewing the original response in the questionnaires. The cases for which no reasonable theoretical interpretation could be given were then deleted for the subsequent analysis. The result shows some improvement in terms of the normality, whereas it still suggests using the Robust statistics estimation. Thus, the rest analysis all used the Robust ML estimation method.

After cleaned the data and used the Robust ML method, the overall goodness of fit was also improved (CFI=.951 and RMSEA=.064) which showed a reasonably well fitting (See Table 1). However, in the largest standard residuals, more than five parameters were related with indicator SP_3. Also, the LM test univariate incremental $\chi 2$ statistic revealed strong evidence of misspecification with respect to the cross-loading of SP_1 and SP_3 on SO. These two items were then further reviewed in the questionnaire, and it indicates that the word "performance" can be interpreted as both for the negotiation result/outcome and the negotiation process. Similarly, "accomplishing my tasks" may be interpreted as the final achievement (outcome) and the process to achieve the outcome. Although the ambiguity can be eliminated by dropping one or both of these two items, it may be interesting to keep them as they reflect

both SO and SP, and to test how sound they can be used to measure user's satisfaction in these two categories and how they relate with each other. Since existing literature has not even very clearly distinguished SO and SP, this examination may gain some evidence to show their similarities and differences.

Moreover, the error co-variance (E12, E11) also indicated a significant difference in $\chi 2$ statistic. After checking the two items (SR3 and SR4), it indicates that the items may have an overlap in their meanings (i.e. the counterpart "acted in good faith" and "was honest"). Thus, instead of adding this parameter, it may be more appropriate to remove one item (see Table 1). Relatively, the word "honest" may be too general to catch user's satisfaction with the relationship in e-negotiations. With double checking other largest residuals and the LM test result, the item SR4 was finally dropped from the model.

The CFA model for user's satisfaction was thus re-specified to include or eliminate these parameters. The revised model showed a much improved fitting (CFI=.990 and RMSEA=.031) and the LM test also showed no significant improvement needed. Table 1 summarizes the model specification with the fit indices.

Table 1 Model specification and goodness of fit

Model Specification	χ^2	CFI	RMSEA
SO: SO1, SO2, SO3, SO4 SP: SP1, SP2, SP3, SP4 SR: SR1, SR2, SR3, SR4	109.4322 (51, .000)	.951	.064 (.047,.080)
SO: SO1, SO2, SO3, SO4, SP1,SP3 SP: SP1, SP2, SP3, SP4 SR: SR1, SR2, SR3, SR4	86.1139 (49, .00083)	.969	.052 (.033, .069)
SO: SO1, SO2, SO3, SO4,SP1, SP3 SP: SP1, SP2, SP3, SP4 SR: SR1, SR2, SR3	49.5576 (39, .11981)	.990	.031 (.000,.055)

After obtained a well fitting overall model, the individual parameter estimates need to be assessed. In general, two aspects were concerned: the appropriateness of the estimates and their statistical significance. The output of the final model showed all estimates were reasonable and statistically significant at a 5% level. In addition, all standard errors were also in a good order, neither too large nor too small, which also indicates a good model fit.

Finally, the standard solution showed high factor loadings of each specified item and reasonably high R2 (bigger than .6). Noted that the factor loadings of SP1 and SP3 which were misspecified in the initial model still showed higher loadings on their original factor (SP) than on the re-specified paths to the factor SO. Thus, the final measurement model retained the revised specifications throughout all the subsequent analyses of the proposed models in SEM.

Stage 2: SEM to identify the relationships

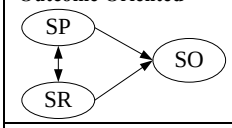
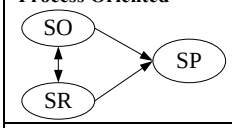
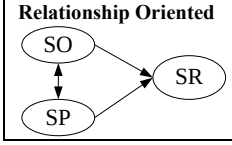
The second stage mainly focuses on the relationships among the three categories of user's satisfaction. The SEM technique is used to test the proposed models (See Table 2). In order to capture the sources of misspecified structural paths, the LM test also used. Particularly, three possible misspecifications were to be tested: 1) the paths from either independent factor to

dependent factors (GFF); 2) the paths from one dependent factor to another (BFF); and 3) the covariances among the disturbance terms (PDD).

Because the six models specified different directions between the three factors (i.e. categories of user's satisfaction), the Akaike's Information Criterion (AIC) and Consistent Akaike's Information Criterion (CAIC) fit indices were used to compare these non-nested models. Nevertheless, the outputs for the six proposed models showed much closed values on AIC (-29.40) and CAIC (-210.30). Moreover, other fit indices were also good but very close for the six models (CFI=.991 and RMSEA=.030). The LM test showed only two possible misspecifications (V4, F2; V3, F3), while they were considered tenable after reviewing the items and the test results. Furthermore, in terms of the effects of the individual paths, the output showed that all the relationships specified in the model were significant at a 5% level. Thus, it indicates that all the three types of negotiators exist in e-negotiations: outcome-oriented, process-oriented, and relationship-oriented.

Though the R2 shows no difference between the two models for each orientation, the effects of the directions and strength of the paths in the models vary (see Table 2). Relatively, the result indicates a stronger relationship between SR and SO. In addition, SP also more strongly affects SO and SR while it is not affected by those two.

Table 2: The relationships of SO, SP, and SR

Model	ML Solution	R^2
Outcome Oriented 	F1=.274×F2+.702×F3+D1 F3=.940×F2+D3	.610 .201
	F1=.274×F2+.702×F3+D1 F2=.213×F3+D2	.610 .201
Process Oriented 	F2=.127×F1+.117×F3+D2 F1=.760×F3+D1	.596 .228
	F2=.127×F1+.117×F3+D2 F3=.784×F1+D1	.596 .228
Relationship Oriented 	F3=.726×F1+.262×F2+D3 F1=.934×F2+D1	.204 .608
	F3=.262×F2+.726×F1+D3 F2=.218×F1+D2	.204 .608

5. Result and Discussion

Through the dual-stage approach, the measurement items were further tested and the underlying structures among the three categories of user's satisfaction were identified.

The CFA results showed that the remaining 12 items from the previous studies need to be further purified and re-specified. Item SP1 and SP3 were found highly correlated with SO while item SR3 and SR4 were overlapped with each other. With a further review of the items, SP1 and SP3 were re-specified in the CFA to relate to SO and item SR4 was removed from the measurement model.

The SEM results showed that the three categories of user's satisfaction are highly correlated but theoretically different. The underlying structure shown in the six models indicates three types of negotiators exist in e-negotiations: outcome-oriented, process-oriented, and

relationship-oriented. Nevertheless, it also demonstrates that a stronger relationship between SR and the SO but not between SP and others. In addition, SP also more strongly affects SO and SR while it is not true as vise versa.

6. Conclusion

Previous studies have shown that user's satisfaction is an important construct in e-negotiation research, particularly for assessing e-negations and ENSs. As an extension, the present study follows a dual-stage approach to examine the three categories of user's satisfaction: satisfaction with outcome, satisfaction with process, and satisfaction with relationship. Stage 1 conducts a CFA to further refine the measures of the three categories, and Stage 2 uses SEM to explore the underlying structure among them. The results indicate that the negotiators in e-negations can be outcome, process or relationship oriented.

Future studies may further examine user's overall satisfaction with a second-order factor model. From the descriptive analysis of the sample, it also suggests concerning several control variables in the analysis (e.g., gender, age, and culture). Moreover, the role the participants presented in the experiments may also need to be considered. Thus, a multi-group analysis with a sufficient sample data is recommended in future work.

References

Vetschera, R., G. Kersten, and S. Koeszegi, User Assessment of Internet-Based Negotiation Support Systems: An Exploratory Study. Journal of Organizational Computing and Electronic Commerce, 2006. 16(2): p. 123.

Lim, L.-H. and I. Benbasat, A Theoretical Perspective of Negotiation Support Systems. Journal of Management Information Systems, 1992. 9(3): p. 27.

Kohne, F., M. Schoop, and D. Staskiewicz. An Empirical Investigation of the Acceptance of Electronic Negotiation Support System Features. in ECIS 2005: the European Conference on Information Systems. 2005. Regensburg, Germany.

Kersten, G. and H. Lai, Negotiation Support and E-negotiation Systems: An Overview. Group Decision and Negotiation, 2007. 16(6): p. 553.

Yu, B., Negotiations or Auctions: Experimental Comparison of Two e-Market Mechanisms, in John Molson School of Business. 2007, Concordia University: Montreal. p. 134.