Embedded System Use and Users' Assessment: An Experimental Study of Electronic Negotiation

Completed Research Paper

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Abstract

Focusing on users' perspective, the current study conceptualizes that system use is embedded within the processes the users follow in order to achieve their goals. Given this conceptualization, users' assessment of system use will take place in three sequential tiers, i.e., the assessment of achievement, technology-interaction, and the system. The theoretical propositions were tested by conducting an e-negotiation experiment. The results support the proposed theoretical model and also show that users' perception of their negotiation partner may influence their assessment of system use.

Keywords

Embedded system use, user evaluation, electronic negotiation.

Introduction

System use is a central construct in information system (IS) research. Since the early development of IS research, attempts have been made to explain the relationship between system use and its potential impacts on both individual and organizational levels (DeLone and McLean 2003). With time, the field has progressed and now recognizes that system use plays a key role for organizations. However, the empirical results showed mixed effects between system use and individual performance (e.g.,Barki *et al.* 2007). This may be due to both the weak conceptualization and operationalization of the construct. These findings now drive researchers to further scrutinize the concept of system use. To improve the appropriateness of operationalizing the construct, some remedies have been proposed including extending the scope of the construct (e.g.,Barki *et al.* 2007) or focusing on effective system use (e.g.,Burton-Jones and Grange 2013). Re-conceptualization of the construct was also proposed in order to better guide research about system use (e.g.,Burton-Jones and Straub 2006).

Aside from investigating the influence of system use, user evaluation of system use is another main concern in the IS field, as it is believed that users' perceptions and attitudes towards a system will influence their behaviors (Venkatesh *et al.* 2003). Thus, it is also desirable to understand how users may respond to and assess their system use. The Technology Acceptance Model (TAM) and Task-technology

Fit model (TTF) are two of the most influential theories focusing on user evaluation of system use. Their profound influence and citation frequencies suggest the importance of user evaluation of system use. However, user evaluation of system use has been criticized as weak in its theoretical foundation. Psychological and social-psychological mechanisms that connect individual attitudes to their actual behaviors need to be clarified and investigated (Melone 1990).

An IS usually encompasses multiple stakeholders, including managers, designers and users. Traditionally, IS research about system use and user evaluation adopted a perspective of either the managers or the designers. It rarely adopted the users' perspective. In contrast to the traditional practices, the current study conceptualizes system use from the users' perspective. For users, their use of a system is embedded inside the processes in which users attempt to achieve their goals. The goals pursued by users are prescribed or constructed by the social system in which they reside. If the main purpose of users is to achieve their goals while using a given system, their achieved outcomes will play a significant role of influencing their perceptions and attitudes toward their system use. The current study uses an online e-negotiation experiment to test a research model. The experimental results support both the proposed research model and the theoretical analysis.

Although the current study has considered several important elements of embedded system use, its operationalization of the system use context was still limited. Re-examination and further empirical work are required. The current study offers a competing view about system use. It also posits more challenges. Discussions are conducted in order to draw connections between the research settings for e-negotiation with the features of organizational contexts, which are more concerned in existing literature and the general practices of IS use and user evaluation. Several questions are highlighted and reflected. Essentially, it is our hope that the current study will trigger new thoughts about the two classical themes and stimulate healthy debates in this research area.

The current paper is organized as follows. The next section establishes the research background of the current study. Due to the vast scope of literature about IS use and user evaluation, the paper restricts its discussion by focusing on several influential theories in the IS field. The conceptualization of embedded system use is then introduced. E-negotiation as a case of embedded system use is briefly discussed further. Following the background section, a research model about users' use and assessment of e-negotiation system is proposed. Based on the research model, two further sections, i.e., methodology and results, present the details of conducting the current study and the main findings. The paper then proceeds with the discussion of the findings. The paper concludes with a summary and implications for future research.

Research background

User evaluation and system use

System use is a key concern for managers and IS researchers. Resources and capitals have been and will be continuously invested in order to build systems with an expectation to help users and organizations achieve better decision making, increased productivity, and improved organizational performance (Orlikowski and Lacono 2001). Accordingly, it is desirable for both researchers and practitioners to ascertain how well the expected results will or have been obtained. User evaluation is an important way to assess systems. In the 1980s, user evaluation practices focused on user satisfaction, which was frequently treated as a measure of IS effectiveness (Melone 1990). Lately, more theoretical models and approaches were proposed in the IS field for assessing the success of systems. Among them, the most influential ones include the TAM of Davis (1989), the TTF model (TTF) of Goodhue (1995), and the IS success model of DeLone and McLean (1992).

TAM is one of the most intensively investigated models in the IS field. It adopts users' behavioral intention to use a system as the key predictor of their actual behaviors when using a system. The drive to understand users' behavioral intention to use a technology stems from the fact that the unwillingness of users to accept or use a system often brings the investment of the system under a risk of waste (Davis *et al.* 1989). An implicit assumption of TAM is that users are somehow self-interested when considering whether they should use a technology or not, i.e., the technology needs to be useful to them.

Multiple extensions to TAM have been proposed. The recent unified TAM (Venkatesh *et al.* 2003) integrated many factors (e.g., performance expectancy, effort expectancy, social influence and facilitating conditions) that may influence users' behavioral intention to use a system. Although the unified TAM includes more factors that may help to explain the variance of users' behavioral intention to use a system, it still implicitly assumes that users are self-interested. Although self-interest behaviors may prevail in many social contexts, they are not always desirable in organizational and team-based contexts. Cooperation, coordination, and stewardship behaviors may be required to resolve conflicts or achieve joint goals. These types of behavior often require mutual support from participants.

The TTF postulates that individual performance depends on the fit between the tasks undertaken by users and the technology used for the tasks (Goodhue and Thompson 1995). The better the fit, the higher the user performance will be, resulting in increased value of the technology. A distinct feature of TTF is its method to measure fit based on user evaluative perceptions. Due to the de facto difficulty of assessing the actual fit, the TTF uses users' beliefs in and attitudes towards a system as a surrogate. Such a surrogate approach makes the validity of the construct questionable. Since the actual fit is difficult to determine, all the reported performance gain or loss can be interpreted in terms of better or worse fit. The appropriateness of using users' attitudes and beliefs to assess the success of IS has been challenged (e.g.,Melone 1990). In addition, the fit between tasks and used technology can be very dynamic. In actual applications, the fit can be achieved by either modifying tasks when a new technology is introduced (e.g., business process re-engineering) or by selecting alternative technologies. Recently, organizations and IT projects emphasize the capability of being agile. Users, tasks, and used technologies may dynamically get involved in a complex adaption process. It becomes challenging for TTF to reliably or robustly capture a dynamic fit as both technologies and tasks can change at any time.

While these two models shed some light on user evaluation of IS, the requirements of assessing a system are often more complex and broader than these two models can describe and predict. Assessing system use in organizations usually involves multiple level relations between systems, individual users, and organizations. The IS success model (DeLone and McLean 1992) seeks to explain the chain of impacts, which connects systems, individual users, and the organization. The benefit of using a system for an organization depends on the characteristics of the system (i.e., system and information quality) and usage (i.e., use and user satisfaction). Although the IS success model helps to bridge different levels, the use of the whole model is often difficult. The impacts of a system on an organizational level are often multiple and complex. For instance, organizational effectiveness as a construct can be defined and operationalized very differently (Thong and Yap 1996). Consequently, it is difficult to clearly ascertain the relation between organizational performance and the systems used. As an integral part of management, system evaluation highlights the complex nature of any organization. To be part of the management control process, an evaluated system must meet the organizational needs, comply with the organizational policies, and be assured to have good quality. An IS project often has multiple stakeholders whose interests are different and often conflicting. The process of evaluation of a system must examine, encourage, and promote a collective satisfaction as a legitimacy process within the relational network. In order to appropriately evaluate a system, approaches need to be applied carefully with respect to both the identified organizational objectives and the actual difficulties (Hamilton and Chervany 1981a; Hamilton and Chervany 1981b)

User evaluation often relies on user subjective beliefs in and attitudes towards a system. The premise underlying this approach is that these beliefs and attitudes will influence users' use of a system, i.e., behaviors; or at least positive beliefs and attitudes will provide a good basis for the actual behaviors. However, beliefs and attitudes cannot fully explain or reliably predict actual behaviors. Both criticism (e.g.,Melone 1990) and support (e.g.,Gatian 1994; Gelderman 1998) for this approach exist. Thus, examining users' system use behaviors may be helpful. A school of IS research is interested in system usage, which is closely related to user evaluation of IS. System usage is a notion that focuses on the observable behaviors of system users. It is believed to be a critical factor influencing the success of information systems. As Orlikowski (2000, p.425) notes, "Technology per se can't increase or decrease the productivity of workers' performance, only use of it can." This idea is simple, yet powerful and keenly points out the importance of this concept. System usage was among the most frequently used measures of assessing IS success (DeLone and McLean 2003). It may also underpin other important processes of information technology development and implementation, such as adoption, acceptance, and diffusion. The IS field has dedicated a large amount of effort to develop and understand this notion. According to

Barki, *et al.* (2007), the journals of *MIS Quarterly* and *Information System Research* published 60 papers between 1992 and 2007, in which IS use was a key construct. In total 120 issues of these two influential IS research journals, IS use appeared in one article every two issues.

Despite being an important construct in IS research, IS use is still problematic in both its conceptualization and measurement. For instance, IS use may be measured very differently in terms of used system features, frequency, or duration. Empirical studies have shown mixed results of the impact of this construct on individual performance. Positive, negative, and insignificant effects have been reported. Barki, *et al.* (2007) identified six problems of this important construct, listed as following:

- *Ignoring how IT is actually used in organizations,*
- *Failing to consider the multidimensional nature of IS use,*
- *Overlooking the richness of organizational contexts,*
- *Lack of relevance in mandatory used context,*
- *Ignorance of what level of use should be considered sufficient for successful IS,*
- *Inadequacy for capturing the relationship between usage and the realization of expected results.*

Both the importance and problems of the IS use construct calls for improving its conceptualization and measurement. Barki, *et al.* (2007) proposed expanding the focus of existing conceptualizations of IS use. As they commented, the current measurement of IS use exclusively focuses on user technology interaction behaviors. This practice excludes many other use-related activities that may make contributions to IS use. Based on task-technology fit and activity theory, they extended traditional IS use to a new construct of IS use-related activity which is conceptualized as a second-order aggregate construct that comprises both user technology interaction behaviors and activities that users undertake to adapt the task-technology-individual system. They also provide empirical results that support the proposed extension.

Burton-Jones and Straub (2006) explicitly recognized the difficulty in obtaining a unified definition of IS use. They proposed a systematic approach for re-conceptualizing the system usage construct in the particular nomological contexts that interest researchers. The approach is composed of two stages, i.e., definition and selection. In the definition stage, researchers need to define system usage and clarify its underlying assumptions. In the selection stage, IS use needs to be conceptualized in terms of its structure and function. The structure of IS use has three key components, i.e., user, system, and task. Researchers need to justify the relationships between these three components and their relevance for studies. A desirable, rich measure for IS use may nicely tie these three components together and draw relations with other closely related constructs. However, obtaining such a measure is very challenging. Burton-Jones and Straub's approach provides a useful methodological guide if IS use is adopted as a construct in studies.

In contrast to the approach of Barki, *et al.* (2007) which expands the focus of IS use, Burton-Jones & Grange (2013) proposed moving from use to effective use. The authors define effective use as "using a system in a way that helps attain the goals for using the system." The authors draw on the representation theory to state that an IS consists of structures that serve to represent part of the actual world. The effective use of the system is derived from how users and other stakeholders understand the system. They also presented a framework to explain how effective use and performance are related. Intuitively, this approach may narrow the operationalization scope of IS use, which in turn may help establish consistent relationships among the constructs.

Embedded system use and users' assessment

Both the studies of Barki, *et al.* (2007) and Burton-Jones & Grange (2013) identified three key elements in IS use, i.e., user, system and task. According to Barki, *et al.* (2007), IS use-related activity includes two types of behaviors, i.e., individual-technology interaction and task-technology-individual adaptation behaviors. Both types of behaviors are related to individual users, the system used, and tasks undertaken by users. The approach proposed by Burton-Jones & Grange (2013) distinguished six ways to measure IS use, which differ in terms of how users, systems and tasks are related. In their view, a rich and ideal measure of IS use needs to consider all three elements. They also point out that IS use often involves multiple stakeholders. The stakeholders may expect different results from IS use. Although these recent movements in IS use research have the potential to significantly improve our understanding of this

construct, we still need to develop a deeper insight into it. IS research often focuses on the perspective of observers, managers, or designers. From these perspectives, IS use is the behaviors of users, which may be observed and used to predict other effects. In contrast, it is rare to examine IS use from a user perspective. It becomes interesting to investigate how users may look at system use and how they may assess that use.

Users do not use systems just for the sake of using them. They have a goal to achieve. Both studies of Barki*, et al.* (2007) and Burton-Jones & Grange (2013) deem tasks as goal-directed activities that users need to undertake. The concept of task can be refined into two elements, i.e., a goal that drives a user and a discourse of actions that the user undertakes to achieve her goal. The use of the system is embedded within a process of goal achievement of the user. In order to achieve her goal, a user may tap into different resources to learn about the system, interact with the system, and verify the results by examining feedback from the system or by collecting multiple cues from the context.

When IS use is embedded within a goal-achievement process, the achieved performance of a user will become a significant factor influencing their assessment of the system. This is in contrast with the traditional practice of IS use research that treats individual performance as a dependent variable which is influenced by both users' use of the system and their subjective attitudes and believes about their use. In addition, it is very likely that users may use the system in ways that are not expected by designers and managers. In a goal achievement context, users may explore solutions, change routines, or adjust their goals. Thus, it is difficult to coherently prescribe users' behaviors from a designer perspective or describe their behaviors from an observer perspective.

In an embedded IS use scenario, the actual use of the system is jointly influenced by both how a user wants to achieve their goal and how the system will help. The goals of users are constructed or provided in a socio-system. For instance, it is a goal for a user to meet the requirements of her job description. In order to do so, she needs to use a system. The discourse of actions undertaken by a user is partially prescribed by the socio-system, such as norms and institutions. At the same time, the actions undertaken by a user are also shaped by the system as she uses it. Usually, a system will have a set of functionalities and features available to the user. It is also possible for the system to implement and enforce socio-rules or norms to regulate the behaviors of the user in order to comply with institutions and policies.

In an embedded system use scenario, a user resides in a socio-system and needs to interact with a technical system. This scenario shares a lot in common with the socio-technical theory which was initially developed to help understand the relationship between IS and organizations. Figure 1 presents an adapted model from Bostrom & Heinen (1977) which demonstrates an embedded system use scenario and how users' assessment of its use may take place. Users are social entities who reside in a socio-system and have goals to achieve. Their goal achievement may be assessed by different means (e.g., how many and how quickly customer orders are processed). In order to achieve their goals, users may divide their overall tasks into more manageable sub-tasks. Some of the sub-tasks are technical tasks that can be carried out by using the system. The complexity of the technical tasks is a function of both the requirements of users' goals and the functionalities of the systems used, i.e., what users want to do with the system and what the system can offer.

Figure 1 identifies the basic relationship between a user and a system used in an embedded system use scenario. The relationship suggests that a user's assessment may take place in three sequential tiers. First of all, a user will assess her goal achievement. Since she is a social actor and her goal is either constructed in or provided by the socio-system, her assessment of goal achievement will be a fundamental factor influencing many other perceptions and attitudes. Secondly, the user's assessment about her interaction with the system will influence how well she assesses the contribution of system to her goal achievement. For instance, a user may need information from the system and so she submits a query. The system responds by providing information and then the user can evaluate the quality of the information. The perception of the user concerning information quality is not solely determined by either the user or the system. It is a joint outcome between what the user wants and what the system provides. By borrowing the term "technology interaction" from Barki*, et al.* (2007), users' evaluation of their interaction with the system can be defined as their assessment of technology interaction. Finally, users will form their beliefs and attitudes about the used system basing on the prior two assessment tiers. More frequently, this set of beliefs and attitudes will surround what contribution the system has made, e.g., perceived usefulness. In summary, users will assess embedded system use in three tiers. Their assessment of goal achievement will

be the first tier, which will influence the assessment of technology interaction. The first two tiers will jointly influence users' assessment about the contribution of the system.
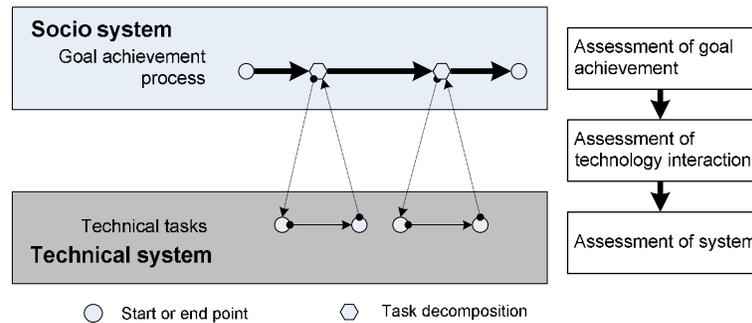

Figure 1: Embedded system use and user assessment

E-negotiation as a case of embedded system use

E-negotiations can be simply defined as negotiations conducted through electronic means. Recently, a family of systems has been developed to facilitate and support negotiations involving multiple parties. These systems are generally classified as electronic negotiation systems (ENSs) (Kersten and Lai 2010). ENSs evolved mainly from two areas of research. The first area includes decision support systems and negotiation support systems (Kersten and Lai 2007). The second area includes research for the design and development of groupware. Closely related groupware includes computer-supported cooperative work, group decision support systems, group support systems, and meeting support systems. The main focus of the second area was to facilitate group activities and assist group members in undertaking joint tasks, with or without support functions. ENSs, as a joint product of two areas of research, are concerned not only with support for individual negotiators, but also for collective interaction and decision making. Negotiation processes need to be facilitated, managed, and supported. Lim and Benbasat (1992) noted the minimum requirement by drawing insights into both areas of research and stated that an ENS requires the capabilities of negotiation support systems and decision support systems. It also needs to address issues of how negotiation can be effectively conducted through electronic communication channels.

Negotiation is a ubiquitous practice wherein dependencies exist and they cannot be resolved unilaterally. Negotiations often involve various types of social entities, such as individuals, groups, and organizations. In general, negotiators involved in a negotiation are looking for a potential agreement, which will help to resolve conflicts or make arrangements for further cooperation or coordination. The achieved agreement can be assessed based on various criteria (e.g., utilities).

When users use ENSs to conduct their negotiations, they meet the definition of embedded IS use, as users have a goal, i.e., to achieve an agreement, and the best agreement if possible. The use of the system is embedded within the goal achievement processes of negotiators. There is no guarantee of an agreement in negotiations. Users have to work with other negotiators to explore and exploit the possibilities. When users negotiate with each other through an ENS, the system is a channel for their communication. The system can also provide structured process management and decision support features to facilitate the negotiation or help users to analyze issues and make decisions. Therefore, the prior analysis of embedded system use is applicable to examine how users may assess their ENS use.

The research model

The current study is interested in understanding how users assess their e-negotiation experience if their use of an ENS is conceptualized as a case of embedded systems use. The users' actual use behaviors of the system will not be considered as it is difficult to pin down which actions undertaken by users would help them to achieve better agreements. During negotiations, users exercise their freedom to make choices and interact with each other given their mutual dependencies. Their use of the system is a means to the end, i.e., to achieve an agreement. A research model is presented in Figure 2. The main structure of the model is composed of three constructs, i.e., users' satisfaction with achievement (SA), satisfaction with

technology interaction (STI), and perceived usefulness of the system (PU). Three hypotheses are proposed following the prior analysis of embedded system use.

H1a: Users' satisfaction with achievement will positively influence their satisfaction with technology interaction.

H1b: Users' satisfaction with achievement will positively influence their perceived usefulness of the system.

H1c: Users' satisfaction with technology interaction will positively influence their perceived usefulness of the system.
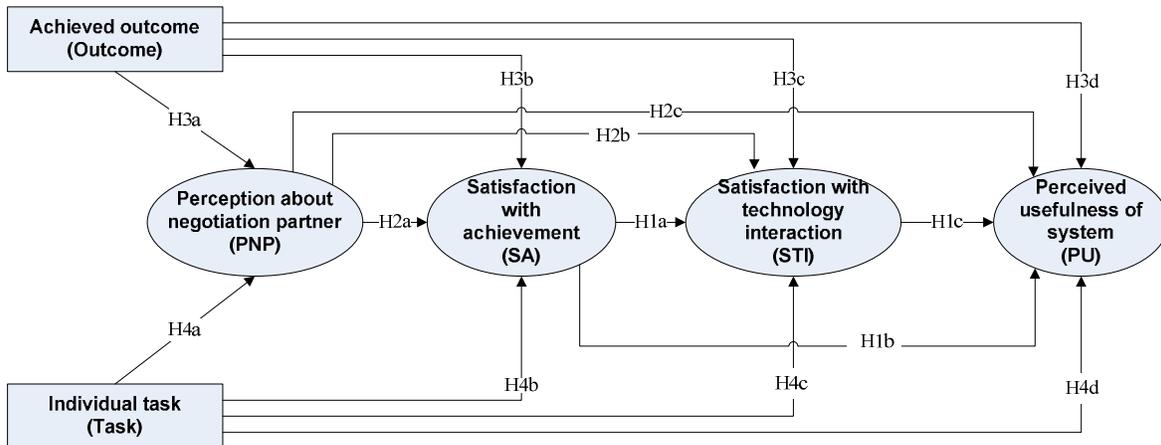

Figure 2: a research model of user evaluation of e-negotiation

Users of ENS need to engage in social interactions. Each negotiator needs to negotiate with at least one other partner. Users' perceptions of their partners (i.e., a type of social-psychological impact) may influence their assessment negotiation on multiple aspects. In negotiations, negotiators need to address both own and partners' concerns. Thus, certain behaviors (e.g., honest vs. deceptive) are often deemed to be either positive or negative for negotiations. In order to examine the role of social psychological impacts on user evaluation of system, three hypotheses are proposed based on users' perceptions about their negotiation partner.

H2a: Users' positive perceptions about negotiation partner will positively influence their satisfaction with achievement.

H2b: Users' positive perceptions about negotiation partner will positively influence their satisfaction with technology interaction.

H2c: Users' positive perceptions about negotiation partner will positively influence their perceived usefulness of system.

A distinctive feature of the conceptualization of embedded system use is that the performance achieved by users will be a significant factor influencing their assessment. In contrast to traditional IS use research that put performance as a dependant variable, the current study put performance on the independent variable side. Four hypotheses are proposed to examine the influence of achieved outcome (e.g., the value of agreement).

H3a: Users' achieved outcome will positively influence their perception of negotiation partner.

H3b: Users' achieved outcome will positively influence their satisfaction with achievement.

H3c: Users' achieved outcome will positively influence their satisfaction with technology interaction.

H3d: Users' achieved outcome will positively influence their perceived usefulness of system.

In a negotiation, users are engaged in a task from the individual perspective. The individual task may influence individuals in multiple ways. Within the core of individual task is a set of negotiated issues, with which negotiators need to work. Given the negotiation issues, users may develop distinctive preferences, which will guide negotiators choices and then influence negotiation outcomes. In order to examine the influence of individual task on users' assessment e-negotiations, four hypotheses are proposed.

H4a: The individual tasks of users will have an influence on their perception of negotiation partner.

H4b: The individual tasks of users will have an influence on their satisfaction with achievement.

H4c: The individual tasks of users will have an influence on their satisfaction with technology interaction.

H4d: The individual tasks of users will have an influence on their perceived usefulness of system.

Methodology

Experiment and data collection

To test the research model, an online experiment was conducted. The experiment adopted an e-negotiation system, Inspire (http://interneg.concordia.ca/inspire), which supports bilateral negotiations. A business case was used to provide the negotiation context and task. The case involved a contract negotiation between an agent representing an artist (i.e., the seller side) and a manager representing an entertainment company (i.e., the buyer side). The contract was comprised of four issues: (1) number of new songs, (2) royalties for CDs, (3) number of promotional concerts, and (4) contract signing bonus. Each issue has three to five options to choose from. Every contract package to be negotiated is a particular combination of one option from each issue. Neither party was allowed to propose new issues or options. The case information was divided into two parts: general and confidential information. All participants were provided with the same general information which describes the parties involved in the negotiation and the negotiation issues. The confidential information was conveyed in both text and graphs the interests of the seller and buyer respectively. The confidential information provided to the buyer and seller sides is respectively presented in Appendices A1 and A2. The relative importance of the issues and options was manipulated so that the buyer and seller have opportunities to improve joint gain.

Sample feature	Statistics
Total number of participants	278
Number of effective samples	207
Gender	Male: 96; female: 104, missing data: 7
Number of participant in groups	Austria 1: 65; Austria 2: 69; Portland: 13; Taiwan: 48; U.S.A: 3; Canada: 9.
Prior experience of using negotiation support system	Yes: 9; no: 198
Self-ranked knowledge of negotiation (1 to 7 to indicate the levels from novice to expert)	Level 1:38; Level 2:37; Level 3:36; Level 4:42; Level 5:23; Level 6:14 ; missing data: 7
Prior experience with negotiation experiment	Yes: 28; no:172; missing data: 7

Table 1: The descriptive statistics of samples

Based on the confidential information, users needed to specify their preferences in a form of utility using the system. Users need to assign a numerical value for each issue and its options. The system uses these values to calculate a rating for each issue-option package. Users were paired into dyads and through the system, communicated with each other using free-text messages. The progress of negotiations and the exchanged offers were provided to users, along with a graphical display support. After an initial agreement, if it was not Parento optimal, users can choose whether to proceed to a post-settlement stage in order to improve the agreement.

In total, there were 278 participants. All of them were students mostly between the ages of 20 to 30. They were from six classes in four universities located in Europe, North America, and Asia. Two classes were in

Austria and one class each in Canada, Poland, U.S.A., and Taiwan. The participants were given three weeks to complete negotiations; however, they could finish earlier if they reach an agreement. After the negotiations were ended, the participants were invited to fill in an online questionnaire which contained questions measuring the four subjective construct in the research model. On a voluntary basis, 207 complete sets of responses to the questionnaire were obtained. Descriptive statistics of the samples are provided in Table1.

Measurements

The manipulation of individual tasks was conducted only in terms of complexity. Other potential influences were controlled. For instance, parties represented by users may have relative power over each other that will influence users' choices and negotiation outcomes. In the current experiment, the negotiation was in dyads, which were supposed to provide each negotiator with an equal social position. The negotiators used pseudo names, which were carefully selected to reflect no cultural and gender information. The complexity of individual tasks was manipulated only by giving to buyers and sellers different pairs of inconsistent natural option order and preferential order. Buyers had two pairs (i.e., number of songs and royalties of CDs) that have inconsistent natural option and preferential order. Sellers only have one pair (i.e., number of songs). After receiving relative importance of negotiation issues and options, users could determine their own utilities. Given the experimental settings, it is expected that the influence of individual task would come only from the nature of negotiation issues and options, which were manipulated.

The achieved negotiation outcome for each individual negotiator was measured in terms of their utility value, which was calculated by an additive compensatory function based on the preferences specified by the users. It needs to note that the achieved utilities for both users in a dyad would be zero if no agreement was reached.

In total, seven set of questions were used to capture users' subjective assessment. Five sets of items were used to measure users' satisfaction with outcome, self-performance, information, communication, and process. One set was used to measure users' perceived usefulness of the system. One set was used to measure users' perception about their negotiation partner in the dyads. The instrument was developed in accordance to the guidelines of Straub*, et al.* (2004). The factor structure and the items contained in questionnaires that were administered in the experiment are presented in Table 2. The five sets of items measuring users' satisfaction are constructed into two secondary reflective factors. Users' satisfaction with achievement was assessed with users' satisfaction with outcome and self-performance as first order factor indicators. Users' satisfaction with technology interaction was assessed with users' satisfaction with communication, information and process as first order factor indicators. More details will be discussed in the scale validation section.

Results

Manipulation checks

Manipulation checks were conducted for the experiment. The first manipulation check was to examine whether the achieved outcome by users will differ given the parties that they represented. Since users determined their own utilities, no significant effect was expected, although the relative importance of issues and options were provided to users. A comparison between two groups divided by the two parties confirmed the expectation. Second, users were asked about their perceived ease of understanding of their tasks before the negotiation. The comparison between two parties as groups showed no significant difference. Therefore, the results show that the manipulation effects were obtained.

Scale validation

The potential effects of demographic variables on the subjective measures were examined at the very beginning. Aside from the variables presented in the methodology section, other demographic variables included participants' spoken languages, English proficiency, and the country of residence etc. Multivariate analysis of variance (MANOVA) was used for this task. No significant effect of each demographic variable on the set of subjective measures was found. After this initial examination, a

confirmatory factor analysis was conducted. The initial model contains 27 indicators, which are constructed into seven first order factors and two second order factors. The two second order factors are users' satisfaction with achievement and technology interaction. The details of the model structure can be found in Table 2. There were 207 observations in this experiment. The sample size is greater than the requirement of five observations per item. The software EQS 6.1 was used to test the factor model, with the maximum-likelihood method plus the robust option. The fit indices of the initial model showed a poor fit (see Table 3). A further refining the factor model was conducted. In total, six items were removed. One item was removed from satisfaction with communication, and the other five were removed from the perception about negotiation partner. During the refining process, both the statistic indices and face validity of the instruments were simultaneously checked. The final factor model showed an improvement on the indices of goodness of fit and those of residuals of errors (see Table 3). All indices meet the recommended cut-off points.

The reliability of the scales was assessed by examining the reliability coefficient Rho (Raykov 1997). All the values of the coefficient were greater than 0.7 which indicates a good coherent reliability of the measurement of factors. The discriminant validity of the scales was assessed by examining AVEs (Average Variance Extracted) of the factors. The values of AVE and shared variance are reported in Table 2. All the values of AVE are above the recommended value of 0.5 (MacKenzie *et al.* 2011).

	Items	Factor Loading		Rho	AVE
		Second order	First order		
Satisfaction with achievement	**Satisfaction with outcome:**			0.88	0.59
	Now that the negotiation has concluded, I can say that...				
	I am satisfied with the results that I achieved.	0.80	0.90		
	I am satisfied with the results as compared to my expectations.		0.91		
	I am satisfied that the results were favorable for me.		0.87		
	Satisfaction with self-performance:				
	I am satisfied with my own performance in this negotiation.	0.73	0.84		
	I was confident in performing the negotiation tasks.		0.71		
	I adequately represented my client.		0.80		
Satisfaction with technology interaction	**Satisfaction with communication:**			0.88	0.63
	*I felt that it was easy to communicate with my counterpart.	0.82			
	I could write freely to my counterpart.		0.84		
	I was able to express myself effectively.		0.90		
	Satisfaction with information:				
	I felt that the information provided by the system was sufficient to conduct the negotiation.	0.81	0.73		
	I felt that the information was represented in a format that I felt comfortable with.		0.83		
	I felt that the information exchanged through the system could be relied upon.		0.73		
	Satisfaction with process:				
	I feel the negotiation process was efficient in performing my tasks.	0.75	0.94		
	I am pleased with the effectiveness of the negotiation process.		0.92		
	I feel the negotiation process was adequate for this business scenario.		0.72		

Perceived usefulness of the system		0.85	0.65
I felt that the system helped to achieve my objectives.	0.84	
I felt that the system helped to improve my performance.	0.84	
I felt that the system helped to obtain faster results.	0.75	
Perception about negotiation partner: nine questions of 7-point bi-polar scale What can you say about your counterpart in the negotiations?		0.86	0.61
* Uninformative __ __ __ __ __ __ __ Informative		
* Push-over __ __ __ __ __ __ __ Persuasive		
Deceptive __ __ __ __ __ __ __ Honest	0.76	
* Exploitative __ __ __ __ __ __ __ Accommodating		
Competitive __ __ __ __ __ __ __ Cooperative	0.68	
Untrustworthy __ __ __ __ __ __ __ Trustworthy	0.86	
* Unlikable __ __ __ __ __ __ __ Likable		
Unfair __ __ __ __ __ __ __ Fair	0.82	
* Rigid __ __ __ __ __ __ __ Flexible		

1. Users' satisfaction and perceived usefulness of system were measured by questions of 7-point Likert-scale with two anchors varying from "Strong disagree" to "Strongly agree"

2. * The items were removed from the initial factor model.

Table 2: The factor loading, reliability, and validity of subjective constructs

Indices	Initial Model	Final Model	Cut-off Point
NFI (Bentler-Bonett Normed Fit Index)	0.772	0.832	NFI >0.90 good fit(Salisbury *et al.* 2002); NFI >0.8 reasonable fit (Hadjistavropoulos *et al.* 1999; Hair *et al.* 1998)
CFI (Comparative Fit Index)	0.888	0.936	CFI>0.90 (Bentler and Bonett 1980; Salisbury *et al.* 2002).
IFI	0.890	0.938	IFI >0.90 good fit (Bollen 1989; Salisbury *et al.* 2002)
RMSEA (Root Mean Square Error of Approximation)	0.059	0.049	RMSEA<0.01 excellent, <0.05 good, and <0.08 reasonable fit. (MacCallum *et al.* 1996)
90% confidence interval of RMSEA	0.050~0.067	0.036~0.060	

Table3: The goodness of fit of the factor model

Research model testing

A path analysis method was adopted to test the research model as the model needs to be identifiable. A path analysis is very helpful in reducing the overall number of paths. A full structural equation model exploring all potential effect between the constructs having multiple indicators would contain too many paths. In total, the tested model included six variables, which is consistent with the research model. The sum scores of the subjective variables were used. In variance analysis, the use of sum score to represent factors is deemed to be appropriate or even a preferred technique (DiStefano *et al.* 2009). The individual task is categorical variable. The model treated the variable as a numeric variable (i.e., buyer's task was coded into 1 and seller' task into 0). The coding of the categorical variable reflects the buyers had a more complex task than sellers. Categorical variables can also be used to conduct between-group tests mainly

for moderating effect. However, it will be more useful for the current study to examine the effect of this variable along with others. The descriptive statistics of the variables contained in the research model, except task, are reported in Table 4. The variable of task is excluded, because it is a categorical variable. The correlations of the five variables are presented in Table 5.

Variable	Minimum	Maximum	Mean	Std. Deviation	Variance
Outcome	0	100	72.99	22.696	515.102
PNP	-11.00	12.00	3.9469	4.66677	21.779
SA	-16.00	18.00	9.3478	5.69916	32.480
STI	-16.00	24.00	12.5024	7.32722	53.688
PU	-6.00	9.00	3.7729	3.28894	10.817

Table 4: The descriptive statistics of variables in the research mode

	Outcome	PNP	SA	STI
PNP	.346**			
SA	.465**	.448**		
STI	.144*	.517**	.594**	
PU	.149*	.320**	.424**	.605**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5: The correlations of variables in the research model

The software EQS 6.1 was used for the path analysis of the research model testing. The maximum-likelihood method with robust option was used. The results showed a very good fit (Chi-square = 0.421 with 1 degree of freedom, probability value for chi-square = 0.514, NFI = 0.998, CFI = 1, IFI = 1.003, RMSEA =0, and 90% confidence interval of RMSEA is between 0 and 0.159). The coefficients for the paths contained in the model are presented in Figure 5. The significant paths (at 5% significant level) are highlighted.
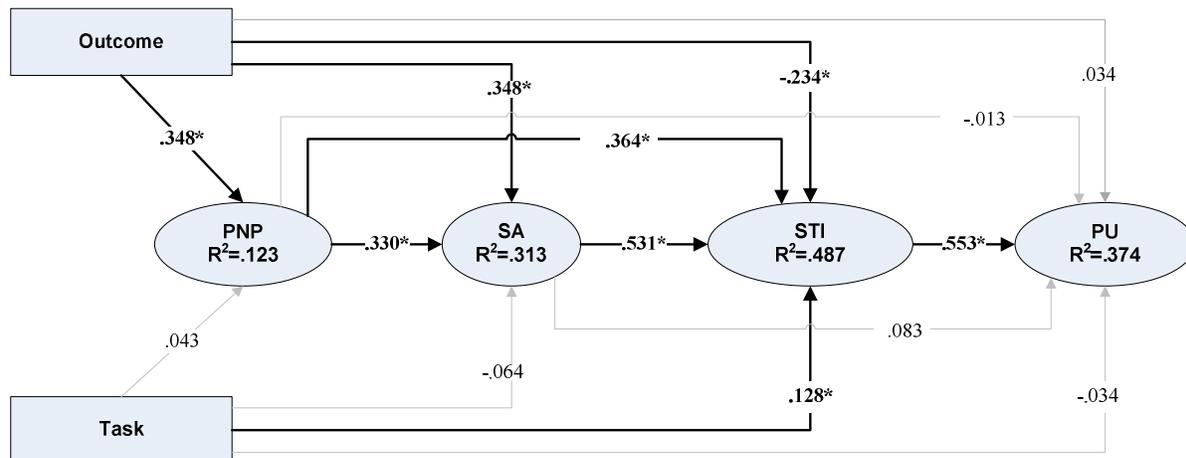
Statistics significant at the 5% level are marked *.

Figure 3: The results of testing the research model

Discussion

The results of testing the research model show several interesting findings. First, the relationships of the three main constructs are consistent with the prior theoretical analysis of embedded system use and user

evaluation. Users' satisfaction with their achievement positively influences their satisfaction with technology interaction, which in turn influences users' perceived usefulness of the system. The direct effect from users' satisfaction with achievement on their perceived usefulness of the system is not significant. These results show a clear evaluation sequence of how users assess the system which is involved in their goal achieving processes. When a system is embedded inside users' goal achievement processes, the purpose of using the system is secondary. To achieve their goals and obtain the best outcomes given the evaluative criteria is primary. Therefore, the assessment sequence postulated in the prior analysis is well supported.

Second, users' satisfaction with technology interaction has a full mediation effect on their perceived usefulness of the system. This finding is surprising, but also reasonable according to the prior analysis of the embedded system use. When users are pursuing their goals while using a system, they need something from the system. The effect resulting from the user-system interaction is not solely determined by either the users or the system; rather, it is jointly influenced by what objectives users need to achieve and what the system is able to provide. Users' assessment of technology interaction captures how well they feel about interacting with the system. Without interaction, the assessment of the contribution of system is meaningless. Thus, the full mediation effect is very possible.

Third, users' perception of their negotiation partner shows a significant effect on both their satisfaction with achievement and technology interaction. Negotiation is a type of social interaction involving social entities. The mutual influences of users were rarely examined in IS use research. Traditional IS use and user evaluation research focus on the paired relationship between a user and the technology, i.e., the social influences between users are usually abstracted away. The results of the current study show that this assumption needs to be re-considered. Users are residents of a social system. Social psychological impacts may result from using a system if multiple users are involved. However, if users' social psychological impacts are considered, the research of IS use will become much more complex. How we can conceptualize users' social psychological impacts and how we can integrate it into the research of IS use and user evaluation becomes an important issue. The issues may become particularly important in organizational contexts, in which ISs often embody social structures, enforce social rules, and connect users with different roles (DeSanctis and Poole 1994). Given the complexity of organizational and system structures, how users influence each other is a really challenging issue.

Fourth, the results show that the negotiation outcome achieved by individual users has profound influences. It significantly influences users' perceptions of their negotiation partner, satisfaction with achievement, and satisfaction with technology interaction. The direct effect of negotiation outcome on users' satisfaction with technology interaction is negative, which is contrary to the expectation. The sum effect of negotiation outcome on users' satisfaction with technology interaction was then calculated. The sum effect is positive. The result indicates that users' satisfaction of technology interaction may be overly influenced by the other subjective antecedents. The negative direct effect may be also due to the fact that utilities achieved by users do not nicely fit to a normal distribution. The research model treats negotiation outcome as a regular variable.

A debatable issue needs to be noted. In a negotiation scenario, negotiators are presented with a goal to obtain the best outcome. According to goal achievement theory (Pintrich 2000), the better the outcome is, the better the users may perceive or assess the negotiation from multiple aspects. From the psychological perspective, it is reasonable that the achieved outcome influences users' perceptions and evaluations on multiple aspects in negotiation. However, the issue may become debatable if we consider the effect of achieved outcome from the negotiation analysis perspective (Raiffa *et al.* 2002). According to negotiation analysis, the achieved outcome is essentially influenced by individual preferences, i.e., the negotiation outcome of a negotiation instance can be determined given the individual preferences, if all negotiators are rational and patient. From the negotiation analysis perspective, users and the technology used may make little contribution to the negotiation outcome. Therefore, it is questionable whether users are able to fairly assess the contribution of the system in a scenario of embedded system use. In addition, users' assessment is also influenced by their negotiation partners. This finding makes it more debatable, as social psychological impacts on users influence their assessment.

Fifth, the effect of the individual task shows a significant effect on users' satisfaction with technology interaction. The effect indicates that buyers evaluated the technology interaction better than the sellers. For buyers, the values of two issues are not straightforward given the option values of each issue. Thus,

the buyers may need more support from the system and the system may better satisfy them with its decision support features.

Overall, the results yielded from the testing of the research model well support the theoretical analysis of embedded system use and users assessment. However, the model testing is based on users' use of an ENS, which is a particular type of system. The question is how much this research scenario may shed light on general IS use research which is interested in IS use both within or between organizations. It will be helpful to examine several features of the e-negotiation setting in the current study in order to reply to such an inquiry. First, according to negotiation theory negotiators are often expected to be self-interested. Self-interested behaviors are influential not only in negotiation theory, but also other fields such as economics and organization theory. For instance, the self-interested behavior often underlies the design of incentives. Self-interested behavior is also fundamental to both TAM and TTF. Both theories expected that the used technology needs to make contributions to the individual job or task. The instruments used for both theories support this observation.

Second, the current study constructed a goal achievement context for negotiation, i.e., users' need to achieve the best possible agreement. Goal achievement is also quite common in organizational contexts or our daily life. For instance, a user usually needs to fulfill her job requirements. This goal of users underlies all three theories of TAM, TTF, and IS success, although all of them do not explicitly specify the types of goals that users may pursue. Not explicitly specifying users' goal has its strength as goals are often complex. Organizations and individuals usually have multiple or hierarchical goals. Thus, it is difficult to clarify the type of goals and the relationship of multiple goals. The robustness of the three theories partially builds on the strategy of leaving the types of users' goals out of the models. However, the important influence of users' goals has been somewhat under-investigated in IS research.

Third, the current study clearly set up the system use in order to resolve conflicts. Conflict is universal in all kinds of social contexts. It is a fact of our life. Negotiation is a robust social mechanism that is frequently used to resolve conflicts. In negotiations, negotiators exercise their freedom to make choices. Conflict management is also an important and long lasting theme. How conflict might influence users' use and assessment of a system is still rarely studied. In an organization, users of a system often have conflictive interests about its use. For instance, the three cases studied by Lapointe and Rivard (2005) for system resistance showed that multiple stakeholders of a healthcare system (i.e., physicians, administration, and nurses) had conflicting interests in using the system. The distinctive approaches adopted to solve conflict lead to either failure or success of the system. Nowadays, information systems become more and more complex when they extend their scopes and involve more and more users. Some systems implemented or even enforced social norms and rules. Thus, the systems have more influence upon the relations between users. Users' participation of the system development is usually deemed as a good solution to solve inter-user and inter-stakeholder conflicts during the design and implantation stage. However, it has been rarely studied how users may respond to actual system use when they have conflicting interests with other users or with the system. In an e-negotiation context, some system features are offered for users to help them resolve conflicts. In contrast, an organizational system usually will not consider these features. The current study of e-negotiation builds upon a non-cooperative problem basis, in which the improvement of joint outcome is not enforced by the context. In an organizational context, a cooperative approach to problem solving is often preferred. How a system needs to be designed to encourage different types of behaviors of users is a challenging question.

It is impossible to provide enough evidence to verify the validity of the proposed relationships among the constructs in a scenario of embedded system use by conducting an experimental test of e-negotiation. However, it will be helpful to ask what we may need to change, if the proposed model is valid by chance or on reason. There are several issues that need to be reflected upon. The first issue concerns the relationship between system and users. The IS success model suggests a causal relationship between system and users. It is implicitly assumed that systems differ in terms of their quality (e.g., system and information quality). Thus the systems may be differently used and assessed by users, which in turn leads to increased individual and organizational impacts. From an embedded system use perspective, the individual impacts (e.g., the achieved individual outcome and the influence of other users) on users will influence how they assess the role of system. From a user perspective, the individual impacts are often factual, based on the justifiable contributions of system. The rational is quite simple. If we think from the

users' side, we may ask questions such as, what happened when I use the system, how well did I do given the task, and what did the system offer to me?

The second question concerns the relation between system use and user performance. In IS field, the relationship between system use and individual performance was conceptualized differently. For instance, the IS success model proposes that the quality of the system is a fundamental factor. In contrast, the TTF model deems the relationship slightly different. The TTF does not emphasize any causal relationship between system quality and the use of system. In contrast, it argues that the fit of the system and the task undertaken by users is the main factor leading to the improvement of individual performance. Following these two theories, individual performance is quite often treated as a dependent variable. The conceptualization of embedded system use in current study attempts to understand how users may assess their use of a system. Similar to TTF, it also heavily relies on users' subjective evaluations. In contrast, however, it locates the achieved performance at the independent variable side, i.e., the achieved individual performance will impact on users' perceptions and attitudes about their use of the system.

The third question we need to ask is how reliably or fairly users are able to assess their used technology. User evaluation of system use is a frequently used technique to assess the effectiveness of the system. The relation between user evaluation and individual performance were a main concern of IS use research. The TTF model is a good example. From a manager or designer perspective, the relationship proposed by TTF is desirable. The reasons are at least twofold. First, if the quality of a system can better satisfy users, users would be able to perceive it. Second, the quality basis offered by the system will be at least not bad if users are better satisfied when using it. However, the theoretical rationale of the relation is weak. The relation between users' evaluation of the system and their performance is debatable. The relationship between system use and performance lacks empirical support. From a user perspective, the achieved outcome may influence their perceptions and attitude of the system use. This causal relationship is more reasonable for users. If the relationship proposed by the current study is reasonable, the practice of using users' subjective evaluation of system need to be reconsidered, as user' achievement may be evaluated on different criteria and by different means. The current study provides empirical evidence that users' subjective evaluation of system use is influenced by their achieved outcomes and their social psychological perceptions of other users.

Conclusion and implications

Focusing on the users' perspective, the current study conceptualized system use to be embedded within users' goal achievement processes. When system use is embedded, the outcome achieved by users will influence their assessment of multiple aspects of system use. The current study proposed a three sequential tier model of users' assessment when using a system. The theoretical model was tested by conducting an experiment with e-negotiations. The results of the current study well support the proposed theoretical model. In addition, the results also show that social psychological impacts on users may also influence users' assessment.

There are multiple implications resulting from the current study. First, it proposed a new way to conceptualize system use and offered competing view about system use and user valuation. If the concept of embedded system is adopted, the relationships of several key constructs in IS field need to be reconsidered, e.g., user system relationship and system use and individual performance relationship. Second, it may provide a new insight for IS research to look at system use and IS success. Traditionally, focusing on the designers or managers is preferred in IS research about system use and user evaluation. Efforts have been made to find the relationship between system use and individual impacts or organizational impacts. However, system use may be better understood from the users' perspective, examining how they may look at and respond to system use. Third, managers may be better informed if system use is considered to be embedded. The research results of the current study shows that users are influenced by both their achieve outcome and other users. Thus, the success of IS may depend on how the employees job are designed and how they are evaluated. The alignment of the organizational policies may influence how employees assess their use of technology.

The limitation of the current study has been discussed. Although it only tested its theoretical analysis in one experiment with a particular type of system, its conceptualization makes a lot of sense from the users' perspective. It also offers opportunities to IS research about system use and user evaluation, such as

examining the influence of social contexts, construction of users' goals, and social psychological impacts. Future studies can provide useful insights if the IS use issue can be considered from the users' perspective. In addition, the current study does not consider the potential influence of culture on users' assessment of system use. The experimental design of the current study did not consider culture, although the study involved users from America, Europe, and Asia. The influence of culture can be an interesting topic in future research as well.

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Appendices

A1. The issues, options, and preliminary preferences provided to the buyer

Importance of the **four issues**:

It is clear that the most important issue is the **number of promotional concerts**. This is because successful concerts are critical to the artists' popularity and approval ratings. Without the concerts the agency cannot establish the artist in a particular market.

Almost as important an issue is the **number of new songs**. Obviously the artist has to produce new songs to be recognized and accepted.

Royalties for CDs are less important; some managers note that they are only half as important as the number of songs.

The **contract signing bonus** is the least important issue. It is less important than the royalties for CDs. This is because the agency views a contract as an investment opportunity that can bring in many of millions of dollars. The bonus size is seen as a token of appreciation, but obviously within limits.

The illustration of the issue importance is given in the figure.
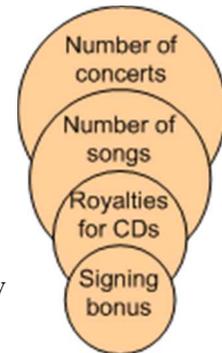
1. **Number of promotional concerts**
   This is the most important issue for the management. The more concerts the better for WorldMusic. From your discussion with the management, it follows that 5 concerts is significantly worse than 6 and more. Less than 5 makes little sense in the entertainment business.
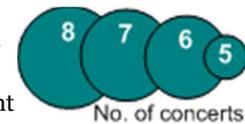
2. **Number of new songs**
   It is a long established practice that too few songs are disastrous but too many are also not profitable. The best number of songs is 14; 14 songs make two full CDs.
   15 songs are worse than 14 because it is considered somewhat too many. 13 songs are almost as good as 15.
   12 songs are worse than 13 because 13 songs allow the discarding of the worst song if necessary. Having 11 new songs is the worst option because only one CD can be produced.
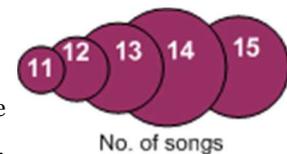
3. **Royalties for CDs**
   Royalties strongly depend on the artist's present standing. Typically, WorldMusic pays between 2.0% and 2.5% royalties. If the artist is very well known during contract signing, the royalties can go up to 3%.
   Based on the research done regarding Ms. Sonata's standing, the management considers 2.0 % the best option; 2.5% is considered somewhat too high. The management prefers 2.0% much more than 1.5% because of the artist's standing. And it makes little sense to try and save a little now and loose the artist's interest in cooperating with the agency. The research done convinced the management that 3.0% is too much.

Royalties for CDs
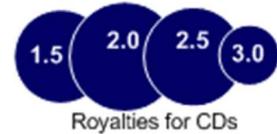
4. **Contract signing bonus**
   This issue is considered the least important, although the agency does not want to be seen as throwing money away. The management's preference is to pay less rather than more.

Contract bonus

A2. The issues, options, and preliminary preferences provided to the seller

Importance of the **four issues**:

You asked Ms. Sonata to think aloud the importance of issues. She said that this is quite easy-every issue is important to her. But, she added, she really does not want to have too many **promotional concerts**, so it is very important for her that she has as few concerts as possible.

Ms. Sonata says that she must write as many **new songs** as she can, because this is her only way to enrich her fans. This issue of new songs is equally important to the first issue, promotional concerts.

Signing bonus is less important than the first two issues. Although she would like to make money, she must remain true to herself; that is, write and sing songs.

She is the least concerned with the **royalties for CDs.**

The illustration of the issue importance is given in the figure.
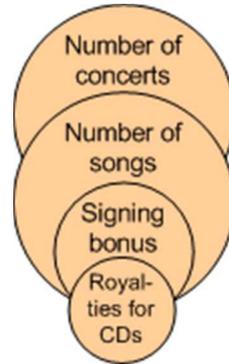
1. **Number of promotional concerts**
   This issue is very important because Ms. Sonata would rather have no concerts at all. She understands that it is not possible so her preference is the fewer concerts the better. She finds that between 5 and 7 concerts every additional concert is equally bad for her. But she considers giving 8 concerts a lot worse than 7.


No. of concerts
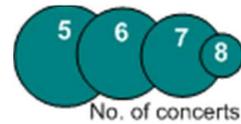
2. **Number of new songs**
   Ms. Sonata likes writing songs. After you noted that the maximum number of songs is 15 in the contract form, she was surprised. She said that the best for her would be writing 14 songs because she also writes poetry and short stories. 15 songs somewhat worse than 14, because she thinks it is a bit too many. Her preference for 13 is a little lower than 15. She added that 12 songs is barely acceptable, while 11 is not enough.

No. of songs

3. **Contract signing bonus**
   Ms. Sonata considers this issue much less important than the first two issues. This is not to say that the bonus is not important; her obvious preference is to obtain a higher bonus rather than a lower one. She notes, however, that the difference between 125 and 150 thousands dollars is greater than between 150 and 200 thousands.

Contract bonus
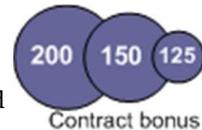
4. **Royalties for CDs**
   This is the least important issue for Ms. Sonata but-she notes-it does not mean that bonus is unimportant. She naturally prefers higher royalties rather than lower. However, her preference for 1.5% and 2.0% are much lower than her preference for 2.5% because she thinks that receiving a very lower royalty insults her musical talents. The 3.0% is obviously the best but not so different form 2.5%.

Royalties for CDs