Negotiations or Auctions: experimental comparison of two e-market mechanisms

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ABSTRACT

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During the last decade, we have witnessed the rapid development of e-commerce, which has provided opportunities for organizations to facilitate transactions, improve trade efficiency, create competitive advantage, and reduce related costs through online transactions. Various kinds of market mechanisms, such as auction, catalogue and bargaining, can be used in these interactions. The growth of e-commerce stimulates design of electronic marketplaces and market mechanisms. We therefore need to study the differences in mechanism usage and their possible impact on users and transactions.

This study compares negotiations and auctions, two principal market mechanisms, to develop a deeper understanding of their similarities and differences in e-market. The expectation is that the study will expand e-commerce knowledge to ensure the appropriate use of market mechanisms, which will further increase social welfare and better satisfy the agents with improved online transaction experiences.

Empirical testing of the entire effective sample shows that participants in e-marketplaces are driven by the goal of own utility maximization. The amount of utility that participants gain positively impacts three types of satisfaction (i.e., satisfaction with outcome, self-performance, and process). Also, no significant effect attributed to differing mechanisms is found in economic measures or agents' satisfaction. Looking only at the winners (i.e. a sub-sample group), utility also has a significantly positive

effect on participants' satisfaction. Gender as an individual characteristic is found to have a significant effect on the winners' satisfaction with outcome and self-performance. Non-winners' satisfaction with outcome is also significantly affected by mechanism type.

DEDICATION

To those people who devote themselves to research!

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LIST OF ABBREVIATIONS

B2B Business to business

CMC Computer mediated communication

EFA Exploratory factor analysis

EMs Electronic marketplaces

GDSS Group decision support system

MAAs Multi-attributes auctions

MVC The model-view-controller design pattern

NorA The project entitled "Negotiation or Auction"

NSS Negotiation support system

SAAs Single-attribute auctions

SET The social exchange theory

TAM Technology acceptance model

TRA Theory of reasoned action

UIS Users' information satisfaction

1 INTRODUCTION

1.1 Motivation and scope

During the last decade, we have witnessed the rapid development of e-commerce, which has provided opportunities for organizations to facilitate transactions, improve trade efficiency, create competitive advantage, and reduce related costs through online transactions and interaction (Litan & Rivlin, 2001). E-commerce has made the transition from a cutting-edge idea into a standard of business practice (Treese & Stewart, 2002)

Figure 1.1 depicts a commerce value chain, which consists of activities that take place between buyers and sellers (Runyon & Stewart, 1987). These interactions often start with the steps of buyers' *product discovery* or sellers' *market research*, and ends with *customer support*. In the value chain, the step of *terms negotiation* is a critical step, as it decides how social resources can be reallocated between the buyers and sellers and how their post-negotiation relationships will be maintained.

The step of *terms negotiation* can take place in either a physical or a virtual marketplace. Various kinds of market mechanisms[1], such as auction, catalogue, or bargaining, can be used in this step. The growth of e-commerce stimulates the design of electronic marketplaces[2] (EMs) (Grieger, 2003) and market mechanisms (Bichler, Field, & Werthner, 2001). We therefore need to study the differences in mechanism usage and their possible impact on users and transactions.

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[1] Please refer to Chapter 3, Section 3.3 for the definition of mechanism.

[2] EMs can be simply defined as a community resorting to electronic technology, which defines the market rules, provides infrastructure, supports different roles (e.g., suppliers and buyers) in order to facilitate the exchange. For more accurate definition, please refer to Martin (2003)

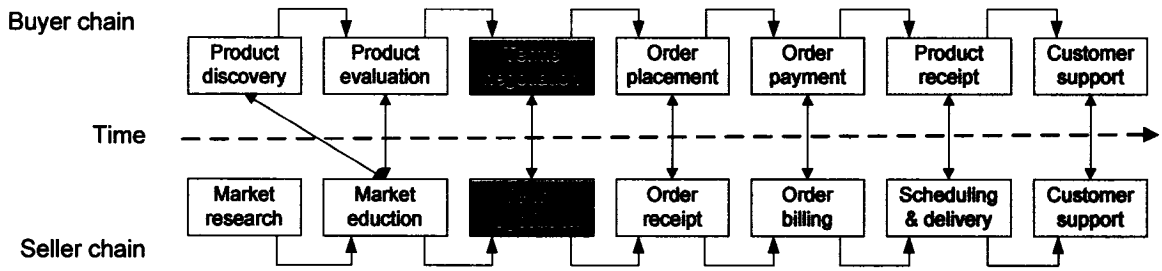

Figure 1.1: Commerce value chain (Runyon & Stewart, 1987)

This thesis presents a comparative study of negotiations and auctions, two principal market mechanisms, in order to develop a deeper understanding of their similarities and differences in e-markets. The expectation is that this study will add to our understanding of market mechanisms and their roles in e-markets. Appropriate use of market mechanisms, in turn, can further increase social welfare and better satisfy the users with improved transaction experiences.

1.2 Contributions

The current study is an exploratory work, which attempts to make the following six contributions to the e-market research.

1. It presents the reasons for and purpose of the use of a complementary research approach that integrates theories from economics, behavioral science, and psychology. Through a review of these fields, variables relevant to e-market assessment are simply organized as the inputs and outputs of a generic market exchange instance. Some important variables are identified and defined.

2. It conducts a literature review focusing on users' satisfaction, in which eight satisfaction categories are identified. The empirical test shows that three of them (i.e., satisfaction with outcome, self-performance, and process) are correlated but conceptually different.

3. It builds on the existing comparative studies of auctions and negotiations and proposes the socio-economic approach to market exchange research, which tries to integrate economic, behavioral and psychological perspectives.

4. It empirically tests the common assumption in economic theories that agents[3] in market exchange are driven by the goal of their own utility maximization. Experimental results show that the utilities gained by agents positively affect their three types of satisfaction simultaneously. This is consistent with the economic theory.

5. Given the business task specified in the experiment, this study finds no significant effect of mechanisms on economic measures and users' satisfaction in overall tests (i.e., including winners or non-winners[4] from the buyer's side).

6. In subgroup tests (i.e., among winners or non-winners), the experiment also shows that:

    (i) Gender has a significant effect on winners' satisfaction with outcome and self-performance.

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[3] If the term *artificial agent* is not used, *agent* is used to indicate a human agent or participant in market exchange

[4] who win or do not win in the given task

(ii) Mechanism has significant effect on satisfaction with outcome among non-winners.

1.3 Project NorA

This thesis reports on a study undertaken as a part of the project "Negotiation-or-Auction" (NorA). It is a joint research project involving researchers and students from the InterNeg Research Centre, Concordia University, and the Institute for Information Systems Management, University of Karlsruhe, Germany. The purpose of the project is to investigate the differences and similarities between auction and negotiation models and systems, designed and developed for use in online transactions.

1.4 The structure of the thesis

This thesis has seven chapters. Chapter 2 briefly reviews negotiation and auction research, focusing on typology, research approaches, and main findings. Chapter 3 discusses the need for a complementary approach to market research and the objectives for its implementation. In accordance with this approach, diverse kinds of variables related to e-market assessment are defined and discussed. Chapter 4 presents the research questions and model. A description of the methodology, including the experiment design, experiment procedure, and measurement follows in Chapter 5. Next, in Chapter 6, the statistical analysis of the experimental data is presented. Finally, in Chapter 7, the thesis concludes with several findings and a discussion of their implications.

2 NEGOTIATIONS AND AUCTIONS

Negotiations and auctions are studied in a wide variety of domains, such as economics, behavioral science, law, politics, computer science, and information system (IS). In this chapter, we first introduce the various types of mechanisms used in e-market and the typology that is applicable to negotiations and auctions. Following that is the introduction of negotiations and auctions research, which focuses on the research approaches and main findings. Finally, comparative studies of auctions and negotiations are reviewed.

2.1 Market mechanisms and typology

Market mechanisms may be broadly categorized into catalogues, double-sided auctions, single-sided auctions and negotiations.

A catalogue is a typical fixed-price mechanism. It is effective in terms of reducing search time and bargaining costs. A simple catalogue on the web consists of the descriptions and prices of products for purchase (Bichler, Field, & Werthner, 2001). A typical catalogue provider is Amazon.com, which sells books, CD's, and other collections.

Double-sided auction is another effective mechanism, which is notable for its aim to match the demand and supply to the greatest possible extent by allowing bidding from both the buyer and seller sides. Well-known examples of double auctions are the New York Stock Exchange and the Toronto Stock Exchange.

In this study, the primary mechanisms of interest are single-sided auctions and negotiations. Negotiations and auctions[5] can be classified according to the number of parties and the number of issues[6] concerning the goods involved. Figure 2.1 depicts the relationship between increasing market complexity and increasing the number of parties and issues. Auctions are designed for the transactions between many parties and are inappropriate for situations where there is only one buyer and one seller. Compared with auctions, negotiations are more general mechanisms that can deal with all the party and issue variations.

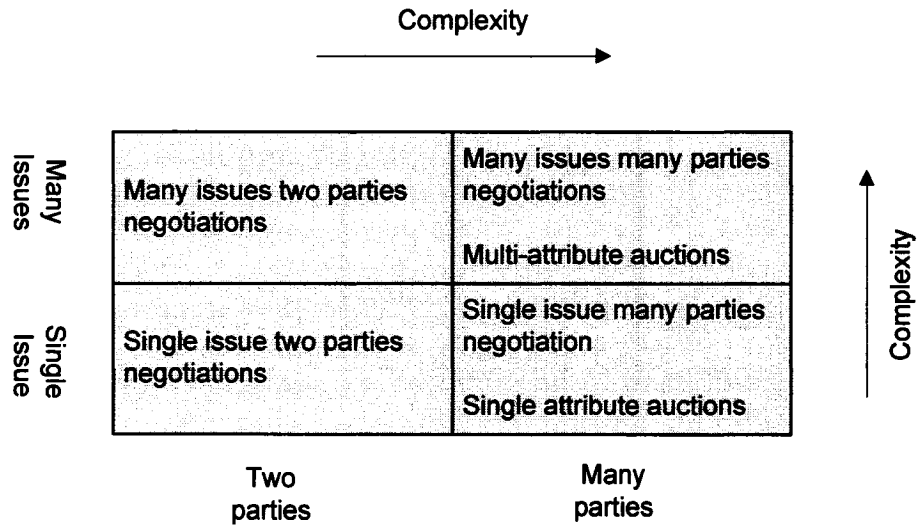

Figure 2.1: Topology of market mechanism

Standard auction theories mostly deal with one seller and many buyers, while reverse auctions deal with the cases of one buyer and many sellers. It is easy to mathematically

[5] The term *auction* will be used to indicate a single-side auction in the reminder of this text

[6] The term "attributes" used in auctions is equivalent to "issues" used in negotiations. The term "issue" was used in auction literature, while "attribute" is rarely used in negotiation literature. Thus, we would like to use the term "issue" in this typology description

invert standard auction theories to reverse auction cases. Thus, reverse auctions (also known as procurement auctions) will not be reviewed.

2.1.1 Single-attribute auctions

There are four standard types of *single-attribute auctions* (SAAs) (Kagel, 1995; Klemperer, 1999; McAfee & McMillan, 1987):

1. *English auction:* This is an open-cry auction, in which the price increases until one bidder remains. The winner pays the final price.

2. *Second-price sealed-bid auction* (Vickrey auction): Each bidder gives only one sealed bid. The bidder with the highest bid price wins the auction and pays the second highest price.

3. *Dutch auction*: The auction starts at a very high price and reduces the price continuously until the first bidder calls out. This bidder wins the auction and pays the called price.

4. *First-price sealed-bid auction*: Each bidder submits only one sealed bid. The bidder with the highest price wins the auction and pays the price s/he bids.

Currently, SAAs proliferate on the Internet. These mechanisms involve just one issue, typically, price. Thus, SAAs exhibit limitations to both buyers and sellers when they need to trade off different attributes, such as quality and price. This often leads to an inefficient agreement (Strecker, 2004). In addition, using one attribute as the only decisive factor is a rare situation for business to business (B2B) transactions (Teich *et al.*, 2003).

2.1.2 Multi-attribute auctions

The limitations of SAAs motivated researchers and practitioners to look for more flexible mechanisms, such as *multi-attributes auctions* (MAAs). The studies of Che (1993), Milgrom (2000), and Beil (2003) establish the theoretical foundation of MAAs. MAAs are distinguished from SAAs by their scoring functions or rules, which are not necessarily explicit and are often arbitrary or even unknown to the bidders. This feature allows buyers and sellers to integrate and trade off multiple attributes (e.g., quantity, delivery, and quality) (Strecker, 2004). Some MAA types discussed in literature follow:

English auction: This is an open-cry auction, in which the rating of bids increases until only one bidder remains. At the end of the auction, the winner is required to fulfill the exact specifications[7] of the best bid (Beil & Wein, 2003; Bichler, 2000; Strecker, 2004).

Second-score auction (second score sealed-bid or Vickrey auction): Each bidder submits only one sealed bid. The bidder whose bid scores the highest (i.e., the most favorable bid for the seller), wins the auction. While non-price attributes are held constant, the winning bidder will receive a price bonus according to the difference between his/her score and the second highest score (Bichler, 2000; Che, 1993; Milgrom, 2000; Strecker, 2004).

Second preferred offer auction: Each bidder submits only one sealed bid. The bidder with the highest score wins the auction, with the condition that the specifications of the winning bid must exactly match all the attributes of the second highest bid (Che, 1993).

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[7] Specification is a package that integrates all related attributes, which accurately describes the conditions or requirements, such as the amount, materials, or services, to make the deal.

First-score auction: Each bidder submits only one sealed bid. The bidder who submits the bid with the highest score wins the auction and is required to fulfill exactly the specifications of his/her bid (Bichler, 2000; Che, 1993; Milgrom, 2000; Strecker, 2004).

A common problem in all MAAs pertains to the exchange of additional information (unlike single-attribute auctions). From the economic rationality perspective, an auctioneer needs to provide the bidders with all relevant information, that is, the scoring system (i.e., the utility or value functions). This may allow a bidder to choose a bid among his/her indifferent alternatives (i.e., which yield the same score for this bidder) while it yields the highest score to the transaction owner[8]. Because such information contains the owner's preferences, s/he may be reluctant to make it public. By contrast, negotiations allow for the exchange of informal information, which enables the agent to reveal his/her preferences flexibly.

2.1.3 Negotiations

There are four types of negotiations, which vary according to how many parties they involve and how many issues they deal with. Each type of negotiation has different features and ability to deal with the complexity as the number of issues and parties increases. These negotiation types will now be discussed.

Two-party single-issue negotiations (also known as typical distributive negotiations) require participants to find agreement despite possibly having very divergent interests on one issue (Raiffa, 1982). They are often described as a pie-sharing case, where one party

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[8] The transaction owner is the party who sets up an exchange transaction.

gains part of the common value while the other party gets the remainder. A necessary condition for an agreement in this kind of negotiation is the existence of the zone of possible agreement, which lies between the reservation values[9] of both parties on the given issue, as Figure2.2 depicts.

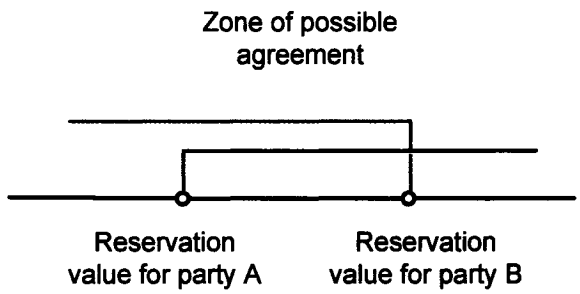


Figure 2.2: Zone of possible agreement in single-issue negotiation

Many-party single-issue negotiations are formed when additional parties are introduced into a two-party single-issue negotiation. The addition of other parties increases the number of possible outcome alternatives, possibility of more efficient allocation of social resources, and complexity of the transaction. For example, a buyer negotiating price with many suppliers in a procurement case can switch to another supplier, if the reservation price does not overlap. Conversely, the suppliers may coalesce in order to resist the price maneuvers of the buyer.

In another case, when the buyer and the seller cannot reach an agreement by their own efforts, a mediator can be introduced to help the negotiation. The introduced third party is

[9] The maximum value of the issue that a buyer, or the minimum value of the issue that a seller, is willing to make a deal with.

not a competitor on either side, but plays a mediating role to facilitate an agreement in the transaction.

When any other issue is introduced into a two-party single-issue negotiation, the negotiation becomes a *two-party many-issues negotiation*. This also increases the number of possible alternatives and consequently the complexity of the transaction. For example, in a two-party single-issue negotiation, the maximum price the buyer may offer is $9 but the minimum that the seller may accept is $10. In this case, they will not be able to make a deal because there is no zone of agreement. However, if the buyer says "I can pay you $10 in one week", will the seller agree? In the second case, the issue of postponed payment is introduced, so the negotiation no longer concerns a single issue. In many-issue negotiations, the parties have a chance to trade off between different issues, explore more alternatives, make concessions, and increase the joint gain. This is often described as integrative negotiation (Raiffa, 1982)

Many-party many-issues negotiation is the most complex type of negotiation. The issues and parties involved in such a negotiation can be independent of or dependent on each other. Multiple parties can form coalitions or groups. The groups can split, merge, or re-form into other groups. Each party can have different preferences concerning various kinds of issues. The preferences affect the relationships between individuals, the individuals and the group they belong to, or groups and groups. Voting is one of the most well-known mechanisms to resolve problems in many-party many-issues cases (Raiffa, 1982).

2.1.4 Other mechanisms

Besides negotiations and auctions, there are many variations derived from them. The differences between these two groups of mechanisms have been blurred (Kersten, Noronha, & Teich, 2000) in the search for alternatives that combine their strengths and minimize their weaknesses. One alternative is the *combination of auctions and negotiations* (i.e. first negotiation followed by auction or first auction followed by negotiation). Another solution is a *hybrid mechanism*, which is defined as a mechanism that can run negotiation and auction as one complete entity. An example of such a mechanism is *NegotiAuction*, proposed by Teich et. al (2001).

2.2 Negotiation research

Negotiation research is a well studied domain that involves many disciplines (Kersten, 2003). In this sub-section, studies on negotiation will be reviewed from two perspectives: economics and behavioral and psychological perspectives.

2.2.1 Economic perspective

Game theory is often used in the modeling and analysis of conflicts and cooperation among multiple parties. The involved parties could be any social entities (e.g., individuals, groups, firms, countries, or any combination of them). Game theory provides a formal approach for structuring situations, analyzing problems, and suggesting strategic choices (Turocy & Stengel, 2001). A well-known tool derived from game theory is axiomatic analysis, initially introduced by Nash (1950). Using axiomatic analysis, people can define their preferences, formulate their utility function, generate possible options and adopt

appropriate strategies in negotiations. Game theory provides theoretical support for rational players to achieve their best outcome in a given situation.

A limitation of game theory is the assumption of a static model, which greatly inhibits its applicability. Based on such a static model, players can know only what optimal outcomes will be, not how to reach them. Accordingly, these negotiation models are useful only for normative purposes (Lim & Benbasat, 1992). Taking a step further to the integration of multiple-criteria decision making, Raiffa (1982) proposed the negotiation analysis approach. This approach focuses on providing comprehensive suggestions (i.e. prescriptions) to the negotiators in order to reach optimal agreements.

There is another approach called "jointly improving direction method", which aims to help negotiators choose appropriate strategy and reach better agreements. This approach relies on facilitators who aid the negotiators in finding the direction to Pareto optimal solutions (Ehtamo, 2001; Ehtamo & Hamalainen, 2001; Ehtamo, Kettunen, & Hamalainen, 2001).

These approaches to negotiation analysis provide the theoretical foundations for the modeling of negotiation problems and processes. Other derivative models either focus on a specific scenario or are restricted to some specific conditions, issues or problems. While these models support players in gaining deeper insights into the specific contexts, there are also limitations to their applicability (Lim & Benbasat, 1992).

2.2.2 Behavioral and psychological perspectives

The economics perspective provides fundamental theories that help rational participants to model negotiations and provide suggestions to reach optimal results. Behavioral research perspectives focus on the actual negotiations. By examining the negotiators and negotiations, behavioral researchers try to gain understanding of the underlying causes affecting the process and its outcomes.

Many negotiation studies from a socio-psychological perspective were conducted in the 1960s and 1970s. Most of them focused on the examination of potential effects due to individual differences (e.g., demographic characteristics and personality variables) and the situational characteristics (e.g., parties' incentives and payoffs, power, deadlines, the number of parties on each side, and the presence of third parties) on the process and its outcomes. However, these studies failed to provide a powerful explanation for real negotiations, because they also assumed a static model (Bazerman *et al.*, 2000).

In the 1980s, a significant amount of behavioral research was aimed at understanding why and how people made concrete choices and undertook certain actions during negotiations. The weak predictive ability of the existing social psychological approach also added to the popularity of behavioral research into negotiations. Behavioral decision studies focus on observing negotiators' actual behaviors in negotiations. Their results often show that people make decisions in negotiations inconsistently, inefficiently, and based on irrelevant information (Bazerman, Curhan, Moore, & Valley, 2000).

In economic theories about negotiation, negotiators are typically assumed to be rational agents who attempt high-quality decision-making searching to maximize their own utilities.

A major finding of the observations of decision makers' behaviors is that they often deviated from the postulated rationality. Negotiators often settle for an inefficient agreement in the situations where a superior alternative exists (Dawes, 1998; Kahneman & Tversky, 1973, , 1979). One possible reason could be the bounded rationality of negotiators, the lack of information availability, or cognitive limitations of information processing (Simon, 1957).

Indisputably, behavioral decision studies of negotiations increased the understanding of how people behave in negotiations and make decisions. These studies did not, however, explain why negotiators act in certain ways. Therefore, negotiation research calls for a return to the social psychological approach (Greenhalgh & Chapman, 1995). A recent research trend in negotiations is to understand how the mental modes of negotiators affect the process and results. The rebirth of the social psychological approach does not simply aim to replicate previous work; rather it seeks to combine all existing research knowledge to explain negotiations.

2.3 Auction research

Auctions are also a well researched subject. In this sub-section, studies concerning auctions will be reviewed from formal and experimental economic perspectives, followed by a brief discussion from psychological perspective.

2.3.1 Formal economic perspective

Bid making, winner determination and price calculation are essential parts of auctions (McAfee & McMillan, 1987). The rules defining these parts are different for each auction type and decide people's behaviors in auctions. There are four types of standard

single-issue auctions (i.e. English, Dutch, first-price sealed-bid and second-price sealed-bid auction), which have been reviewed in section 2.1.1. Here the economic value models of auctions and their relationships are discussed.

Basic value models

Three basic value models have been described in auction literature. They vary according to the degree of asymmetric information (Kagel, 1995; Klemperer, 1999; McAfee & McMillan, 1987). These value models are also applicable in negotiations in market exchange.

1. Private values model: Bidders know their own values for an object (i.e. the traded goods or services) and those values are kept as private information. Knowing another bidder's value would not change the buyer's own value for the object.

2. Pure common value model: The actual value of the object is the same for all bidders, but each bidder may have a different private evaluation of the object. In this case, bidders would like to know the other bidders' evaluation of the object.

3. Affiliated values model: This is a hybrid model of private value model and pure common value model. The value of the object depends on both the private value and the common value (i.e., the actual value of the object is the same to each bidder, while the bidders have different evaluations of the object based on their own private information). This model is more general than the other two.

Revenue equivalence theorem

In a symmetric independent private values context, bidders know only the value they themselves have placed on an object. All bidders' values are independent of each other and no bidder knows the other bidders' values. With risk-neutral bidders in such an auction context, the following theorem holds: English auction, second-price sealed-bid auction, Dutch auction, and first-price sealed-bid auction yield the same expected price paid (Vickrey, 1961).

Strategic equivalence of different auctions

This theory concludes that the four standard types of auction are strategically different, yet they theoretically yield the same revenue.

Dutch auctions and first-price sealed-bid auctions are strategically equivalent (Vickrey, 1961). In Dutch auctions, each bidder has to decide on the maximum reservation value at which s/he will call out. The first called price is paid. Thus, although the auction process is dynamic in Dutch auctions, the price is equivalent to what the bidder is willing to pay in a first-price sealed-bid auction. In both types of auctions, bidders need to decide the maximum price that they want to pay (Klemperer, 1999).

English auctions and second-price sealed-bid auctions are strategically equivalent (Klemperer, 1999). An English auction ends when the bidder with the second highest bid drops out, leaving the winner to pay an amount equal to the second highest bid plus the value of the minimum bid. If the minimum bid is small enough, the price the winner pays in an English auction is equivalent to that in a Vickery auction, in which the winner pays the second highest price (Klemperer, 1999; Vickrey, 1961).

2.3.2 Experimental perspective

Essentially, economics is a science that aims to understand people's behaviors in transactions. In addition to the purely normative studies of agents and their interactions, the agents' actual behaviors are examined in experimental auction research. The experimental tests of normative theories in auctions show many differences between the bidders' actual behaviors and the theoretical predictions. One effect of these differences is that the revenue equivalence theorem often fails to hold (Chakravarti *et al.*, 2002).

For example, experimental findings indicate that higher prices result in first-price sealed-bid auctions than in Dutch auctions (Coppinger, Smith, & Ttitus, 1980; Cox, Roberson, & Smith, 1982). Many experimental studies report that prices are also slightly above equilibrium price in first-price auctions (Cox, Smith, & Walker, 1988; Dyer, Kagel, & Levin, 1989). It has also been reported that the results in English auctions and the theoretical prediction were consistent, yet over-bidding often took place in second-price sealed-bid auctions (Kagel, 1995).

One possible reason for the differences between the bidders' actual behaviors and the theoretical prediction is the gap between the actual perceptions and knowledge of the agents and the commonly adopted assumption that agents are rational, well-informed and oriented by their own utility-maximization (Rothkopf, 1991).

2.3.2 Psychological perspective

Compared with formal and experimental economic approaches (i.e. those that emphasize formal theories and empirical studies examining agents' actual behaviors), few studies have investigated possible psychological factors in auction research. Thus,

psychological auction research may yield a better understanding of auctions (Cheema *et al.*, 2005).

2.4 Theoretical and empirical comparisons

2.4.1 Formal studies

A selection of studies from the formal economic perspective (Bulow & Klemperer, 1996; Kirkegaard, 2004; Manelli & Vincent, 1995) develop theory leading to the comparison of auction and negotiation.

Based on two assumptions, i.e. (1) a seller could negotiate optimally and make credible commitments, and (2) buyers had no bargaining power in a negotiation, Bulow and Klemperer (1996) pointed out that, rather than exploiting the existing negotiators, finding more buyers for a simple competitive auction gives the seller the possibility of increasing revenue; i.e., finding one additional earnest buyer will be better than negotiating with the existing buyers in depth.

Taking the type of demand[10] and the symmetricity[11] of buyers into account, Kirkegaard (2004) slightly revised Bulow and Klemperer's theory (1996) as "[I]f buyers are symmetric and demand regular, a negotiation [an optimal mechanism] with n buyers is revenue inferior to the English auction with $n+1$ buyers" (p.6). Through the analysis of English auction and seller-offer bargaining in a non-cooperative context (where the seller

[10] Demand is endogenously discreet when buyer's valuation of the object is in one of a finite set of intervals; otherwise it is regular or continuous.

[11] Buyers are symmetric when there is no incentive for seller to discriminate among them.

can switch from one buyer to another, make offers, and then "play" one against another) he concluded that:

(1) Seller-offer bargaining exceeds English auction in terms of revenue, if demand is discrete and agents are patient enough.

(2) When demand is regular, pre-auction negotiations can improve English auction.

In terms of maximizing the social surplus, Manelli and Vincent (1995) pointed out that the effects of auction and negotiation would vary according to the situation, i.e., it is difficult to judge the effect of these two mechanisms on a given transaction without the consideration of the overall context, including the goods, participants, market, and so on. Assuming that sellers were privately informed about the quality, the authors analyzed which mechanism (i.e. auction or bargaining) would be optimal for the given trading task. They also proposed a methodology for the mechanism selection. An important conclusion in this study is that the auction mechanism is frequently inefficient in a procurement environment, which contradicts the previous two studies.

2.4.2 Experimental studies

Thomas and Wilson (2002; 2005) conducted two related experimental studies in a laboratory setting. The first study (Thomas & Wilson, 2005) compared first-price auctions with multi-bilateral negotiations[12] in a procurement scenario. They found that with more

[12] Thomas and Wilson (2002) originally use the term "multilateral negotiations" to describe an exchange institution, in which more than two agents (e.g., buyers) on one side negotiate with a single agent (e.g., seller) over the division of common surplus. Because multilateral negotiation has been used to describe negotiations involving multiple sides, rather then two, we use term "multi-bilateral negotiations" to describe two-sided negotiation with multiple agents on one or both sides.

sellers (four sellers) the transaction prices in multi-bilateral negotiations were not significantly different from those in first-price auctions. The transaction prices in multi-bilateral negotiations were higher than in first-price auctions when the number of seller was reduced from four to two. Moreover, these two mechanisms were equal in terms of efficiency.

In their second study, Thomas and Wilson (2002) compared second-price auctions with multi-bilateral negotiations with verifiable offers. They found that prices were lower in verifiable multi-bilateral negotiations than in second-price auctions. However, the efficiency of theses two mechanisms was found to be statistically equivalent. By comparing these results with those of the first study, they ordered the four mechanisms in terms of yielded transaction prices, from highest to lowest: second-price auctions, verifiable negotiations, non-verifiable negotiations, and first-price auctions.

Ivanova-Stenzel and Kroger (2005) investigated the prediction of Bulow and Klemperer's study (1996) that agents would prefer auction to negotiation. The experiment used a mechanism combining a negotiation and an auction. In the experiment, a seller would first negotiate with a potential buyer about the price of a good. If an agreement could not be reached in the negotiation, a second-price sealed-bid auction with an additional buyer was conducted. They found that the average prices and profits were quite well predicted by the theory. However, many agreements had been reached before the auction stage, which contradicts the theory. This study indicated that the agents might seek not only better prices, but also some unknown values (such as relationship).

2.4.3 Field studies

Bajari *et al.*(2003) analyzed a data set including 25,600 non-residential building contracts awarded in the private sector of Northern California during the years 1995-2000. Their main findings were that a contract with complex requirements or involving long-term relationships would be more likely to be awarded through negotiation, while a simple contract would be awarded through auction.

To investigate the application of negotiation and auction in the timber industry, Leffler *et al.*(2003) conducted a survey. Their data indicate that the selection of auction or negotiation in contract assignment depends on the complexity of the contract. Moreover, the selection is also affected by the distribution of buyers' expected valuations and the costs of conducting transactions for a given number of involved buyers.

2.4.4 Summary of mechanism comparison studies

Comparative studies of negotiations and auctions led to important findings for the design and use of these mechanisms. However, these studies have limited generalizability. They focused on a specific scenario, as shown both by Manelli and Vincent (1995) for procurement and by Bulow and Klemperer (1996), Kirkegaard (2004), and Bajari *et al.* (2003) for retail. Another limitation, which is particularly relevant to the present study, is the presentation of mechanism as an abstract or rudimentary system. Actually, mechanisms implemented in electronic markets are embedded in information systems which are used by buyers and sellers and which may affect their decisions.

Due to these limitations, it is difficult to position the earlier studies on a single landscape in order to construct prescriptions for the users of e-markets. Limburg *et al.* (2005)

proposed a research agenda for the comparison of auction and negotiation in a procurement scenario, and tried to eliminate some limitations by focusing mechanism type. It is expected, however, that other factors besides mechanism type, such as the task difficulty, context, or characteristics of agents, may also affect the transaction results.

3 E-MARKET ASSESSMENT FOUNDATIONS

In this chapter, a review of e-market research is performed. Available literature suggests that the traditional economic approaches are too restrictive to give insights into the function of e-markets. Accumulative evidence indicates that orthodox economics, which relies on the fully rational agents, cannot explain behavioral deviations from the theoretical predictions (e.g., over-bids or early withdrawals in auction that result in less than optimal outcomes).

Thus, in order to develop a deeper understanding of such behavioral deviations of agents, the use of a complementary approach is required, in particular an approach that attempts to integrate economics, behavioral sciences, psychology, and information systems. More specifically, two complementary approaches can be used to assess socio-economic processes (e.g., business transactions): the economic measures and the various types of personal satisfaction. By combining the social exchange theory (SET) and motivation theories with classical economic theories, it is possible to investigate how agents behave in a non-perfect, but more realistic, market context and how the exchange leads to psychological impacts on the involved agents.

Various types of variables related to e-market assessment will also be defined and discussed in this chapter. Among the subjective variables, we choose users' satisfaction as the complementary measure to economic ones. The reason for such selection is addressed. This chapter also presents a literature review of satisfaction. Eight categories of satisfaction related to e-market exchange are then identified: *1) satisfaction with outcome, 2) satisfaction with performance/decision quality, 3) satisfaction with relationship, 4)*

satisfaction with information, 5) satisfaction with communication media, 6) satisfaction with process, 7) satisfaction with tech-system/tool, and *8) overall satisfaction.* These types of satisfaction may be highly correlated to each other, but they are theoretically different.

3.1 Understanding e-markets

3.1.1 Market Exchange from the economic perspective

Economics deals with exchange, and a market is the place where the exchange takes place. As depicted in the Smith's model, five market components need to be examined from the traditional economic perspective (Smith, 2003).

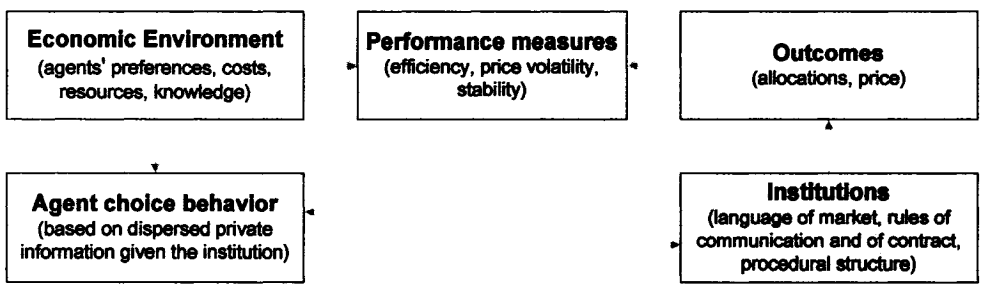


Figure 3.1: The components of market (Smith, 2003)

Institution determines three elements: 1) the language of a market (i.e. what kinds of messages, such as bids, offers, or free-text messages are sent by agents), 2) the rules that govern the exchange process, 3) the rules that define the conditions in which certain messages lead to the allocation or prices.

Agent choice behavior is influenced by economic environment and institutions. Agents are motivated by the given conditions and act according to the institution. Their choice behaviors reflect the environment and bear outcomes through the institution. The agents' decision making and moves in the exchange game make up their choice behaviors.

Outcomes describe the results of exchange, such as the allocation of resources, agreements, and prices. Based on the economic environment (i.e. the pre-exchange conditions) and the final results (i.e. outcomes), *performance* of a market can be evaluated.

Although economics has developed various powerful techniques for market analysis, there remain several limitations, described in Emerson's study (1976):

1. Economics assumes a perfect-competition condition, rendering it unable to deal with dependent parties in markets.

2. Parties are often depersonalized in order to eliminate individual effects on transactions.

3. "Pure" rationality is assumed among traders who are motivated by the goal of maximizing their own utilities.

These simplifications have allowed economists to develop market analysis techniques. Yet, such simplifications also limit the ability of economics to explain some phenomena (Emerson, 1976). It would be easy to attribute the agents' behavioral deviations from theoretical predictions in market exchange as random effects. However, literature suggests that such phenomena are not random, but happen systemically (Frey & Benz, 2004). Such unexplainable phenomena indicate that there are gaps in traditional economic theories. In the following sections we will discuss theories which allow us to further explain such phenomena.

3.1.2 Social exchange theory

Social exchange theory (SET) was developed to deal with non-economic exchange behaviors of real-world agents who do not conform to the traditional economic assumptions. SET shares many similarities with economic exchange theory, but focuses more on explaining the function of human behaviors in exchange (Emerson, 1976).

SET is built upon three key concepts: operant response, reinforce stimulus and discriminative stimulus. An operant response is a behavior which can be modified by its consequences. A reinforce stimulus is a stimulus that increases the recurrence possibility of the behaviors that it follows. A discriminative stimulus is one that can arouse different actions contingent on the schedules of reinforcement or paradigms of reinforcement and punishment (Skinner, 1969).

Homans (1974) made the following five propositions guiding the application of SET:

1. *The success proposition.* "For all actions taken by persons, the more often a particular action of a person is rewarded, the more likely the person is to perform that action." (p.16)

2. *The stimulus proposition.* "If in the past the occurrence of a particular stimulus, or set of stimuli, has been the occasion on which a person's action has been rewarded, then the more similar the present stimuli are to the past ones, the more likely the person is to perform the action, or some similar action, now." (p.29)

3. *The deprivation-satiation proposition.* "The more often in the recent past a person has received a particular reward, the less valuable any further unit of that reward becomes for him." (p.29)

4. *The value proposition.* "The more valuable to a person is the result of his action, the more likely

he is to perform the action." (p.25)

5. *The rationality proposition.* "In choosing between alternative actions, a person will choose that one for which, as perceived by him at the time, the value, V, of the result, multiplied by the probability, p, of getting the result, is the greater." (p.43)

From the social-exchange perspective, exchange results are dependent not only on the market conditions in a given context, but also on agents' relational dependencies. Therefore, the outcomes are contingent on their reactions to each other (e.g., the success, rationality, and stimulus propositions), interpretation of other parties' moves (e.g., the deprivation-satiation and value propositions), and the institution which plays the role of tuning all the relationships (Blau, 1964; Emerson, 1976).

SET can be considered as the complement of economic exchange theory; both of them adopt utility theory as their foundations and aim at gaining insights into the agents' behaviors in market exchange (Coleman, 1990). However, the agents' utility in the economic exchange theory often focuses on the "true" values and prices of goods, while the social-exchange theory extends utility to the parties' interactions or cognitions (Zafirovski, 2003). For example, one may value more the first concession than the second concession made by the counterpart even if both concessions yield same market value increase.

3.1.3 Motivation theories

Economics, under the "perfect" exchange assumptions, treats parties as isolated, well-informed (if not with perfect information), and in pursuit of maximizing their own utilities. Own utility maximization during exchange is assumed as the fundamental goal for

every involved party. Without this goal, economics would lose its analytical power and the "rationality" proposition would break.

Any violation of this assumption can lead to a deviation from the theoretical prediction. Thus, motivation research can be used to explain agents' behaviors when this assumption does not hold. Motivation is the most important psychological construct underpinning human behaviors in a goal-achievement setting (Eccles & Wigfield, 2002). In market exchange, agents' motivation shapes their choices, willingness to expend effort, and persistence to achieve the goal. More specifically, their motivation decides how well the agents maximize their own utility.

Theories of motivation can be classified into two main groups: expectancy theories and task value theories.

The expectancy theories focus on the expectancies of success, such as self-efficacy theory (e.g., Bandura, 1997) and control theory (e.g., Skinner, 1995). The underlying assumption is that people's expectancies (i.e. the beliefs that one has about how successful one can be in a task) affect their motivation and performance. According to these theories, one would be more likely to pursue the utility maximization if the possibility of winning in a given transaction is high. Instead, one may give up if there is a very low expectancy of winning.

The task value theories emphasize the value people attach to an outcome or the reasons for their motivation. These theories address the reasons behind people's attraction to a goal. For example, self-determination theory indicates that people can be motivated to different levels (from amotivation, extrinsic motivation, to intrinsic motivation), which affect their

degree of involvement towards the goal, further leading to their psychological wellbeing (Ryan & Deci, 2000). According to this theory, knowing people's motivation strength can help decide what incentives may be needed to keep their interest in making efforts to reach the goal.

Other theories in the second group are similar, such as flow theory (e.g., Csikszentmihalyi, 1988), interests theory (e.g., Alexander, Kulikowich, & Jetton, 1994; Hidi & Baird, 1986), and goal theory (e.g., Butler, 1993; Elliot & Church, 1997). These theories try to address what factors influence people to achieve a task. One may not want to perform a task, although one has the ability to do so. This indicates that both one's expectancy and value of task will contribute to how well one will behave, engage, and persist in the process to achieve the goal.

Models which integrate both expectancy and task value theories have been proposed. A good example is the expectancy-value model of achievement, shown in Figure 3.2 (Eccles & Wigfield, 2002). According to this model, one's achievement-related choices and performance are affected by one's expectancy of success and subjective task value, including interest-enjoyment value, attainment value[13], utility value, and relative cost. Other influencing factors include affect, past experience, various goals, social perception, culture, and so on.

The expectancy-value model of achievement is derived from education psychology. However, this model reveals some factors which can be used in order to explain how an agent is motivated and behaves in the process of exchange. For example, the subjective

[13] "The personal importance of doing well on the task" (Eccles & Wigfield, 2002, p119)

task-value construct in this model includes interest-enjoyment value, attainment value, utility value and relative cost. All these concepts are applicable to market exchange. In market exchange, agents need to think about how important the outcome is to them, whether there is any alternative that they can choose or switch to, how much utility they can gain if they win, and what cost (monetary, physical, or psychological) is associated with achieving the goal.

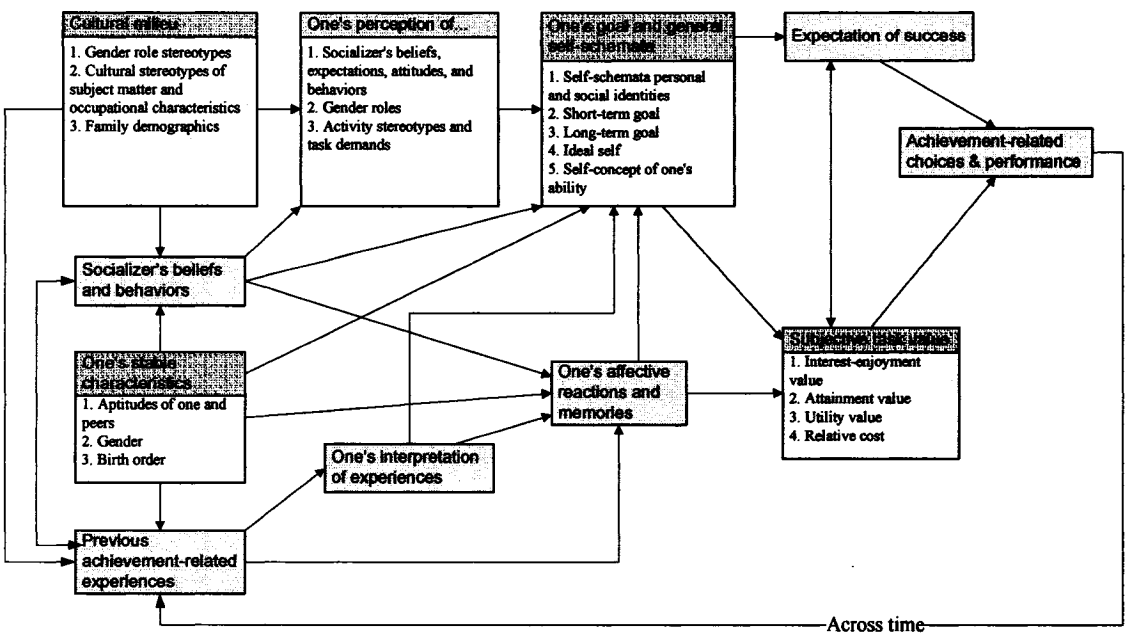


Figure 3.2: The expectancy-value model of achievement (Eccles & Wigfield, 2002)

There are other motivation theories in psychology containing factors that are applicable to market research. An in-depth discussion of these motivation theories is beyond the boundary of this current work. For a comprehensive review of motivation theories in psychology, please see Eccles & Wigfield (2002).

3.2 Market transaction process

The preceding sections introduced the economics, SET, and motivation theories, which provide a basis for the design of a model and experiments that allow us to gain deeper insights into negotiations and auctions. Thus, a complementary research approach for market exchange should prove enlightening.

The complementary approach can be termed as *socio-economic approach*, which tries to integrate economics, behavioral science, and psychology. While the socio-economic approach will help us understand market exchange more deeply, it may also be difficult for such an approach to handle the variety of involved variables. Taking a process view, it may be helpful to organize variables as inputs and outputs of a generic market transaction, such as Figure 3.3 describes.

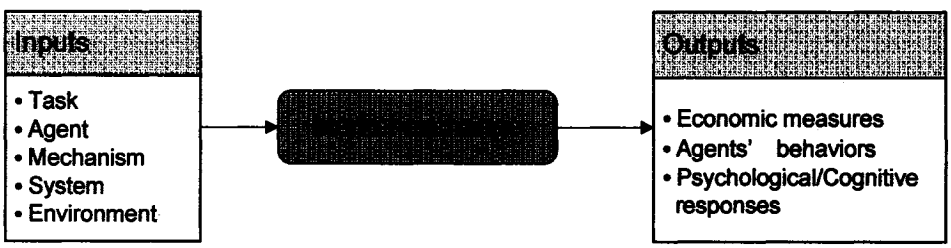


Figure 3.3: Market transaction process

On the left side are pre-transaction conditions, which can be taken as independent variables. On the right side are outputs that are produced through the exchange process. According to economic exchange theory, we need to examine two groups of variables, i.e. economic measures and agents' behaviors. As SET and motivation theories suggest, we also need to examine the psychological and cognitive responses of agents. In the following subsections, these inputs and outputs will be further defined and discussed.

3.3 Types of inputs

According to the existing literature, possible inputs related to e-market assessment can be classified into five groups in the formation of five constructs: task, agent, mechanism, environment, and technological system.

The *task* construct refers to the characteristics or requirements of the trade activities that agents need to carry out in e-market exchanges. Several properties of task have been identified: bargaining orientation, degree of conflict, time pressure, and complexity (Starke & Rangaswamy, 1999).

The *agent* construct refers to the properties of agents who act in the market. An agent can be a human being or a computer. For human agents, their individual characteristics could be potential factors that influence market transactions (Bazerman, Curhan, Moore, & Valley, 2000). There has recently been a trend towards using artificial intelligent agents in e-markets, such as autonomous auction agents (e.g., Greenwald & Stone, 2001; Stone *et al.*, 2001) and negotiation agents (e.g., Chen *et al.*, 1999; Fink, 2004; Klaue, Kurbel, & Loutchko, 2001). These studies indicate that the properties or features of agents (including human and artificial agents) will affect the exchange process and results.

A *mechanism* is defined here as an abstract artifact that describes the exchange protocol and model, regardless of its implementation. This construct reflects the characteristics of the adopted mechanism in the exchange. The Montreal Taxonomy of Electronic Negotiation (Ströbel & Weinhard, 2003) can be used to describe market mechanisms.

The *environment* construct is used to capture other environmental factors that may influence the exchange outcomes. The factors can include industries (e.g., agriculture, steel, and information technology), type of products (e.g., wheat, construction service, and computers), type of supply or demand (e.g., continuous, discrete, and rare), among others.

Finally, the *system* construct captures the properties of a computer-mediated system which implements the adopted mechanism to facilitate the exchange. The properties of such a system can include its user interface, features, functionalities, and so on.

3.4 Economic outputs

Economic outputs of a micro market system include performance measures and outcomes. Widely used *outcome* measures include agents' utilities (i.e. buyers' surplus and sellers' surplus), prices, agreements, social welfare distribution, and so on.

Performance measures can be calculated according to the outcomes and pre-exchange conditions. Performance measures include social welfare (i.e. social surplus), efficiency (e.g., Pareto efficiency, welfare maximization, and allocative efficiency), agreement rate, balance of the deal, and so on.

3.5 Behavioral and psychological outputs

3.5.1 Definitions

Agents' behaviors can be defined as the actions performed by agents during the exchange process. Agents' behaviors have been widely examined in market research literature. They have been measured differently, such as the time of entry/exit, number of bids (e.g., Bapna *et al.*, 2004), early withdrawal rate (e.g., Strecker, 2004), and so on.

Behavioral responses to the different factors of transactions (e.g., information, counterparties, and risks) have been also examined (e.g., Bazerman, Curhan, Moore, & Valley, 2000; Smith, 2003).

Besides these behavioral outputs, users' perceptions and psychological impacts are also important in market research. The concern is that agents cannot only benefit from the exchange, but also have improved satisfaction with their transaction experiences if an e-market is well designed. This should further encourage the users to adopt and continuously use the technology. Moreover, exploration of agents' psychological or cognitive changes can help us understand why agents behave in such patterns, if any exist.

The social sciences have identified several key cognitive components of the human psyche that can be examined as potential impacts on e-market users. They include cognitive belief, attitude, behavioral intention, and affect. While there are no universally accepted definitions of these components, researchers have tried to clarify differences among them (e.g., Goodhue, 1988; 1992). Based on literature, the definitions of these cognitive components and their relationships are briefly addressed below.

In the social psychology domain, one of the most influential works is Fishbein and Ajzen's theory of reasoned action (TRA). According to TRA, *behavioral intention* can be defined as the strength with which an actor intends to perform a specific behavior. Behavioral intention is the best predictor of an actor's actual behavior. The strength of behavioral intention depends on the actor's attitude to the behavior and his/her subjective norm (Fishbein & Ajzen, 1975, p.288).

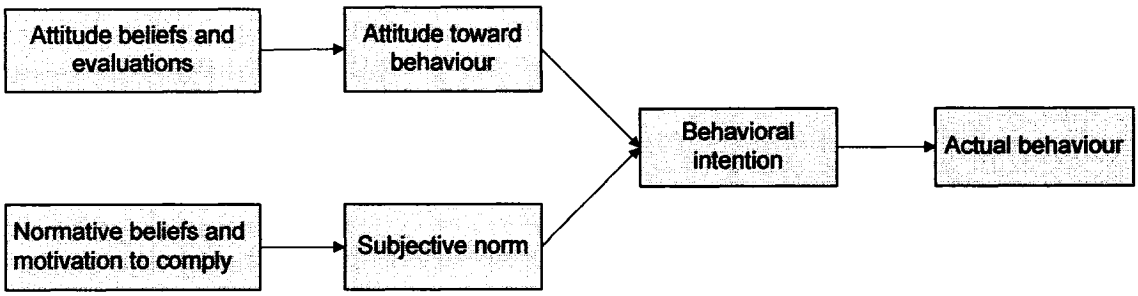


Figure 3.4: Theory of reasoned action (Fishbein & Ajzen, 1975)

Attitude towards behavior is defined as the individual's positive or negative feelings about performing the behavior. It is an aggregation of the product between the actor's salient beliefs about the consequences of performing the behavior and his/her evaluation of the consequence (Fishbein & Ajzen, 1975, p.302; Petty & Cacioppo, 1996).

Subjective norm is defined as the aggregation of one's beliefs that the behavior should be performed. Various beliefs contribute to the subjective norm. These beliefs are normative beliefs, which differ from those *behavioral beliefs* (i.e. attitude beliefs) that contribute to one's attitude to the behavior (Fishbein, 1979).

Belief can be defined as the degree of certainty about a particular attribute of an object or issue that is perceived by the actor and that the actor believes it would lead to a certain consequence (Fishbein & Ajzen, 1975, p. 29; Petty & Cacioppo, 1996). Compared with attitude, belief is a cognitive component that is closer to the actor's perception of the external stimuli or objects, i.e., belief forms before attitude (Goodhue, 1988).

TRA resolves the issue that one's attitude is often inconsistent with one's actual behavior in empirical studies by specifically defining attitudes as the negative or positive response to

the behavior. For example, a buyer may purchase a product even though s/he dislikes it. There is an inconsistency between the buyer's attitude and the buying behavior, since the buyer is supposed to purchase the product when s/he likes it. By defining the attitude as the negative or positive response to the action, instead of the action object (e.g., the responses to buying the product, instead of the product itself), TRA shows its power in eliminating the inconsistency between the buyer's attitude and behavior, since if s/he does not like to buy s/he will not do so, regardless of whether or not s/he likes the product.

Some researchers (e.g., Rokeach, 1979) have criticized the definition of attitude in TRA as being too specific and confounding the attitude towards the object with the attitude towards situational variables. For example, a customer's negative attitude to leaded fuel at a gas station does not prevent her/him from buying it, because s/he may not have enough money to buy the more expensive unleaded gasoline.

Triandis (1979) argued that it was not meaningful to empirically test the relationship between attitude and behavior if attitude was defined as the predisposition to the behavior, since the definition itself establishes the relationship. Triandis believes it would be more appropriate to define attitude as the affect toward the attitude object. The reason for the differing definitions of attitude between TRA and the model of Triandis (1979) is the target of the attitude. Triandis would like to take the actual object (e.g., leaded gas) as the target of attitude, while TRA prefers the behavior (e.g., buying leaded gas) towards the actual object.

In this study the author would like to draw attention to the differences between the definitions of attitude and affect. *Affect* can be defined as an enduring emotional response

(positive or negative) of actors to external stimuli (Park, Sims, & Motowidlo, 1986). Mano (1993) proposed eight categories of affects: aroused, elated, pleased, calm, quiet, bored, unpleasant, and distressed. Although affect and attitude are similar (e.g., they can be negative or positive; both involve individual judgment about the object; both may affect behavior towards the object), affect is a stronger emotional response than attitude. For example, one may have a negative attitude towards, but not hate, leaded gas. The negative attitude may prevent one from buying leaded gas, while the negative affect will lead to a lesser possibility that one will buy it.

Besides the above psychological responses, satisfaction is another important cognitive component. It is widely used in different research domains as a key construct, such as in IS research (e.g., DeLone & McLean, 1992; Goodhue, 1988), group decision support (GDS)/ decision support systems (DSS) (e.g., Fjermestad & Hiltz, 1998), negotiation (e.g., Gillespie, Brett, & R.Weingart, 2000; Novemsky & Schweitzer, 2004), and marketing research (e.g., Novemsky & Schweitzer, 2004; Spreng, MacKenzie, & Olshavsky, 1996; Woodruff, Cadotte, & Jenkins, 1983; Yi, 1990).

According to existing literature, *satisfaction* can be defined as a specific attitude which involves an integrative evaluation of an actor's attitudes as they form (Yi, 1990). It can also be treated as the sum of one's negative or positive attitudes toward the factors that affect the situation (Bailey & Pearson, 1983; Spreng, MacKenzie, & Olshavsky, 1996; Woodruff, Cadotte, & Jenkins, 1983; Yi, 1990). It is a high-level evaluation that integrates other cognitive components.

Marketing research (e.g., Fournier & Mick, 1999; Novemsky & Schweitzer, 2004; Oliver, Balakrishnan, & Barry, 1994; Spreng, MacKenzie, & Olshavsky, 1996; Woodruff, Cadotte, & Jenkins, 1983; Yi, 1990) suggests that the construct of cognitive congruence mediates actors' perceptions and their satisfaction regarding an object or stimulus. Three components of cognitive congruence for satisfaction are discussed in literature. They are expectation, desire, and experience (see Figure 3.5).

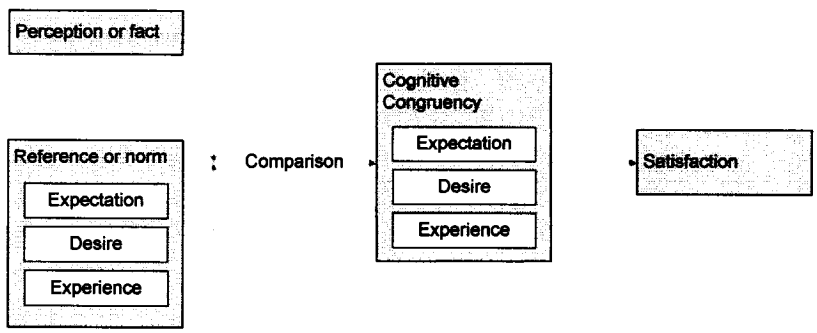


Figure 3.5: Formation of satisfaction

In the following, an example is given to illustrate the different psychological responses discussed above. These statements are the responses of a worker who uses a tool:

1. "This tool works"
2. "So, it is good"
3. "But, it is not enough"
4. "I am going to use it, anyway"
5. "I like it more than I hate it."

The first statement is a belief, a relative direct response to the stimulus or object (i.e. the tool). Note that there is no negative or positive judgment in this statement. The second

statement is an attitude, which is a positive evaluation. The third is the worker's satisfaction, indicating a comparison between her/his perception and certain norms or references that we may not know about. The fourth is a behavioral intention. The last statement is an affect, which indicates an emotional response.

3.5.2 Literature review concerning satisfaction

In order to choose appropriate subjective variables and measures, a literature review concerning the construct "satisfaction" was conducted. The focus was on users' satisfaction with group decision support system (GDSS), negotiation/negotiation support system (NSS) and computer-mediated communication (CMC), as well as with users' information satisfaction (UIS) and their evaluation of the information system (IS).

At least two advantages can be obtained when focusing on the satisfaction constructs. First, satisfaction provides an overview of users' psychological responses to the market exchange, since it is an integrative evaluation of many factors that possibly affect the situation. These factors include other psychological variables, such as belief, affect or attitude. Second, compared with other variables, satisfaction may have better validity. Rich literature on this construct can be found that provides a thorough investigation into its breath and scope. In addition, satisfaction is not like attitude and affect, which suffer from multiple and occasionally inconsistent definitions.

The papers selected for this review come from several meta-analyses and surveys, including Fjermestad & Hiltz (1998), Dennis, Haley, & Vandenberg (1996), Baltes *et al.* (2002), and Shaw (1998), and a collection of IS instruments provided by the Association

for Information Systems[14]. We also include the previous studies which tried to investigate satisfaction in negotiations or auctions, such as Oliver, Balakrishnan, & Barry (1994), Novemsky & Schweitzer (2004), and Ocker & Yaverbaum (1999).

In this review, all selected papers include original or adapted instruments of satisfaction. The citations of these papers are provided in Table 3.1. The items from these instruments have been manually classified, and eight categories are then identified as follows: *1) satisfaction with outcome, 2) satisfaction with performance/decision quality, 3) satisfaction with relationship, 4) satisfaction with information, 5) satisfaction with communication media, 6) satisfaction with process, 7) satisfaction with tech-system/tool,* and *8) overall satisfaction.* The identified categories indicate that an e-market can be examined from all of these cognitive or psychological perspectives. The types of satisfaction from each perspective will be correlated, but are theoretically different from each other. The reasons that market exchange leads to different types of satisfaction are discussed in the following eight points:

1. The outcomes of the exchange are predictable to a certain extent, based on the environment and selected institution in a market context (Smith, 2003). Resorting to economic analysis techniques (e.g., game theory), the optimal outcomes can be found; thereby the joint gain can be maximized. Economic outcomes (which are often presented as the allocation and utility gained by each party) will impact the agents, affect how they perceive and respond to the outcomes if they try to

[14] http://www.isworld.org/surveyinstruments/surveyinstruments.htm

maximize their own utility, and then lead to the agents' satisfaction with the outcome.

2. If the agents adhere to the goal of own utility maximization to a certain degree (if not perfectly), the series of decisions made during the exchange can impact their perception of their own performance in the process. This leads to psychological impacts (e.g., satisfaction with self performance) according to achievement goal theory (Hinkley, 2001; Pintrich, 2000).

3. According to socio-exchange theory, the exchange is not a simple re-allocation of resources/goods. Before, during, and after the exchange, agents may evolve or establish certain relationships based on dependency and power (Emerson, 1976; Zafirovski, 2003). Thus, the health of the relationships could impact the agents and then lead to their satisfaction with the relationship.

4. The exchange is a process of group decision making, which requires relevant information to support the agents' own decision making. According to end-user computing studies (e.g., Doll & Torkzadeh, 1988; Mahmood *et al.*, 2000; McHaney & Cronan, 1998; Rivard & Huff, 1988), agents need accurate, fast, sufficient (but not overloaded) information, and rapid feedbacks, in order to achieve high-quality decision making. Moreover, according to cognitive fit theory (Vessey, 1991), the information needs to be presented in an appropriate format that people can understand.

5. The information needs to be conveyed through certain media to each party involved in the exchange. The richness of communication media can affect agents'

satisfaction with it. New media (such as, telephone, telecom, video, audio, and the Internet.) are continuously applied to information exchange. According to computer-mediated communication studies (e.g., Kahai & Cooper, 1999; Kahai & Cooper, 2003; Suh, 1999; Valacich *et al.*, 1993), media have different abilities to convey information, which affect the process and the results (Bazerman, Curhan, Moore, & Valley, 2000).

6. The exchange process involves multiple parties and requires coordinated actions among parties. According to coordination theory (e.g., Malone & Crowston, 1994), the actions of agents can be sequenced and their dependencies can be managed in order to improve group performance in coordination. Institutional theory (e.g., Scott, 2005) indicates that a market institution (such as a group of rules governing the exchange process) has significant impacts on the market exchange.

7. Many computer systems, such as auction, negotiation support, or group decision support systems, are designed to facilitate exchange or decision making. The related system features and tools, as technology, can affect the transactions. According to the technology acceptance model, the perceived ease of use and usefulness can lead to users' acceptance of technology (Davis, 1989), which can then contribute to users' satisfaction with the tech-system. Moreover, the task-technology fit model indicates that the fit between tech-system/tool and the given task can lead to performance improvement (Goodhue & Thompson, 1995).

8. A group of instruments is used to measure the overall satisfaction, which aims to get the overall evaluation of one's experience during the process. Some questions

were often asked about overall satisfaction. For example, "do you have fun during the process…?"

Table 3.1 Literature review concerning satisfaction

Article	*Field*	*O*	*P/DQ*	*R*	*C*	*T*	*P*	*I*	*G*
Bui & Sivasankaran (1990)	GSS/DSS	x	x	x			x		
Chidambaram (1996)	GSS/DSS	x	x	x					x
Connolly, Jessup, & Valacich (1990)	GSS/DSS	x			x	x	x	x	x
Jarvenpaa, Rao, & Huber (1988)	GSS/DSS	x	x	x					x
Huang, Wei, & Tan (1999)	GSS/DSS	x					x		
Adrianson & Hjelmquist (1999)	CMC		x						
Gouran, Brown, & Henry (1978)	GSS/DSS	x	x	x					
Carey & Kacmar (1997)	GSS/DSS	x	x	x			x	x	
Davey & Olson (1998)	GSS/DSS	x	x			x	x	x	x
Dennis (1996)	GSS/DSS		x	x			x	x	x
Novemsky & Schweitzer (2004)	Nego/NSS	x					x		
Nunamaker *et al.* (1991)	Nego/NSS		x	x			x		x
Rangaswamy & Shell (1997)	Nego/NSS	x		x	x		x	x	
Moore *et al.*(1999)	Nego/NSS			x					
Olaniran (1996)	CMC	x	x	x	x		x		
Hiltz & Johnson (1990)	CMC				x	x		x	
Alavi (1994)	CMC								x
Bergeron, Rivard, & Serre (1990)	UIS					x		x	
Chin, Diehl, & Norman (1988)	UIS						x	x	x
McHaney & Cronan (1998)	UIS					x		x	
Kahai & Cooper (1999)	UIS	x		x			x		
Kahai & Cooper (2003)	UIS			x	x				
Etezadi & Farhoomand (1996)	UIS					x		x	
Doll & Torkzadeh (1988)	UIS					x		x	
Gelderman (1998)	IS					x		x	
Palvia (1996)	UIS					x		x	
Palvia & Palvia (1999)	UIS					x		x	
Ang & Soh (1997)	UIS					x		x	
Doll, Xia, & Torkzadeh (1994) [to Confirm Doll & Torkzadeh (1988)]	UIS					x		x	
Hendrickson, Glorfeld, & Cronan (1994) [extend Doll & Torkzadeh (1988)]	UIS					x		x	
Vinze (1992) [tested by Davey & Olson (1998)]	Knowledge -base System	x	x			x	x	x	
Hiltz (1995)	CMC					x			
Green & Taber (1980)				x				x	
Hiltz (1984)	CMC			x		x		x	

O –Satisfaction with outcome
P/DQ –Satisfaction with self performance/decision quality
R –Satisfaction with relationship
C –Satisfaction with communication media
T –Satisfaction with tech-system/tool
P –Satisfaction with process
I –Satisfaction with information
G –Overall satisfaction

GSS/DSS – Group support system/Decision support system
Nego/NSS –Negotiation/Negotiation support system
CMC –Computer mediated communication
UIS –Users' information satisfaction
IS – users' evaluation of IS

4 RESEACH QUESTIONS, MODEL AND HYPOTHESES

This thesis continues the experimental studies initiated by Thomas and Wilson (2002, 2005), which compare auction and negotiation mechanisms. Early experimental research focused only on economic measures of these two kinds of market mechanisms. In the present study, the negotiation and auction mechanisms are examined through economic, behavioral, and psychological measures.

4.1 Research questions and model

Our research continues to address the general question: What are the differences or similarities between negotiations and auctions? For the sake of simplicity, the research question can be broken down into the following questions:

1) What are the differences in economic outcomes (e.g., utility of buyers and sellers) that can be attributed to differing mechanisms?

2) Which one is better in terms of economic performance (e.g., allocative efficiency, social welfare)?

3) What are the potential impacts of the different mechanism uses on agents in markets?

The research model is shown in the Figure 4.1. In the left column are independent variables for both mechanisms (i.e. multi-bilateral negotiation and multi-attribute English auction) as well as for agents' individual characteristics (i.e., gender). The other inputs (i.e., task, environment, and system) are controlled in this experiment. In the right-hand

column are dependent variables which include three groups: economic outcomes, economic performance, and users' satisfaction.

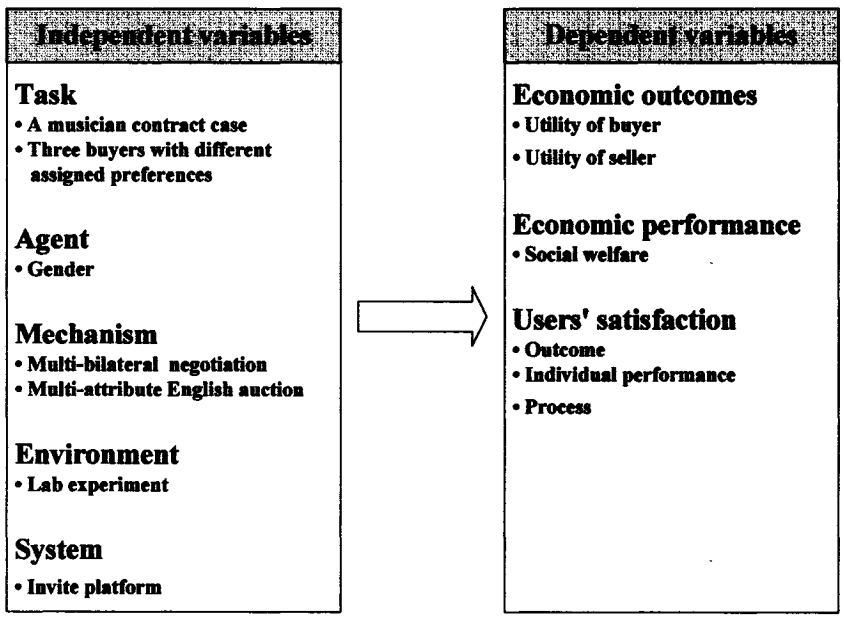


Figure 4.1: Research model for current thesis

To answer the research questions, the methodology of this study contains the following steps:

(1) Experiment design, which includes the design of experiment procedure, case, preferences structure, role of the parties, involved attributes, and the specification of the environment.

(2) Mechanism design, including the implementation of a limited-information multi-attribute English auction and a multi-attribute multi-bilateral negation.

(3) Measure selection and instrument adaptation.

(4) Completion of the experiment for this comparison study.

4.2 Research hypotheses

The earlier literature review identified five groups of independent variables: task, agent, mechanism, environment, and system. In the current comparison study, we are interested in the differences that the mechanisms can be accountable for in the outputs. Elaboration on these outputs follows.

4.2.1 Economic outputs

Two groups of widely used economic measures (i.e. economic outcomes and performance) have been chosen as dependent variables. Among the measures of economic outcomes, we focus on the utility of buyers and sellers. Our measures of economic performance include allocative efficiency and social welfare.

According to revenue equivalence theory, the four well known auction types (i.e. English auction, Vickery auction, Dutch auction, and first-price sealed-bid auction) should generate the same expected revenues (Klemperer, 1999). Yet the strategic equivalence theory says that Dutch auction and first-price sealed-bid auction are equivalent, while Vickery auction and English auction are equivalent (Vickrey, 1961).

Differing slightly from Vickrey (1961), Milgrom (1982) concluded that: if the bidders are risk-neutral in competitive bidding, 1) English auction would generate higher average prices than Vickery auction; 2) Vickery auction would generate higher average prices than the other two types (i.e., Dutch auction and first-price sealed-bid action).

Further studies also provide insights into the relations between the four types of auctions and different types of negotiations. Thomas and Wilson's work (Thomas & Wilson, 2002) suggests that multi-bilateral negotiation can be treated as equivalent to first-price sealed-bid auction if the owner cannot credibly reveal the current best offer during the process. If the owner can credibly reveal, the multi-bilateral negotiation would be equivalent to Vickery auction

It can be derived from the above work that the yielded price will be higher for an English auction than for a multi-bilateral negotiation according to these studies, at least for single-attribute auctions. Strecker (2004) conducted an experiment to compare single-attribute and multi-attribute English auctions. The results indicate no significant difference in outcome and efficiency between these two mechanisms.

Based on these existing studies, there is some evidence allowing us to make the following hypotheses about the buyer's and seller's utility[15] (in the current study, the seller is the transaction owner who wants to assign the contract to others):

HA1: The seller's utility will be higher in an English auction than in a negotiation.
HA2: The buyer's utility will be lower in an English auction than in a negotiation.

Although the multi-attribute English auctions may yield more utility to the owners, the market performance generated from the outcomes will not necessarily be optimal ones, since the efficiency is based on the joint gain from both sides. Kersten *et al.*(2000) indicate

[15] In the current work, we do not use prices to indicate the value of the assigned contract. Accordingly, the term of price is transferred to the term of utility.

that the competitive nature of auction can lead to a distributive strategy, while negotiation provides opportunities for agents to explore better alternatives. These alternatives can increase their joint gains if the agents can thoroughly examine the available alternatives. Therefore, the following hypotheses can be made. Please note, the preferences of agents are given and fixed. Thus, we do not include any hypothesis about market efficiency, since the tested hypothesis of market efficiency is equivalent to that of social welfare.

HB: The social welfare in an English auction will be lower than that in a negotiation.

4.2.2 Users' satisfaction

As the previous chapter explained, there are eight perspectives from which we can examine potential impacts of mechanisms in terms of the agents' satisfaction. We are interested in three of them: satisfaction with outcome, performance/decision quality, and process. The agents' satisfaction with performance/decision quality in the experiment can be narrowed down to satisfaction with self-performance, since each agent is supposed to maximize her/his own utility during the exchange process.

The Smith model (2003) indicates that the optimal outcome of a given exchange instance is decided by the given environment, the institution and agents' choice of behaviors. Agents in market exchange are assumed to maximize their own utility (i.e., motivated by a type of achievement-goal). At the end of the exchange, the outcome (i.e., presented in a vector for the allocation) is a fact that can be interpreted to mean how much utility agents have gained. Thus, how well their goal is fulfilled in terms of utility will lead to different levels of satisfaction.

Existing studies (e.g., Gillespie, Brett, & R.Weingart, 2000; Novemsky & Schweitzer, 2004; Oliver, Balakrishnan, & Barry, 1994) suggest that agents' satisfaction is affected by several factors, including own utility, counterpart's utility, expectancy disconfirmation, and social comparison. Yet the relationship is moderated by other factors such as motivational and social value orientations. In order to test whether the agents are own-utility driven, as assumed, the following hypotheses are also included:

HC1: The utilities gained by agents will positively impact their satisfaction with the outcome.

HC2: The utilities gained by agents will positively impact their satisfaction with self-performance.

HC3: The utilities gained by agents will positively impact their satisfaction with process.

English auctions continually provide feedback to agents through the disclosure of the current best offer. Frequent and accurate feedback provides better information support to the user's evaluation of the outcome. By contrast, negotiation may not provide as accurate, quick, or credible feedback as auctions do to the offer-submitters. However, negotiations provide more opportunities for users to adopt an integrative strategy in the transaction (Kersten, Noronha, & Teich, 2000). It is more likely that an efficient outcome will develop from negotiation than from English auction, providing agents with greater satisfaction with the outcome.

Agents' satisfaction involves a complex process of evaluation. Currently, no study claims any relation between mechanisms and agents' satisfaction with outcome. In our research,

we aim to investigate which mechanism (i.e., negotiation or auction) leads to higher satisfaction among agents. Thus, the following alternative hypotheses are made:

HD_0: Negotiation will lead to higher satisfaction with the outcome, or

HD_a: Auction will lead to higher satisfaction with the outcome.

Additionally, socio-psychology research may help us analyze agents' satisfaction. Three goal types have been identified in socio-psychology. The first is the task-specific goal or target goal and is directly related to specific outcomes (e.g., the agent must get a certain price, such as $120). The second type is the general goal, such as pursuing happiness or safety in our lives. The last type is the achievement goal, which is situated between target goal and general goal. This type seems the most appropriate for our explanation of achievement motivation and behavior (Pintrich, 2000)

Achievement goal theory literature identifies two types of goal-orientation behaviors that affect agents' satisfaction with performance. One is task-goal orientation, while the other is outcome-goal orientation. People who have task-goal orientation are inclined to focus on improving over their past performance. By contrast, outcome-goal oriented people prefer to compare themselves with others (Duda, 1996; Nicholls & Press, 1989).

People cannot to be purely task-goal or outcome oriented. Consequently, the evaluation of their own performance is affected by both orientations. It is not known which one has greater effect. Thus, we need to ascertain the potential effect of mechanisms on agents' satisfaction with self-performance.

HE_0: Negotiation will lead to higher satisfaction with self-performance, or

HE_a: Auction will lead to higher satisfaction with self-performance.

Negotiations provide flexible communication among parties. This feature of negotiations also allows the transaction owner (i.e., the one who initialized the exchange instance) to choose what information s/he wishes to reveal. Thus, the process of negotiation will be more complex than that of auction and will vary from case to case. Accordingly, agents working on negotiation systems will experience greater difficulty in controlling the trade process, which can lead to lower satisfaction with the process.

Compared with negotiations, auctions are more efficient in coordination for multiple bidders (Kersten, Noronha, & Teich, 2000). Therefore, agents involved in auctions should have higher levels of satisfaction with the process.

HF: Agents will attain a higher level of satisfaction with the process in auctions than in negotiations.

5 METHODOLOGY

5.1 NorA experiment

5.1.1 Treatments

In this laboratory experiment two treatments were involved, one for each mechanism. Each treatment was broken down into sessions, depending on the number of participants available on a same time schedule. Each session included multiple transaction instances and each transaction instance required three or four participants (i.e., three in auction and four in negotiation treatment). Each participant could attend the experiment only once.

We exposed the participants to multiple-party interaction for longer than for traditional economic experiments in order to give them enough stimuli for their subjective responses to the treatments. The complexity of the case, length of the questionnaires, and participants' learning about the system and tools also required a longer period of interaction. Each experimental session took two hours at most. Participants were given pre- and post-interaction questionnaires.

5.1.2 Parties

The number of parties involved in the transaction affects the final results in negotiations and auctions (Bulow & Klemperer, 1996). In Strecker's experiment on auctions (2004), five bidders (not including the owner) were involved in a multi-attribute procurement scenario. In Thomas and Wilson's experiments (Thomas & Wilson, 2002, 2005) examined the effect of the number of sellers in a single-attribute procurement scenario. In one experiment, two participants were used as sellers; in another, four participants were used. It

was found that the transaction prices were statistically higher in multi-bilateral negotiations than in first-price auctions with two sellers, while they were indistinguishable in the two experiments with four sellers. In our experiments, we constantly used three buyers in each transaction instance.

5.1.3 Attributes

The requirement complexity of a contract affects the selection of negotiation or auction (Leffler, Rucker, & Munn, 2003). This suggests that the number of attributes involved in a transaction is a potential factor that affects the contract assignment. Strecker (2004) and Koppius and Heck (2002) used three attributes (including price) in their studies. Thomas and Wilson (Thomas & Wilson, 2002, , 2005) used only one attribute.

In the current experiment, four attributes were considered in order to give the agents more options to trade off among these attributes. Abstract attributes are often used in traditional experiments (Strecker, 2004). Since we wanted to simulate a real business case, we decided to use real attributes in the experiment. Moreover, we attempted not to confuse the participants with ambiguous attributes. Thus, we selected attributes that were quite reasonable and easy to understand.

5.2 The case

An experimental case (i.e., a musician's agent tries to assign a contract to one of three entertainment companies) was used to depict the scenario of the exchange. The case consisted of the *public information* available to all parties and the *private information* that was respectively available to each party. The public information described the overall situation of the scenario (e.g., how many parties were involved, who they were, what were

the issues that they needed to deal with, etc.). The private information depicted the preferences structure for each party. The details of the case are given in Appendix B.

5.3 Involved mechanisms and the Montreal Taxonomy application

This experiment involved two mechanisms: a limited-information multi-attribute English auction and a multi-attribute multi-bilateral negotiation.

The limited-information multi-attribute English auction allows multiple-bid submission. However, the owners' preference structure is not directly revealed to the bidders. Once a successful bid has been submitted, the current best offer will be revealed. Strecker (2004) used a similar institution in his multi-attribute auction experiments.

For the negotiation institution, we extended the existing bilateral negotiation mechanism implemented on the Invite platform to our multi-bilateral case with the one restriction that the owner could send only messages, not offers.

A table that depicts these two mechanisms is provided in Appendix A. The table is inspired by The Montreal Taxonomy of Electronic Negotiation (Ströbel & Weinhard, 2003). Some liberties have been taken in adjusting the table and adding the necessary new fields. The purpose of the table is to provide a quick overview of the mechanisms.

5.4 Imbins and InAuction: implementation of the mechanisms

There are several key elements of the technical implementation that need to be addressed for the systems involved in this experiment. They include the Invite platform, Fusebox framework, MVC design patter, negotiation protocol, and Inspire system.

Following the introduction, we will briefly describe how we implemented Imbins and InAuction, the two systems designed for this experiment.

5.4.1 The Invite platform

Invite© is a software platform, an acronym for "InterNeg virtual integrated transaction environment"[16]. It is a platform that is designed to be able to hold various e-negotiation or auction systems in an integrated environment. At present, these systems are used for research and training purposes.

5.4.2 Fusebox

Fusebox is an open framework for building Coldfusion or PHP web applications[17]. It resolves some common problems in web application development, such as unmanageability, complexity, code redundancy, and difficulty with maintenance. A typical Fusebox-enabled web application can be broken down into fuses (i.e., a type of component) that can be assembled to create a function base on use cases (known as a fuseaction).

Fusebox also proposes a methodology for application development along with it. This is known as the Fusebox Lifecycle Process (FLiP). Generally, the FLiP includes the following steps:

1. Wireframing: This is the initial step for building a web application. It is coarse-grained prototyping technology which can help identify use cases, define the layouts, and

[16] http://invite.concordia.ca/

[17] http://www.fusebox.org/

walks non-technical participants through the main business process.

2. Prototyping: A step beyond wireframing, which uses the HTML to represent the components of the final application.
3. Architecture and fuse coding: The use cases developed in wireframing are implemented as circuits, fuseactions and fuses. The fuses are coded in ColdFusion Markup Language (CFML) or PHP based on the design requirements.
4. Unit testing: This is a popular testing methodology in system development. It can test the whole system component by component before they are assembled. Test-driven development is an effective method of preventing system flaws.
5. Integration and deployment: Fuses need to be integrated into fuseactions, which are assembled under circuits. The whole web application is composed of circuits that are deployed on the server.

5.4.3 The MVC design pattern

The Model-View-Controller (MVC) design pattern is well known and widely tested, and is aimed at handling user interaction with the system effectively. According to the MVC design pattern, the components of a system can be classified into three types: the model, view, and controller objects. The controller receives requests from the user and dispatches the work to other model objects to process the requests. The view objects are used to display outputs to the user.

The Invite platform is built on the Fusebox framework, which enables the MVC design pattern. Figure 5.1 describes the architecture of the Invite system. A centralized controller is used to handle users' web requests, and to delegate the requests to the related model components. The model components are responsible for querying databases,

calculation, and generation of related contents. Once the model components complete their work, the page composer interprets the returned content and data for the user interface and sends it back to the users' interface.

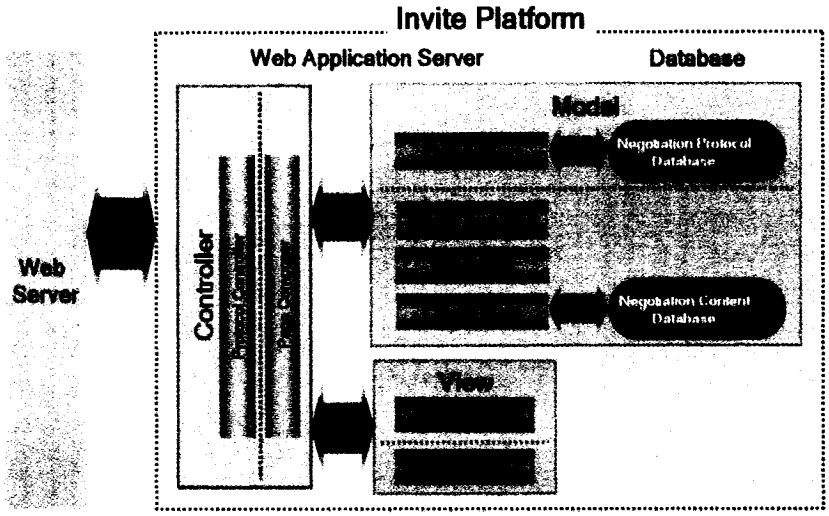


Figure 5.1: Architecture of the Invite platform (Kim *et al.*, 2006)

5.4.4 Negotiation protocol

Negotiation protocol is a method of modeling negotiation processes. The Invite platform adopts a top-down approach to construct the negotiation protocol. Each negotiation can be broken down into several sequences. Each sequence contains several states. The initial state must be completed before the users can switch to any other state in the sequence. The mandatory state must be also completed before the user leaves the sequence. For a formal introduction to negotiation protocol, please refer to (Kersten, Strecker, & Law, 2004; Kim, Kersten, Strecker, & Law, 2006; Kim *et al.*, 2005)

5.4.5 The Inspire system

The Inspire system supports bilateral negotiations and is currently implemented on the Invite platform (www.interneg.org). This system was initially developed and deployed in July 1996 and has been used for both bilateral negotiation studies and training. By May 2004, 6,126 people from 62 countries had negotiated via the Inspire system (Kersten, 2004). Users include students, managers, lawyers, engineers and physicians from countries such as the U.S., Austria, Canada, India, Finland, Korea, Portugal, and Russia.

Inspire, as a negotiation support system, contains two main parts: decision support and communication support. The decision support component provides the functions of elicitation of preferences, construction of utility functions, quantitative evaluation of offers, maintenance of negotiation history, and graphical representation of negotiation dynamics. The communication support component performs the functions of structured offer exchange, free-text messages exchange, and automatic e-mail notification.

5.4.6 Implementation and testing

Based on available technologies derived from the Inspire system, two other systems were developed for the current experiment. One of them is Imbins (InterNeg multi-bilateral integrative negotiation system), which extends the current bilateral negotiation to multi-bilateral cases (i.e. one vs. many). The second system is InAuction (InterNeg auction system), which supports a limited-information multi-attribute English auction. These two systems were built with similar user interfaces, functions, and architecture.

In order to reduce potential bias due to different system features, we minimized the differences in system design to those necessary for each mechanism. Besides unit and

integration tests, several rounds of stress and usability tests were conducted. Users' feedback was also considered in order to improve the usability of the systems. As illustrated, Figure 5.2 is a screenshot of the "Read offer" function from the sellers' perspective. Figures 5.3 and 5.4 are screenshots of the "View history" function for Imbins and InAuction.

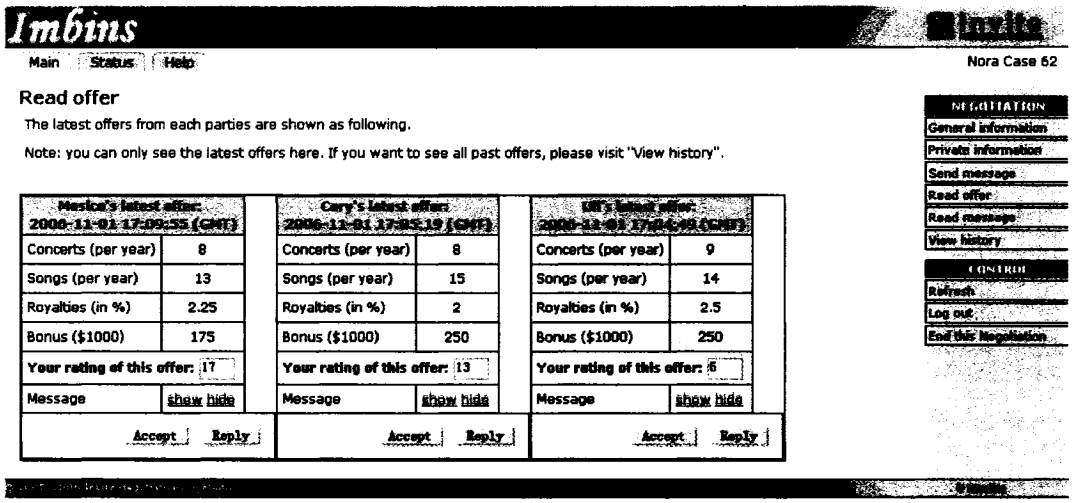
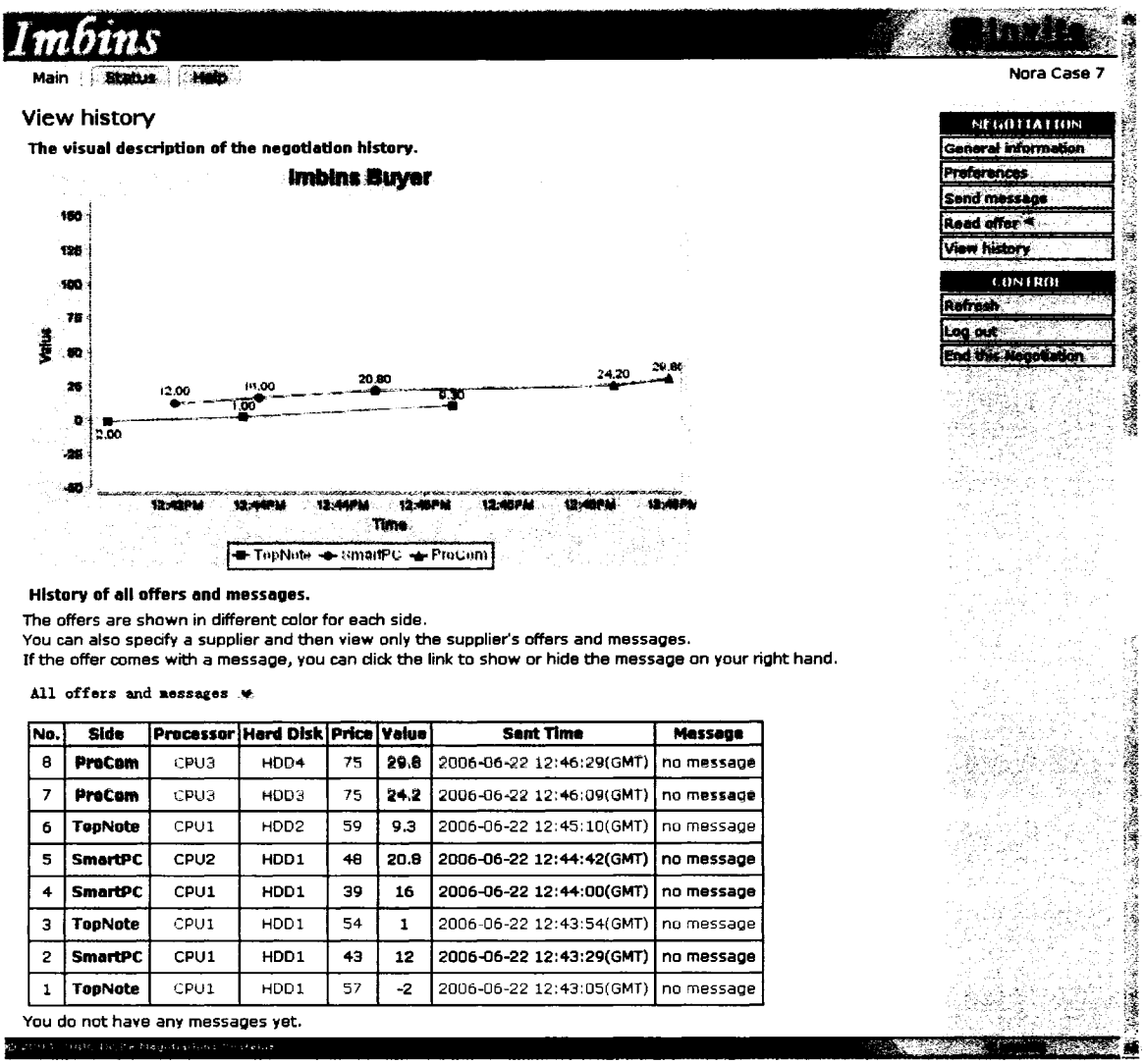
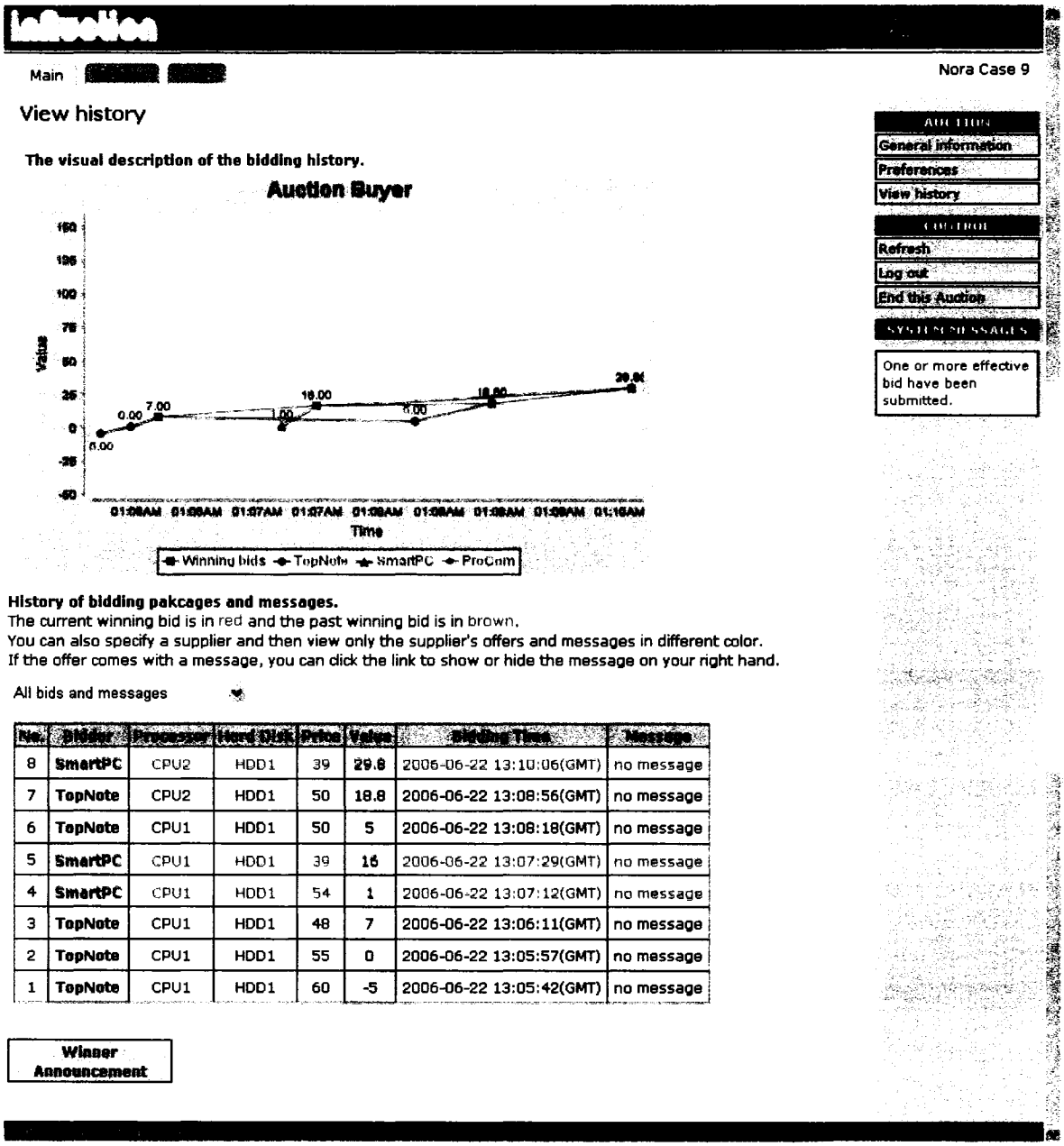


Figure 5.2: The "Read offer" function in the Imbins system



No.	Side	Processor	Hard Disk	Price	Value	Sent Time	Message
8	ProCom	CPU3	HDD4	75	29.8	2006-06-22 12:46:29(GMT)	no message
7	ProCom	CPU3	HDD3	75	24.2	2006-06-22 12:46:09(GMT)	no message
6	TopNote	CPU1	HDD2	59	9.3	2006-06-22 12:45:10(GMT)	no message
5	SmartPC	CPU2	HDD1	48	20.8	2006-06-22 12:44:42(GMT)	no message
4	SmartPC	CPU1	HDD1	39	16	2006-06-22 12:44:00(GMT)	no message
3	TopNote	CPU1	HDD1	54	1	2006-06-22 12:43:54(GMT)	no message
2	SmartPC	CPU1	HDD1	43	12	2006-06-22 12:43:29(GMT)	no message
1	TopNote	CPU1	HDD1	57	-2	2006-06-22 12:43:05(GMT)	no message

Figure 5.3: The "View history" function in the Imbins system



No.	Bidder	Processor	Hard Disk	Price	Value	Bidding Time	Message
8	SmartPC	CPU2	HDD1	39	29.8	2006-06-22 13:10:06(GMT)	no message
7	TopNote	CPU2	HDD1	50	18.8	2006-06-22 13:08:56(GMT)	no message
6	TopNote	CPU1	HDD1	50	5	2006-06-22 13:08:18(GMT)	no message
5	SmartPC	CPU1	HDD1	39	16	2006-06-22 13:07:29(GMT)	no message
4	SmartPC	CPU1	HDD1	54	1	2006-06-22 13:07:12(GMT)	no message
3	TopNote	CPU1	HDD1	48	7	2006-06-22 13:06:11(GMT)	no message
2	TopNote	CPU1	HDD1	55	0	2006-06-22 13:05:57(GMT)	no message
1	TopNote	CPU1	HDD1	60	-5	2006-06-22 13:05:42(GMT)	no message

Figure 5.4: The "View history" function in the InAuction system

5.5 Experiment procedure and participants

The participants were undergraduate students enrolled in the business school of a Canadian university. The experiment was treated as part of their class activities to learn about e-business. Before the experiment, participants were asked to complete a registration form. Demographic information and past negotiation or auction experiences were also recorded.

The participants were contacted two weeks after registration to arrange a convenient experiment session. Before the participants arrived at an experiment session, the transaction instances were set up. Upon arrival the participants were assigned randomly to instances according to their arrival sequence.

The experiment required three stages: preparation, interaction, and post-interaction. In the preparation period, the trained facilitators distributed related documents, read instructions loudly, and explained other relevant issues about the experiment to the participants. Questionnaires, such as those inquiring about outcome expectations, were also given to the participants.

After completing the system introduction, the participants were allowed to interact online. The interaction period took a maximum of one hour for negotiation and 20 minutes for auction. The time period for each treatment was chosen by several negotiation and auction experts in order to ensure better results from the experiment.

After the interaction period, the participants were required to complete several questionnaires. These post-interaction period questionnaires focused on participants' cognitive responses (e.g., to the outcome, self-performance, counterparties, and systems).

5.6 Measurement

5.6.1 Economic measures

An object in an exchange can be defined as a tangible or intangible good or a right to a service (Strecker, 2004). The object in the current experiment is a contract that Ms. Sonata wants to assign to one of three music companies (see Appendix B). Suppose that an object has M (non-zero) attributes. Those attributes could be price and non-price attributes. Let X_j denote the set of all possible values of attribute j .$\{1,\ldots,M\}$. An offer can be described as an M-dimensional vector $x=(x_1,\ldots,x_m)$, while $x_1 \square X_1, \ldots, x_m \square X_m$.

In our experiment, we considered only the transactions that involved two-side parties; this means that exchanges were designed to occur bilaterally. The remainder of this thesis uses "the seller" to indicate one side (i.e. Ms. Sonata) and "the buyers" to denote the three music companies. Suppose there is one seller s and I buyers ($I>0$; $i \square (1,\ldots,I)$). We will use θ_s to denote the preferences of seller s, while θ_i will denote the preferences of the buyer i. The preferences of the agents can be mapped to a specific value function (or scoring rule): $V(x,\theta)$, $\theta.(\theta_1,\ldots\theta_i, and\ \theta_s)$

The *utility of seller* can be presented in the formula:

$$u_s(x,\theta_s) = \begin{cases} v(x,\theta_s), & \text{if an agreement is reached;} \\ 0 & \text{, if no agreement is reached.} \end{cases}$$

The *utility of buyers* can be presented in the formula:

$$u_i(x,\theta_i)=\begin{cases} v(x,\theta_i), & \text{if an agreement is reached;} \\ 0, & \text{if no agreement is reached.} \end{cases}$$

Only one buyer can be chosen as the winner $\hat{i}$ at the end of each transaction in the experiment. Suppose that after the transaction the seller will deliver the object to the buyer $\hat{i}$ with the type $\theta_{\hat{i}}$, if they can reach an agreement with offer $\hat{x}$. The *outcome* of a transaction is denoted as $\hat{o}=(\hat{x},\theta_{\hat{i}})$, and the *social welfare* realized can be calculated according to the following formula:

$$w(\hat{o})=w(\hat{x},\hat{i})=w(\hat{x},\theta_{\hat{i}})$$

$$w(\hat{x},\theta_{\hat{i}})=u_s(\hat{x})+\sum_{i=1}^{I}u_i(\hat{x},\theta_{\hat{i}})=v(\hat{x},\theta_s)+v(\hat{x},\theta_i)$$

The *allocative efficiency* can be calculated according to the following formula:

$AE=\dfrac{\hat{w}(\hat{o})}{w'(o')}$, where $w'(o')$ meets the condition $\nexists\ (o'')\,|\,w(o'')>w(o')$

The *social welfare distribution* can be calculated according to the following formula:

Social welfare for the winner of buyers: $FB=\dfrac{u_{\hat{i}}(\hat{x})}{w(\hat{x},\hat{i})}$

Social welfare for the seller: $FS=\dfrac{u_s(\hat{x})}{w(\hat{x},\hat{i})}$

5.6.2 Users' satisfaction

Users' satisfaction with outcome was measured by directly asking how satisfied the agents were with the outcome (e.g., Gillespie, Brett, & R.Weingart, 2000; Oliver, Balakrishnan, & Barry, 1994). Similarly, Novemsky (2004) measured users' satisfaction

with two questions: 1) how satisfied the agents were with the outcome, and 2) how satisfied the agents were with the process.

In contrast to the previous work, we measured the agents' satisfaction with outcome and process separately, since we believed them to be correlated but conceptually different. We compiled four items to measure agents' satisfaction with the outcome.

Market exchange takes place among multiple parties. Thus, the dependency of their interaction needs to be managed and coordinated (Malone & Crowston, 1994; Ströbel & Weinhard, 2003). According to the literature review discussed in section 3.5.2, several factors could affect users' satisfaction with the process, such as *perceived ease of process* (Chin, Diehl, & Norman, 1988), *perceived usefulness of process* (Davey & Olson, 1998; Rangaswamy & Shell, 1997; Vinze, 1992), and *confidence in the process* (Benbasat & Lim, 1993; Davis & Kottemann, 1994). Based on these studies, we compiled four items to measure agents' satisfaction with the process.

Previous review has also indicated that agents in the exchange context are not only utility driven, but also goal-achievement motivated. Their satisfaction with self-performance can be affected by their task-goal or outcome-goal orientation. Thus, when we measured the self-performance satisfaction of agents, we included questions about subjective evaluation of own performance in conducting the task and achieving the results. Four items were used to measure agents' satisfaction with self-performance.

All the items used to measure users' satisfaction are in the form of seven-point Likert scales. These satisfaction questionnaires can be found in Appendix D.

6 RESULTS

6.1 Descriptive statistics

In total, 321 students participated in our experiment, which included several sessions for pilot studies. Most of the participants were between 20 and 30 years old. Table 6.1 shows the descriptive analysis of the effective samples for this study, i.e. those instances with complete questionnaires that enabled us to conduct analysis on both objective and cognitive measures. The data analysis of subjective measures is only for the buyer side (i.e. the music companies) because there was no auctioneer in auction sessions. In order to balance the comparison, the data for subjective measures from the seller side in Imbins have been dropped.

Table 6.1: Descriptive statistics of samples

Treatment		Imbins	InAuction	Overall
No. of instances		20	27	47
Female		35	47	82
Male		25	34	59
No. of participants		60	81	141
Seller's utility	Minimum	19	2	2
	Mean	34.6	30.17	31.9
	Median	33.5	30.5	31.5
	Maximum	60	45	60
	Standard deviation	12.33	10.49	11.35
Buyer's utility	Minimum	-36	-16	-36
	Mean	4.95	9.43	7.64
	Median	4	7	6
	Maximum	32	28	32
	Standard deviation	16.48	10.36	13.18
Social welfare	Minimum	22	13	13
	Mean	39.5	39.6	39.58
	Median	42	41	41
	Maximum	51	50	51
	Standard deviation	9.78	8.99	9.22
No. of over-bids		5 (25%)	2 (0.7%)	7 (14.9%)
No. of Mosico as the winner		5	7	12
No. of Cory as the winner		8 (40%)	14 (51.9%)	22
No. of Uli as the winner		7	9	16

In the effective data set, there are 20 instances in Imbins and 27 instances in InAuction (i.e. 47 instances in total). Both treatments had more female participants, but the ratio of female to male participants was similar: 71.4% in Imbins and 72.3% in InAuction.

The highest social welfare resulted from negotiations, but was very close to the maximum in auctions. According to the designed preference structure, Cory was the pre-defined winner, i.e., had better utility function and should be the winner. The descriptive statistics showed that the ratio for Cory as the winner in negotiations was 40%, which was lower than the 51.9% in auctions. Thus, auctions seem better than negotiations.

6.2 Reliability and validity

Two sets of measures are used in this study. One set was objective measures, generated from the transaction process. The other was subjective measures that were administered through questionnaires. Subjective measures needed to be checked for their reliability and validity before any further testing was conducted.

Initially, twelve items were used to measure the users' satisfaction with outcome, self-performance, and process (i.e., four items for each construct). In order to test the reliability and validity of these items, an exploratory factor analysis (EFA) was conducted. In the EFA, we used maximum likelihood as the extraction method. Promax (with kappa=4) was used as the rotation method, because it is effective when there are possible correlations among factors. The first EFA gave very good results. Only one item loaded relatively low at 0.527. Although items with loading greater than 0.5 can be accepted in an EFA, we decided to drop this item (i.e. the item of Sat_self2 in Appendix D) because the remaining items have consistent loading of above 0.75.

After we dropped the lowest loading item, we ran another EFA. Table 6.2 shows the output from SPSS, which indicates that the measurement has both internal and discriminate validity. Cronbach's Alphas, as the index of internal reliability, are also shown in the table.

6.3 Comparison tests

We conducted several comparisons to examine the differences and similarities of the mechanisms. First, we compared the treatments of Imbines and InAuction in terms of economic measures. Then, the comparisons of agents' satisfaction were conducted. The independent variables were adjusted according to the dependent variables.

Table 6.2 Validity and reliability of satisfaction measures

Items	Factor			Cronbach's Alpha
	1	2	3	
Sat_outcome1	**.881**	.013	.045	0.938
Sat_outcome2	**.878**	.091	-.020	
Sat_outcome3	**.920**	-.031	-.022	
Sat_outcome4	**.882**	-.065	-.005	
Sat_self1	.038	.062	**.785**	0.863
Sat_self3	.081	.012	**.822**	
Sat_self4	-.093	.046	**.766**	
Sat_process1	.032	**.873**	-.007	0.933
Sat_process2	.072	**.904**	-.030	
Sat_process3	-.114	**.884**	.047	
Sat_process4	.020	**.792**	.085	

6.3.1 The comparison of economic measures

In the economic comparison, the measures include the seller's utility (i.e., the musician's side in the case), the buyers' utility, and the social welfare. All these measures are taken at the transaction instance level (i.e., each instance involves several parties as a group).

Accordingly, the independent variables in the research model are restricted by mechanisms only.

Grouped by treatments (i.e. auction or negotiation), a Mann-Whitney U test was conducted to compare the seller's utilities, the buyers' utilities and the social welfare. Non-parametrical independent sample tests are appropriate for such an experiment design, with distributive utility values (Strecker, 2004). The output of the Non-parametric Mann-Whitney test is shown in Appendix C1. According to the results, mechanisms have no significant effect on the seller's utilities, the buyers' utilities, or the social welfare. Therefore, the hypotheses of HA1, HA2 and HB cannot be confirmed. One reason that no significant effect is found is the small sample size, which cannot give enough power to this statistic test.

6.3.2 The comparison of agents' satisfaction

Agents in a market are assumed to maximize their utilities. According to motivation theories, agents' satisfaction should be affected by the utilities they gained. Thus, we need to take the utility as an independent variable when comparing agents' satisfaction. Besides mechanisms and utilities, we also assigned a construct for gender of the agent as an independent variable in the research model. All these measures are taken at the individual level.

An issue regarding utility measurement needs to be addressed. The variable of utility in this experiment has a special feature that it is not a pure continuous variable. When an

agent wins, s/he receives a certain value that can be positive, zero, or negative[18]. When the agent does not win, utility received will always be zero. In order to adapt to such a feature of utility function, three statistical comparisons of users' satisfaction were conducted.

The first statistical test was conducted using all effective participants in the experiment. The second test was conducted with only the winners, where the utilities that agents gained can be treated as a continuous variable. The final test was conducted among non-winners only, in which all agents gained zero utility.

The first test: satisfaction over the entire effective samples

In the first test, we transform the utility as a categorical variable named *winner* as: 1, when a participant wins with positive utility value; -1, when s/he wins with negative utility; 0 when s/he does not win or wins with zero utility.

In order to compare the effect of mechanisms on the economic outputs and the users' satisfaction, the multivariate analysis of variance (MANOVA) method is used. MANOVA is useful for examining the potential patterns of covariance among dependent variables, which is impossible for univariate analysis (Lattin, Carrol, & Gree, 2003).

The output of this test is shown in Appendix C2: the MANOVA test for the effect of mechanism, gender, and utility on satisfaction of the effective sample. According to the test results, gender (as an individual variable) and mechanisms have no significant effect

[18] In the current study, utility is treated as the score based on agents' own preferences, which was given in a form of value function. Accordingly, zero utility means no gain and no lost in terms of the score based on agents' value function

on users' satisfaction. Winner (as the outcome variable transferred from utility) has a very strong effect on users' satisfaction. Agents who win with positive utility get more satisfaction than those who do not win. Agents who win with negative utility get less satisfaction than those with zero utility. This finding is consistent with the theoretical prediction, but leaves a question unanswered: why do agents try to win the game although they are not satisfied with an outcome of negative value?

The second test: agents' satisfaction among winners

In order to further examine the effect of utility, a multivariate analysis of covariance (MACOVA) test that takes utility as a covariate variable was conducted among the winners. The SPSS output is shown in Appendix C3: MACOVA test for the effect of mechanism, gender, and utility on satisfaction among winners. According to the output, utility still has a significant effect on users' satisfaction, but gender and treatment do not in the overall test. The test of between-subjects effect indicates that gender has a significant effect on satisfaction with outcome and self-performance respectively. The female winners have less satisfaction than male winners with outcome and self-performance.

The third test: agents' satisfaction among non-winners

Another MANOVA test was conducted among the non-winner agents. Utility is eliminated from the comparison as an independent variable because all non-winner agents receive zero utility. The output is shown in Appendix C4: MANOVA test for the effect of mechanism and gender on satisfaction among non-winners.

The statistical results show that the p-value, which indicates whether mechanisms have a significant effect on the three types of satisfaction in the overall test, is 0.057. The

results are still reported, since this value is very close to the commonly used significant value 0.05. The test of between-subjects effect indicates that mechanisms have a significant effect on non-winners' satisfaction with outcome. Non-winners in auction have significantly more satisfaction with outcome than non-winners in negotiation. At a 0.1 level, mechanisms have a significant effect on non-winners' satisfaction with self-performance. Non-winners in auction reach a higher level of satisfaction with self-performance than those in negotiation. The effect between mechanisms and satisfaction with process is not significant. Furthermore, no significant effect of gender on non-winners' satisfaction was found.

6.3.3 Summary of the results of hypotheses test

Table 6.3 Summery of hypotheses test

No.	Description	Supported or ascertained
HA1	The seller' utility will be higher in an English auction than in a negotiation.	Not supported.
HA2	The buyer's utility will be lower in an English auction than in a negotiation.	Not supported.
HB	The social welfare in an English auction will be less than that in a negotiation.	Not supported.
HC	The utilities gained by agents will positively impact their satisfaction with: 1. the outcome 2. self-performance 3. process	Supported among all buyers and winners, except non-winners
HD	0. Negotiation will lead to higher satisfaction with the outcome, or a. Auction will lead to higher satisfaction with the outcome	Not ascertained among all buyers or winners. HD_a is supported among non-winners.
HE	0. Negotiation will lead to higher satisfaction with self-performance, or a. Auction will lead to higher satisfaction with self-performance	Not ascertained among all buyers or winners. HE_a is supported among non-winners at 0.1 significant level
HF	Agents will attain higher level of satisfaction with the process in auction than in negotiation.	Not supported

7 IMPLICATIONS AND CONCLUSION

Our study has several contributions to make to e-market research. First, it theoretically addresses why a socio-economic approach is needed for market research. It opens the door to research that integrates other theories, such as SET and motivation theories, in market exchange research. These theories can be used to complement economic exchange theories in order to further understand agents' behaviors in a market.

Second, various types of variables related to e-market assessment are identified and defined. Their natures have been discussed, which helps improve their validity in measures selection and operationalization. A wide literature review identifies eight categories of agents' satisfaction regarding e-market exchange. The empirical tests prove that three of them (i.e., satisfaction with outcome, self-performance, and process) are correlated but theoretically different. Researchers willing to pursue the development of an instrument measuring users' satisfaction in market exchange can further define and improve the measurement and reliability of the remaining types.

Taking the entire effective samples into consideration, no significant effect of different mechanisms on economic measures (i.e., seller's utility, buyer's utility and social welfare) is found in the current study. The results concerning market efficiency are consistent with Thomas & Wilson's studies (2002; 2005). The empirical tests of subjective measures indicate that agents in e-market exchange are driven by the goal of utility maximization, since the utilities that the agents gained positively impact all the satisfaction.

Among the winners, utility also has a significantly positive effect on agents' satisfaction. It is also found that gender as an individual characteristic has a significant

effect on agents' satisfaction with outcome and self-performance. Female participants gained less satisfaction with outcome and process.

Among the non-winners, it is found that mechanisms have a significant effect on agents' satisfaction with outcome. At a 10% level, mechanisms have significant effect on agents' satisfaction with self-performance. Auction leads to higher levels of agents' satisfaction with outcome and self-performance. A possible reason is that English auctions provide fast and accurate feedbacks (through the revelation of current best bid) to agents in the market during the exchange, while this may not be available in negotiations.

Basically, the research questions raised at the beginning of this study have been answered. Combining the results of all the experiments, we see that agents in market exchange can be impacted psychologically, although there is no significant economic difference. This is an important implication for market and mechanism designers. A well designed market or mechanism can reduce the negative impacts on users, which will encourage them to adopt and continue to use the technology.

The current study also has several limitations, leaving openings future to improve the current work or answer additional questions. The discussion about the limitations and related future work follows.

The first limitation is the small sample size. The current study uses only 20 negotiation and 27 auction instances. This sample size is quite small compared with traditional economic experiments. This is one possible reason that no significant effect is found

among economic measures. Thus, replication of the current experiment will improve the results.

Second, only three categories of satisfaction (i.e., agents' satisfaction with outcome, self-performance, and process) were examined, although eight are identified in literature. The developed measures of users' satisfaction need to be further validated and their reliability needs to be re-tested. The remaining categories need to be further examined and developed in future work. Moreover, other types of psychological variables (e.g., users' belief about fairness or trust) also need to be further investigated in order to understand how users evaluate a market and the embedded mechanisms.

Third, two more mechanisms can be further compared with the two featured in current study. Initially it was planned to compare four mechanisms: multi-bilateral negotiation, verifiable negotiation, limited-information English auction, and Vickery auction. However, this would have tremendously increased the complexity of the experiment and required a much larger sample size. For this reason we dropped two of the mechanisms. In the future work, the remaining two mechanisms should be included in the comparison. The joint results will reveal more interesting findings.

Fourth, motivation types and strength were not measured in the current study, leaving the over-bid behaviors unexplainable. In future work, the types and strength of agents' motivations need to be measured in order to explain why agents still over-bid (even gain negative utility) when they are not satisfied with the outcome.

Finally, the integration of the current study with another conducted in the same project (e.g., Kolitz & Neumann, 2007) can be used to explore a possible alignment among different types of users' satisfaction. For many years, we have tried to build a framework for users' assessment of e-market systems. An alignment of all types of users' satisfaction will make a great contribution to this work.

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APPENDICES

A. The application of the Montreal Taxonomy for Electronic Negotiation

Mechanism criteria and features		Auction	Negotiation
Category	**Name**		
Mechanism	Type	Single-sided	Multi-bilateral
General rules	Rule variation	The rules for the process are fixed	
	Rounds	Multiple	Multiple
	Admission	Closed	Closed
	Object	Single	Single
Offer specification	Attributes	Multiple	Multiple
	Values	Single	Structured part is single; Message (unstructured part) maybe any and is unenforceable
	Structure	Closed	Structured part is closed; unstructured part is open and free text with unenforceable content
	Format	Single structure; table format	A 2-touple: (1) Single structure; table format, and (2) Open structure, message box.
	Content	Uniform and complete (complete offers can be made)	Structured part: uniform and complete; Unstructured: not uniform and may be incomplete.
Offer submission	Sides	One side only	Structured part is only one side; unstructured part is two side
	Number of offers	Single or sequentially multiple	Single or sequentially multiple
	Composition	Structured offer	Structured offer w/out message
	Activity	*Event based: A process with a restricted event-based activity rule will end if a certain event occurs, such as a period of inactivity. Another event could be a time-based termination, i.e. the process closes at a specified point in time and no offers are received or processed after this deadline.*	*Event based and user input* *User input: An event-based activity rule can be further specified as one in which user-input could end the process. Such activities might be break-down of the negotiation or closing the deal with an agreement.*
	Direction	Reverse	Structured offer: reverse Message which may contain full or partial offers: Both
Offer analysis	Offer value	Ascending	Undefined

Mechanism criteria and features		Auction	Negotiation
Category	**Name**		
		(If buyer's utility revealed) otherwise—undefined	
Offer matching	Evaluation	Individual (buyer) utility value	Individual (buyer) utility value
	Resolution	Time defined if reservation level met; otherwise failure. However it is not decided when to check the reservation level or if it is necessary for the experiments.	Buyer's decision within allocated time; otherwise failure
Offer acceptance	Discrimination	Non discrimination meaning same good from every seller has exact the same value for the buyer.	
	Commitment	Current best offer is binding	Binding last offers; Message statement making a commitment to the counterpart is binding. E.g. "If you go down to 20 with the price I will accept your offer"
Termination		Time-based	Agreement- or time-based
Information	message-sides	none	multiple *(but not between sellers)*
	negotiation	Logged (The interaction history of the current process execution is available to the agents (logged))	Hybrid (The agents might have a different degree of information available describing the interaction history) *in this case buyer vs. sellers*
	transparency	Public (The current status of the process e.g. the best offer is available to all agents)	Asymmetric (The current highest bid is visible to a subset of the involved agents, *in this case to the buyer*)

B. Experiment case

B1. Public information

Contract negotiation between Ms. Sonata and three entertainment companies

Public information

Ms. Sonata is a young and not yet widely recognized singer of a new genre. She writes her songs and plays a specially constructed electric piano. She is a singer of yowl-pop, a new music genre that—according to her admirers—helps listeners to better understand their inner selves. Ms. Sonata is a reclusive person who is happiest when entertaining a small friendly audience. In order to have her songs heard by millions as opposed to only a few hundred, Ms. Sonata decided, albeit reluctantly, to sign a contract with a major entertainment agency.

Fado, young and energetic, is an independent agent who has a reputation of being able to establish a good relationship with often eccentric artists, as well as with the agencies. Ms. Sonata hates direct engagement with any kind of a business deals. Therefore, she asked Fado, whom she knows and trusts, to represent her in the contract negotiation.

Fado, the agent representing Ms. Sonata, contacted three entertainment companies: **WorldMusic**, **EnterMusic** and **UniMusic,** for contract discussion. These companies pride themselves as the best promoters of promising young artists.

The representative of WorldMusic is **Mosico,** of EnterMusic - **Cory,** and of UniMusic - **Uli.** They are young and ambitious contract managers; already well established in the world of music. They have been involved in several successful contract negotiations and are known for their ability to promote very good artists.

The artists' association together with the industry representatives has elaborated a standard framework for conducting this kind of contract negotiations. The contract is comprised of four issues and a limited number of options per issue for negotiation:

Standard issues and their options in a contract negotiation

Issues to negotiate	Issue options
Number of promotional concerts (per year)	5; 6; 7; 8; 9; or 10
[illegible]	[illegible]
Royalties for CDs (percentage)	1.5; 1.75; 2; 2.25; 2.5; 2.75; 3
[illegible]	[illegible]

B2. Private information for Fado who represent Mrs. Sonata

Role information for Fado, Ms. Sonata's agent

Private information

Your name is **Fado**, an independent agent representing artists. You pride yourself for being an artists' agent as well as their supporter. You want to build a relationship with the artists, so that they use your services for many years. You prefer representing artists who have strong potential and are genuinely willing to work hard on their careers.

You agreed to represent **Ms. Sonata**, a very talented young artist, in the negotiation of her first contract. Her fans find her songs calming yet invigorating, exciting yet soothing, and they are absolutely certain that her music will soon conquer the world. Ms. Sonata believes in her art and in making people's lives better and happier. While she is not a widely recognized singer yet, you think she has great potential to gain international fame.

You contacted three companies: **WorldMusic**, **EnterMusic** and **UniMusic**; they are prestigious entertainment agencies involved in the production of CDs, the organization of concerts and other events. Your contact in the WorldMusic agency is **Mosico**, in EnterMusic - **Cory** and in UniMusic - **Uli**. They expressed interest in signing a first contract with Ms. Sonata.

In order to well represent Ms. Sonata's interests, you tried to find out her preferences based on several meetings. After some initial difficulties, the discussion improved and you were able to capture her preferences in the following tables.

Each issue has several options to choose from. An option rating reflects Ms. Sonata's preferences towards this option. The more points an option receives, the more it is preferred. The highest rating is assigned to the best option for Ms. Sonata because this option is considered most profitable. Lower rating values are given to options, which are less advantageous. A rating of zero is assigned to the option, which is neither preferred nor displeasing for Ms. Sonata. Negative ratings are assigned to options that clearly create a disadvantage, and therefore they should be avoided.

1. Promotional concerts (per year)

Options	Rating
5	10
[illegible]	[illegible]
(best) 7	30
[illegible]	[illegible]
9	0
[illegible]	[illegible]

2. New songs (per year)

Options	Rating
(best)10	10
[illegible]	[illegible]
12	6
[illegible]	[illegible]
14	-2
[illegible]	[illegible]
(worst)16	-10

3. Royalties for CDs (percentage)

Options	Rating
(worst)1.5	-10
2	-4
2.5	2
(best) 3	10

4. Contract signing bonus (thousand $)

Options	Rating
(worst)150	-10
200	1
250	5
(best) 300	10

Ms. Sonata reviewed these tables you prepared and agreed that the information accurately represents her interests.

Examples of rating calculations

For every offer, the overall rating is computed as the sum of its specific option ratings. The table below gives two examples of rating calculations. Offer 1 and Offer 2 have different combination of options. Every option has a rating that is determined from Ms. Sonata's interests. Consequently, Offer 1 is rated 27 (sum of option ratings) and it represents a favorable solution for her. While, Offer 2 is rated -9, which is an unfavorable solution.

Issue	Option	Rating	Option	Rating
Number of concerts	6	20	9	0
Royalties of CDs (%)	2	-4	1.75	-7
Total		**27**		**-9**

These calculations are based only on the interests of Ms.Sonata and no other. Be aware that the entertainment companies may have a different rating for the very same offers because their interests might not be the same as hers!

Fado's commission

In case you obtain this contract, you will receive a commission which is 100 times the total rating achieved in the agreement. If Offer 1 were accepted, then you would have earned 27 * 100 = $2,700 more, on top of your flat fee. However, if Offer 2 were accepted, then your fixed fee would decrease by $900 (-9*100) because of this offer has a negative rating.

Assessment of entertainment agencies' interests

Based on previous experience, Fado knows that in general, entertainment agencies like artists to perform many concerts, produce many songs, and pay as little royalties and signing

bonuses as possible. However there are exceptions. For example, a company may prefer to pay more royalties in order to retain an artist. Another company would want less promotional concerts so that the artist would concentrate more on writing new songs.

You should take into account Ms Sonata's interest and this information on entertainment agencies during your negotiation.

B3. Private information for Mosico who represent WorldMusic

Role information for Mosico, WorldMusic manager

Private information

WorldMusic Entertainment Agency is a well known and respected company. It competes with other renowned entertainment agencies, including **EnterMusic** and **UniMusic** to promote promising young artists.

Your name is **Mosico**, a contract manager in the WorldMusic. You have been recognized for your ability to connect with both well-known and relatively unknown but promising artists. You are also able to negotiate with artists and their agents in a way that they find agreeable.

Recently, **Fado**, the agent of **Ms. Sonata,** approached you and showed a genuine interest towards signing a music contract with Ms. Sonata. So far, you have heard that Ms. Sonata is a reclusive rising star with an exceptional voice. Currently, it is not yet clear if she could really attract large audiences and CD buyers.

Before meeting Fado, you had several meetings with senior managers about representing WorldMusic's priorities. Based on the company's resources and past experience with artist like Ms. Sonata, they gave you information regarding the importance of the negotiated issues and options, which you put it in the tables below.

You presented the tables to the management who agreed with them. Table 1 shows that the more concerts an artist performs the better it is for the company. Tables 2 and 4, reflect the interest in getting more songs, and paying lower bonus rather than higher. Table 3 however, shows that the best option for royalties paid out is neither too much nor too little; because too much royalty is costly and too little gives the impress that the company is not genuine.

Each issue has several options to choose from. The rating of an option reflects the company's interests towards this option. The more points an option receives, the more it is preferred. The highest rating is assigned to the best option for the company because this option is considered most profitable. Lower rating values are given to options, which are less advantageous. A rating of zero is assigned to the option, which is neither profitable nor costly for the company. Negative ratings are assigned to options that clearly create a disadvantage, and therefore they should be avoided.

Table 1. Promotional concerts (per year)

Options	Rating
(worst) 5	-10
[illegible]	[illegible]
7	-1
[illegible]	[illegible]
9	10
[illegible]	[illegible]

Table 2. New songs (per year)

Options	Rating
(worst)10	-10
[illegible]	[illegible]
12	-4
[illegible]	[illegible]
14	0
[illegible]	[illegible]
(best) 16	6

Table 3. Royalties for CDs (percent)

Table 4. Contract signing bonus ($ in

Options	Rating
1.5	5
[illegible]	[illegible]
(best) 2	13
[illegible]	[illegible]
2.5	0
[illegible]	[illegible]
(worst) 3	-15

thousand)

Options	Rating
(best) 150	18
[illegible]	[illegible]
200	2
[illegible]	[illegible]
250	-5
[illegible]	[illegible]
(worst) 300	-10

Examples of rating calculations

For every offer, the overall rating is computed as the sum of its specific option ratings. The table below gives two examples of rating calculations. Offer 1 and Offer 2 have different combination of options. Every option has a rating that is determined from the company's interests. Consequently, Offer 1 is rated 19 (sum of option ratings) and it represents a positive return for the company. While, Offer 2 is rated -12, which means a loss for the company.

Issue	Option	Rating	Option	Rating
Number of concerts	9	10	6	-5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Royalties of CDs (%)	1.75	8	2.25	7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	**19**		**-12**

These calculations are based only on the interests of WorldMusic and no other. Be aware that Ms. Sonata and other companies may have a different rating for the very same offers because their interests might not be the same as yours!

Mosico's commission

In case you obtain this contract, you will receive a commission which is 100 times the total rating achieved in the agreement. If Offer 1 were accepted, then you would have earned 19 * 100 = $1,900. However, if Offer 2 were accepted, then your yearly commission would decrease by $1,200 (-12*100) because of this offer has a negative rating.

Assessment of Ms. Sonatas interests

You have been able to get the following important information about Ms. Sonata's interests. She will be reluctant to perform in too many concerts, but understand the need to reach out to her audience. Given Ms. Sonata's nature, she has a high standard for producing songs and would not like to write too many in any given year. As expected, she prefers higher royalties and signing bonuses.

You should take into account your company's option ratings and this information on Ms. Sonata to formulate your offers, which would be most profitable for the company.

B4. Private information for Cory who represent EnterMusic

Role information for Cory, EnterMusic manager

Private information

EnterMusic Entertainment Agency is a well known and respected company. It competes with other renowned entertainment agencies, including **WorldMusic** and **UniMusic**, to promote promising young artists.

Your name is **Cory**, a contract manager in the EnterMusic. You have been recognized for your ability to connect with both well-known and relatively unknown but promising artists. You are also able to negotiate with artists and their agents in a way that they find agreeable.

Recently, **Fado**, the agent of **Ms. Sonata,** approached you and showed a genuine interest towards signing a music contract with Ms. Sonata. So far, you have heard that Ms. Sonata is a reclusive rising star with an exceptional voice. Currently, it is not yet clear if she could really attract large audiences and CD buyers.

Before meeting Fado, you had several meetings with senior managers about representing EnterMusic's priorities. Based on the company's resources and past experience with artist like Ms. Sonata, they gave you information regarding the importance of the negotiated issues and options, which you put it in the tables below.

You presented the tables to the management who agreed with them. Table 1 shows that the more concerts an artist performs the better it is for the company. Table 2 indicates that it is better for the firm when the artist produces more new songs. Tables 3 reflects the interest in paying lower royalties rather than higher. Table 4 however, shows that the company prefers to pay a low signing bonus but not a very low one, because management can used the bonus to build goodwill.

Each issue has several options to choose from. The rating of an option reflects the company's interests towards this option. The more points an option receives, the more it is preferred. The highest rating is assigned to the best option for the company because this option is considered most profitable. Lower rating values are given to options, which are less advantageous. A rating of zero is assigned to the option, which is neither profitable nor costly for the company. Negative ratings are assigned to options that clearly create a disadvantage, and therefore they should be avoided.

Table 1. Promotional concerts (per year)

Options	Rating
(worst) 5	-10
7	0
9	12

Table 2. New songs (per year)

Options	Rating
(worst)10	-10
12	-4
14	6
(best) 16	18

Table 3. Royalties for CDs (percent)

Options	Rating
(best) 1.5	6
2	2
2.5	-4
(worst) 3	-10

Table 4. Contract signing bonus (thousand $)

Options	Rating
150	10
(best) 200	18
250	6
(worst) 300	-10

Examples of rating calculations

For every offer, the overall rating is computed as the sum of its specific option ratings. The table below gives two examples of rating calculations. Offer 1 and Offer 2 have different combination of options. Every option has a rating that is determined from the company's preferences. Consequently, Offer 1 is rated 20 (sum of option ratings) and it represents a positive return for the company. While, Offer 2 is rated -12, which means a loss for the company.

Issue	Option	Rating	Option	Rating
Number of concerts	7	0	6	-6
Royalties of CDs (%)	2.5	-4	2	2
	Total	**20**		**-12**

These calculations are based only on the interests of EnterMusic and no other. Be aware that Ms. Sonata and other companies may have a different rating for the very same offers because their interests might not be the same as yours!

Cory's commission

In case you obtain this contract, you will receive a commission which is 100 times the total rating achieved in the agreement. If Offer 1 were accepted, then you would have earned 20 * 100 = $2,000. However, if Offer 2 were accepted, then your yearly commission would decrease by $1,200 (-12*100) because of this offer has a negative rating.

Assessment of Ms. Sonatas interests

You have been able to get the following important information about Ms. Sonata's interests. She will be reluctant to perform in too many concerts, but understand the need to reach out to

her audience. Given Ms. Sonata's nature, she has a high standard for producing songs and would not like to write too many in any given year. As expected, she prefers higher royalties and signing bonuses.

You should take into account your company's option ratings and this information on Ms. Sonata to formulate your offers, which would be most profitable for the company.

B5. Private information for Uli who represent UniMusic

Role information for Uli, UniMusic manager

Private information

UniMusic Entertainment Agency is a well known and respected company. It competes with other renowned entertainment agencies, including **EnterMusic** and **WorldMusic** to promote promising young artists.

Your name is **Uli**, a contract manager in the UniMusic. You have been recognized for your ability to connect with both well-known and relatively unknown but promising artists. You are also able to negotiate with artists and their agents in a way that they find agreeable.

Recently, **Fado**, the agent of **Ms. Sonata,** approached you and showed a genuine interest towards signing a music contract with Ms. Sonata. So far, you have heard that Ms. Sonata is a reclusive rising star with an exceptional voice. Currently, it is not yet clear if she could really attract large audiences and CD buyers.

Before meeting Fado, you had several meetings with senior managers about representing UniMusic's priorities. Based on the company's resources and past experience with artist like Ms. Sonata, they gave you information regarding the importance of the negotiated issues and options, which you put it in the tables below.

You presented the tables to the management who agreed with them. Table 1 shows that the more concerts an artist performs the better it is for the company. Tables 3 and 4, reflect the interest in paying lower royalties and lower bonus rather than higher. Table 2 however, shows that the best number of songs is neither too much nor too little, because too many songs are costly to put on a CD and too few makes the CD difficult to sell.

Each issue has several options to choose from. The rating of an option reflects the company's interests towards this option. The more points an option receives, the more it is preferred. The highest rating is assigned to the best option for the company because this option is considered most profitable. Lower rating values are given to options, which are less advantageous. A rating of zero is assigned to the option, which is neither profitable nor costly for the company. Negative ratings are assigned to options that clearly create a disadvantage, and therefore they should be avoided.

Table 1. Promotional concerts (per year)

Options	Rating
(worst) 5	-10
6	-8
7	-2
8	0
9	14
(best) 10	18

Table 2. New songs (per year)

Options	Rating
(worst) 10	-10
11	0
12	6
13	12
(best) 14	18
15	13
16	10

Table 3. Royalties for CDs (percent)

Table 4. Contract signing bonus

Options	Rating
(best) 1.5	18
1.75	10
2	4
2.25	0
2.5	-5
2.75	-8
(worst) 3	-10

(thousand $) Options	Rating
(best) 150	6
175	4
200	2
225	0
250	-4
275	-7
(worst) 300	-10

Examples of rating calculations

For every offer, the overall rating is computed as the sum of its specific option ratings. The table below gives two examples of rating calculations. Offer 1 and Offer 2 have different combination of options. Every option has a rating that is determined from the company's preferences. Consequently, Offer 1 is rated 20 (sum of option ratings) and it represents a positive return for the company. While, Offer 2 is rated -12, meaning a loss for the company.

Issue	Option	Rating	Option	Rating
Number of concerts	9	14	6	-8
Number of new songs	11	0	12	6
Royalties of CDs (%)	1.75	10	2.25	0
Signing Bonus ($ in thousand)	250	-4	300	-10
Total		**20**		**-12**

These calculations are based only on the interests of UniMusic and no other. Be aware that Ms. Sonata and other companies may have a different rating for the very same offers because their interests might not be the same as yours!

Uli's commission

In case you obtain this contract, you will receive a commission which is 100 times the total rating achieved in the agreement. If Offer 1 were accepted, then you would have earned 20 * 100 = $2,000. However, if Offer 2 were accepted, then your yearly commission would decrease by $1,200 (-12*100) because of this offer has a negative rating.

Assessment of Ms. Sonatas interests

You have been able to get the following important information about Ms. Sonata's interests. She will be reluctant to perform in too many concerts, but understand the need to reach out to her audience. Given Ms. Sonata's nature, she has a high standard for producing songs and would not like to write too many in any given year. As expected, she prefers higher royalties and signing bonuses.

You should take into account your company's option ratings and this information on Ms. Sonata to formulate your offers, which would be most profitable for the company.

B6. Preferences structure

Issue	*Option*	*Fado (Ms.Sonata)*	*Mosico (WorldMusic)*	*Enico (EnterMusic)*	*Unico (UniMusic)*
Number of promotional concerts (per year)	5	10	**-10**	**-10**	**-10**
	6	20	-5	-6	-8
	7	30	-1	0	-2
	8	20	0	2	0
	9	0	10	12	14
	10	**-10**	**18**	**18**	**18**
Number of new songs (per year)	10	10	**-10**	**-10**	**-10**
	11	8	-7	-8	0
	12	6	-4	-4	6
	13	2	-1	0	12
	14	-2	0	6	**18**
	15	-8	4	12	13
	16	**-10**	6	**18**	10
Royalties for CDs (in percent)	1.5	**-10**	5	6	**18**
	1.75	-7	8	4	10
	2	-4	**13**	2	4
	2.25	-1	7	0	0
	2.5	2	0	-4	-5
	2.75	5	-8	-7	-8
	3	10	**-15**	**-10**	**-10**
	3.25	**-10**	**18**	10	6
Contract signing bonus (in thousands of $)	125	-4	6	13	4
	150	1	2	**18**	2
	175	3	0	12	0
	200	5	-5	6	-4
	225	8	-8	0	-7
	250	10	**-10**	**-10**	**-10**
	275	10	**-10**	**-10**	**-10**
	300	20	-5	-6	-8

C. SPSS outputs for comparison tests

C1. Non-parametric Mann-Whitney Test for social welfare, sellers', and buyers' utility

Ranks

	Treatment	N	Mean Rank	Sum of Ranks
Seller_utility	0	30	24.03	721.00
	1	20	27.70	554.00
	Total	50		
Bidder_utility	0	30	27.25	817.50
	1	20	22.88	457.50
	Total	50		
Welfare	0	30	25.28	758.50
	1	20	25.83	516.50
	Total	50		

Test Statistics(a)

	Seller_utility	Bidder_utility	Welfare
Mann-Whitney U	256.000	247.500	293.500
Wilcoxon W	721.000	457.500	758.500
Z	-.873	-1.042	-.129
Asymp. Sig. (2-tailed)	.383	.298	.897

a Grouping Variable: Treatment

C2. MANOVA test for the effect of mechanism, gender, and utility on satisfaction of the effective sample

Multivariate Tests(c)

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.010	.418(a)	3.000	127.000	.740
	Wilks' Lambda	.990	.418(a)	3.000	127.000	.740
	Hotelling's Trace	.010	.418(a)	3.000	127.000	.740
	Roy's Largest Root	.010	.418(a)	3.000	127.000	.740
winner	Pillai's Trace	.253	6.175	6.000	256.000	.000
	Wilks' Lambda	.750	6.559(a)	6.000	254.000	.000
	Hotelling's Trace	.330	6.940	6.000	252.000	.000
	Roy's Largest Root	.320	13.645(b)	3.000	128.000	.000
Treatment	Pillai's Trace	.028	1.225(a)	3.000	127.000	.303
	Wilks' Lambda	.972	1.225(a)	3.000	127.000	.303
	Hotelling's Trace	.029	1.225(a)	3.000	127.000	.303
	Roy's Largest Root	.029	1.225(a)	3.000	127.000	.303
Gender	Pillai's Trace	.020	.853(a)	3.000	127.000	.467
	Wilks' Lambda	.980	.853(a)	3.000	127.000	.467
	Hotelling's Trace	.020	.853(a)	3.000	127.000	.467
	Roy's Largest Root	.020	.853(a)	3.000	127.000	.467
winner * Treatment	Pillai's Trace	.064	1.406	6.000	256.000	.213
	Wilks' Lambda	.937	1.408(a)	6.000	254.000	.212
	Hotelling's Trace	.067	1.409	6.000	252.000	.211
	Roy's Largest Root	.059	2.497(b)	3.000	128.000	.063
winner * Gender	Pillai's Trace	.064	1.415	6.000	256.000	.209
	Wilks' Lambda	.937	1.405(a)	6.000	254.000	.213
	Hotelling's Trace	.066	1.394	6.000	252.000	.217
	Roy's Largest Root	.038	1.632(b)	3.000	128.000	.185
Treatment * Gender	Pillai's Trace	.014	.611(a)	3.000	127.000	.609
	Wilks' Lambda	.986	.611(a)	3.000	127.000	.609
	Hotelling's Trace	.014	.611(a)	3.000	127.000	.609
	Roy's Largest Root	.014	.611(a)	3.000	127.000	.609
winner * Treatment * Gender	Pillai's Trace	.028	.598	6.000	256.000	.732
	Wilks' Lambda	.972	.596(a)	6.000	254.000	.733
	Hotelling's Trace	.028	.594	6.000	252.000	.735
	Roy's Largest Root	.025	1.050(b)	3.000	128.000	.373

a Exact statistic
b The statistic is an upper bound on F that yields a lower bound on the significance level.
c Design: Intercept+winner+Treatment+gender+winner * Treatment+winner * gender+Treatment * gender+winner * Treatment * gender

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Sat_Outcome	42.949(a)	11	3.904	5.645	.000
	Sat_SelfPerformance	17.038(b)	11	1.549	1.745	.071
	Sat_Process	12.596(c)	11	1.145	1.328	.216
Intercept	Sat_Outcome	.111	1	.111	.160	.690
	Sat_SelfPerformance	.217	1	.217	.245	.621
	Sat_Process	.046	1	.046	.053	.818
winner	Sat_Outcome	28.374	2	14.187	20.510	.000
	Sat_SelfPerformance	7.917	2	3.958	4.460	.013
	Sat_Process	7.557	2	3.779	4.382	.014
Treatment	Sat_Outcome	.064	1	.064	.092	.762
	Sat_SelfPerformance	.744	1	.744	.838	.362
	Sat_Process	.136	1	.136	.157	.692
gender	Sat_Outcome	.001	1	.001	.002	.964
	Sat_SelfPerformance	1.587	1	1.587	1.788	.184
	Sat_Process	.301	1	.301	.349	.556
winner * Treatment	Sat_Outcome	2.883	2	1.441	2.084	.129
	Sat_SelfPerformance	.991	2	.496	.558	.573
	Sat_Process	1.723	2	.862	.999	.371
winner * gender	Sat_Outcome	3.399	2	1.699	2.457	.090
	Sat_SelfPerformance	3.232	2	1.616	1.821	.166
	Sat_Process	1.327	2	.663	.769	.465
Treatment * gender	Sat_Outcome	.510	1	.510	.737	.392
	Sat_SelfPerformance	.221	1	.221	.249	.618
	Sat_Process	.001	1	.001	.001	.970
winner * Treatment * gender	Sat_Outcome	1.044	2	.522	.755	.472
	Sat_SelfPerformance	.731	2	.366	.412	.663
	Sat_Process	.159	2	.079	.092	.912
Error	Sat_Outcome	89.230	129	.692		
	Sat_SelfPerformance	114.502	129	.888		
	Sat_Process	111.244	129	.862		
Total	Sat_Outcome	132.180	141			
	Sat_SelfPerformance	131.540	141			
	Sat_Process	123.840	141			

Corrected Total	Sat_Outcome	132.180	140			
	Sat_SelfPerformance	131.540	140			
	Sat_Process	123.840	140			

a R Squared = .325 (Adjusted R Squared = .267)
b R Squared = .130 (Adjusted R Squared = .055)
c R Squared = .102 (Adjusted R Squared = .025)

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
Sat_Outcome	Intercept	1.157	.251	4.613	.000
	[winner= -1]	-2.441	.869	-2.810	.006
	[winner=0]	-1.363	.307	-4.437	.000
	[winner=1]	0(a)	.	.	.
	[Treatment=Imbins]	-.345	.486	-.711	.478
	[Treatment=InAuction]	0(a)	.	.	.
	[gender=F]	-.570	.335	-1.700	.091
	[gender=M]	0(a)	.	.	.
	[winner=-1] * [Treatment=Imbins]	2.217	1.272	1.743	.084
	[winner=-1] * [Treatment=InAuction]	0(a)	.	.	.
	[winner=0] * [Treatment=Imbins]	-.223	.549	-.406	.685
	[winner=0] * [Treatment=InAuction]	0(a)	.	.	.
	[winner=1] * [Treatment=Imbins]	0(a)	.	.	.
	[winner=1] * [Treatment=InAuction]	0(a)	.	.	.
	[winner=-1] * [gender=F]	1.658	1.223	1.355	.178
	[winner=-1] * [gender=M]	0(a)	.	.	.
	[winner=0] * [gender=F]	.797	.407	1.959	.052
	[winner=0] * [gender=M]	0(a)	.	.	.
	[winner=1] * [gender=F]	0(a)	.	.	.
	[winner=1] * [gender=M]	0(a)	.	.	.
	[Treatment=Imbins] * [gender=F]	.197	.590	.334	.739

	[Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=M]	0(a)	.	.	.
	[winner=-1] * [Treatment=Imbins] * [gender=F]	-1.928	1.611	-1.197	.234
	[winner=-1] * [Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[winner=-1] * [Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[winner=-1] * [Treatment=InAuction] * [gender=M]	0(a)	.	.	.
	[winner=0] * [Treatment=Imbins] * [gender=F]	-.078	.686	-.114	.910
	[winner=0] * [Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[winner=0] * [Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[winner=0] * [Treatment=InAuction] * [gender=M]	0(a)	.	.	.
	[winner=1] * [Treatment=Imbins] * [gender=F]	0(a)	.	.	.
	[winner=1] * [Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[winner=1] * [Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[winner=1] * [Treatment=InAuction] * [gender=M]	0(a)	.	.	.
Sat_SelfPerformance	Intercept	.621	.284	2.188	.031
	[winner=-1]	.420	.984	.426	.670
	[winner=0]	-.768	.348	-2.207	.029
	[winner=1]	0(a)	.	.	.
	[Treatment=Imbins]	-.199	.550	-.362	.718
	[Treatment=InAuction]	0(a)	.	.	.

[gender=F]	-.470	.380	-1.239	.218
[gender=M]	0(a)	.	.	.
[winner=-1] * [Treatment=lmbins]	-.640	1.441	-.444	.658
[winner=-1] * [Treatment=lnAuction]	0(a)	.	.	.
[winner=0] * [Treatment=lmbins]	-.083	.622	-.133	.894
[winner=0] * [Treatment=lnAuction]	0(a)	.	.	.
[winner=1] * [Treatment=lmbins]	0(a)	.	.	.
[winner=1] * [Treatment=lnAuction]	0(a)	.	.	.
[winner=-1] * [gender=F]	-1.078	1.385	-.778	.438
[winner=-1] * [gender=M]	0(a)	.	.	.
[winner=0] * [gender=F]	.774	.461	1.680	.095
[winner=0] * [gender=M]	0(a)	.	.	.
[winner=1] * [gender=F]	0(a)	.	.	.
[winner=1] * [gender=M]	0(a)	.	.	.
[Treatment=lmbins] * [gender=F]	.441	.668	.660	.511
[Treatment=lmbins] * [gender=M]	0(a)	.	.	.
[Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
[Treatment=lnAuction] * [gender=M]	0(a)	.	.	.
[winner=-1] * [Treatment=lmbins] * [gender=F]	.240	1.825	.131	.896
[winner=-1] * [Treatment=lmbins] * [gender=M]	0(a)	.	.	.
[winner=-1] * [Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
[winner=-1] * [Treatment=lnAuction] * [gender=M]	0(a)	.	.	.
[winner=0] * [Treatment=lmbins] * [gender=F]	-.630	.777	-.811	.419

	[winner=0] * [Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[winner=0] * [Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[winner=0] * [Treatment=InAuction] * [gender=M]	0(a)	.	.	.
	[winner=1] * [Treatment=Imbins] * [gender=F]	0(a)	.	.	.
	[winner=1] * [Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[winner=1] * [Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[winner=1] * [Treatment=InAuction] * [gender=M]	0(a)	.	.	.
Sat_Process	Intercept	.587	.280	2.098	.038
	[winner=-1]	-1.084	.970	-1.118	.266
	[winner=0]	-.678	.343	-1.976	.050
	[winner=1]	0(a)	.	.	.
	[Treatment=Imbins]	-.147	.542	-.271	.787
	[Treatment=InAuction]	0(a)	.	.	.
	[gender=F]	-.395	.374	-1.057	.293
	[gender=M]	0(a)	.	.	.
	[winner=-1] * [Treatment=Imbins]	.937	1.421	.659	.511
	[winner=-1] * [Treatment=InAuction]	0(a)	.	.	.
	[winner=0] * [Treatment=Imbins]	-.166	.613	-.271	.787
	[winner=0] * [Treatment=InAuction]	0(a)	.	.	.
	[winner=1] * [Treatment=Imbins]	0(a)	.	.	.
	[winner=1] * [Treatment=InAuction]	0(a)	.	.	.
	[winner=-1] * [gender=F]	.029	1.366	.021	.983
	[winner=-1] * [gender=M]	0(a)	.	.	.
	[winner=0] * [gender=F]	.579	.454	1.275	.205
	[winner=0] * [gender=M]	0(a)	.	.	.

	[winner=1] * [gender=F]	0(a)	.	.	.
	[winner=1] * [gender=M]	0(a)	.	.	.
	[Treatment=lmbins] * [gender=F]	.270	.659	.410	.683
	[Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=M]	0(a)	.	.	.
	[winner=-1] * [Treatment=lmbins] * [gender=F]	-.424	1.799	-.236	.814
	[winner=-1] * [Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[winner=-1] * [Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[winner=-1] * [Treatment=lnAuction] * [gender=M]	0(a)	.	.	.
	[winner=0] * [Treatment=lmbins] * [gender=F]	-.317	.766	-.414	.679
	[winner=0] * [Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[winner=0] * [Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[winner=0] * [Treatment=lnAuction] * [gender=M]	0(a)	.	.	.
	[winner=1] * [Treatment=lmbins] * [gender=F]	0(a)	.	.	.
	[winner=1] * [Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[winner=1] * [Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[winner=1] * [Treatment=lnAuction] * [gender=M]	0(a)	.	.	.

a This parameter is set to zero because it is redundant.

C3. MACOVA test for the effect of mechanism, gender, and utility on satisfaction among winners

Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.302	5.759(a)	3.000	40.000	.002
	Wilks' Lambda	.698	5.759(a)	3.000	40.000	.002
	Hotelling's Trace	.432	5.759(a)	3.000	40.000	.002
	Roy's Largest Root	.432	5.759(a)	3.000	40.000	.002
Utility	Pillai's Trace	.263	4.765(a)	3.000	40.000	.006
	Wilks' Lambda	.737	4.765(a)	3.000	40.000	.006
	Hotelling's Trace	.357	4.765(a)	3.000	40.000	.006
	Roy's Largest Root	.357	4.765(a)	3.000	40.000	.006
Treatment	Pillai's Trace	.023	.319(a)	3.000	40.000	.811
	Wilks' Lambda	.977	.319(a)	3.000	40.000	.811
	Hotelling's Trace	.024	.319(a)	3.000	40.000	.811
	Roy's Largest Root	.024	.319(a)	3.000	40.000	.811
gender	Pillai's Trace	.132	2.032(a)	3.000	40.000	.125
	Wilks' Lambda	.868	2.032(a)	3.000	40.000	.125
	Hotelling's Trace	.152	2.032(a)	3.000	40.000	.125
	Roy's Largest Root	.152	2.032(a)	3.000	40.000	.125
Treatment * gender	Pillai's Trace	.015	.204(a)	3.000	40.000	.893
	Wilks' Lambda	.985	.204(a)	3.000	40.000	.893
	Hotelling's Trace	.015	.204(a)	3.000	40.000	.893
	Roy's Largest Root	.015	.204(a)	3.000	40.000	.893

a Exact statistic
b Design: Intercept+Utility+Treatment+gender+Treatment * gender

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Sat_Outcome	8.269(a)	4	2.067	4.138	.006
	Sat_SelfPerformance	6.933(b)	4	1.733	3.794	.010
	Sat_Process	3.646(c)	4	.911	1.987	.114
Intercept	Sat_Outcome	7.412	1	7.412	14.838	.000
	Sat_SelfPerformance	.903	1	.903	1.977	.167
	Sat_Process	1.168	1	1.168	2.546	.118

Utility	Sat_Outcome	5.280	1	5.280	10.570	.002
	Sat_SelfPerformance	4.306	1	4.306	9.426	.004
	Sat_Process	2.451	1	2.451	5.344	.026
Treatment	Sat_Outcome	.053	1	.053	.107	.746
	Sat_SelfPerformance	.003	1	.003	.007	.933
	Sat_Process	.047	1	.047	.103	.749
gender	Sat_Outcome	2.218	1	2.218	4.440	.041
	Sat_SelfPerformance	1.907	1	1.907	4.176	.047
	Sat_Process	1.085	1	1.085	2.365	.132
Treatment * gender	Sat_Outcome	.110	1	.110	.219	.642
	Sat_SelfPerformance	.037	1	.037	.080	.778
	Sat_Process	.001	1	.001	.001	.970
Error	Sat_Outcome	20.981	42	.500		
	Sat_SelfPerformance	19.185	42	.457		
	Sat_Process	19.265	42	.459		
Total	Sat_Outcome	45.813	47			
	Sat_SelfPerformance	29.729	47			
	Sat_Process	26.184	47			
Corrected Total	Sat_Outcome	29.250	46			
	Sat_SelfPerformance	26.118	46			
	Sat_Process	22.911	46			

a R Squared = .283 (Adjusted R Squared = .214)
b R Squared = .265 (Adjusted R Squared = .195)
c R Squared = .159 (Adjusted R Squared = .079)

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
Sat_Outcome	Intercept	.704	.218	3.229	.002
	Utility	.026	.008	3.251	.002
	[Treatment=lmbins]	.032	.382	.084	.934
	[Treatment=lnAuction]	0(a)	.	.	.
	[gender=F]	-.374	.274	-1.364	.180
	[gender=M]	0(a)	.	.	.
	[Treatment=lmbins] * [gender=F]	-.215	.459	-.469	.642
	[Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=M]	0(a)	.	.	.

Sat_SelfPerformance	Intercept	.431	.208	2.068	.045
	Utility	.023	.008	3.070	.004
	[Treatment=Imbins]	-.081	.365	-.222	.825
	[Treatment=InAuction]	0(a)	.	.	.
	[gender=F]	-.509	.262	-1.941	.059
	[gender=M]	0(a)	.	.	.
	[Treatment=Imbins] * [gender=F]	.125	.439	.284	.778
	[Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=M]	0(a)	.	.	.
Sat_Process	Intercept	.327	.209	1.565	.125
	Utility	.018	.008	2.312	.026
	[Treatment=Imbins]	.063	.366	.172	.864
	[Treatment=InAuction]	0(a)	.	.	.
	[gender=F]	-.345	.263	-1.313	.196
	[gender=M]	0(a)	.	.	.
	[Treatment=Imbins] * [gender=F]	.016	.440	.037	.970
	[Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=M]	0(a)	.	.	.

a This parameter is set to zero because it is redundant.

C4. MANOVA test for the effect of mechanism and gender on satisfaction among non-winners

Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.136	4.619(a)	3.000	88.000	.005
	Wilks' Lambda	.864	4.619(a)	3.000	88.000	.005
	Hotelling's Trace	.157	4.619(a)	3.000	88.000	.005
	Roy's Largest Root	.157	4.619(a)	3.000	88.000	.005
Treatment	Pillai's Trace	.081	2.599(a)	3.000	88.000	.057
	Wilks' Lambda	.919	2.599(a)	3.000	88.000	.057
	Hotelling's Trace	.089	2.599(a)	3.000	88.000	.057
	Roy's Largest Root	.089	2.599(a)	3.000	88.000	.057
gender	Pillai's Trace	.028	.840(a)	3.000	88.000	.476
	Wilks' Lambda	.972	.840(a)	3.000	88.000	.476
	Hotelling's Trace	.029	.840(a)	3.000	88.000	.476
	Roy's Largest Root	.029	.840(a)	3.000	88.000	.476
Treatment * gender	Pillai's Trace	.006	.178(a)	3.000	88.000	.911
	Wilks' Lambda	.994	.178(a)	3.000	88.000	.911
	Hotelling's Trace	.006	.178(a)	3.000	88.000	.911
	Roy's Largest Root	.006	.178(a)	3.000	88.000	.911

a Exact statistic
b Design: Intercept+Treatment+gender+Treatment * gender

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Sat_Outcome	8.326(a)	3	2.775	3.581	.017
	Sat_SelfPerformance	5.098(b)	3	1.699	1.612	.192
	Sat_Process	3.496(c)	3	1.165	1.133	.340
Intercept	Sat_Outcome	10.891	1	10.891	14.051	.000
	Sat_SelfPerformance	3.026	1	3.026	2.869	.094
	Sat_Process	2.519	1	2.519	2.450	.121
Treatment	Sat_Outcome	5.868	1	5.868	7.571	.007
	Sat_SelfPerformance	3.211	1	3.211	3.045	.084
	Sat_Process	2.564	1	2.564	2.494	.118
gender	Sat_Outcome	1.857	1	1.857	2.396	.125
	Sat_SelfPerformance	.990	1	.990	.939	.335
	Sat_Process	.578	1	.578	.562	.455
Treatment *	Sat_Outcome	.080	1	.080	.103	.749

gender						
	Sat_SelfPerformance	.202	1	.202	.192	.662
	Sat_Process	.013	1	.013	.012	.912
Error	Sat_Outcome	69.759	90	.775		
	Sat_SelfPerformance	94.907	90	1.055		
	Sat_Process	92.523	90	1.028		
Total	Sat_Outcome	86.366	94			
	Sat_SelfPerformance	101.811	94			
	Sat_Process	97.656	94			
Corrected Total	Sat_Outcome	78.085	93			
	Sat_SelfPerformance	100.006	93			
	Sat_Process	96.019	93			

a R Squared = .107 (Adjusted R Squared = .077)
b R Squared = .051 (Adjusted R Squared = .019)
c R Squared = .036 (Adjusted R Squared = .004)

Parameter Estimates

Dependent Variable	Parameter	B	Std. Error	t	Sig.
Sat_Outcome	Intercept	-.206	.188	-1.096	.276
	[Treatment=lmbins]	-.569	.272	-2.090	.039
	[Treatment=lnAuction]	0(a)	.	.	.
	[gender=F]	.227	.244	.931	.354
	[gender=M]	0(a)	.	.	.
	[Treatment=lmbins] * [gender=F]	.119	.370	.321	.749
	[Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=M]	0(a)	.	.	.
Sat_SelfPerformance	Intercept	-.146	.219	-.668	.506
	[Treatment=lmbins]	-.282	.317	-.889	.376
	[Treatment=lnAuction]	0(a)	.	.	.
	[gender=F]	.304	.284	1.068	.288
	[gender=M]	0(a)	.	.	.
	[Treatment=lmbins] * [gender=F]	-.189	.432	-.438	.662
	[Treatment=lmbins] * [gender=M]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=lnAuction] * [gender=M]	0(a)	.	.	.

Sat_Process	Intercept	-.090	.216	-.417	.677
	[Treatment=Imbins]	-.313	.313	-.999	.321
	[Treatment=InAuction]	0(a)	.	.	.
	[gender=F]	.183	.281	.653	.515
	[gender=M]	0(a)	.	.	.
	[Treatment=Imbins] * [gender=F]	-.047	.426	-.111	.912
	[Treatment=Imbins] * [gender=M]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=F]	0(a)	.	.	.
	[Treatment=InAuction] * [gender=M]	0(a)	.	.	.

a This parameter is set to zero because it is redundant.

D. Instrument for users' satisfaction

Satisfaction with outcome **How satisfied or dissatisfied are you...**	Very satisfied	satisfied	Somewhat satisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied	Dissatisfied	Very dissatisfied
Sat_outcome1: with the achieved outcome?	O	O	O	O	O	O	O
Sat_outcome2: in terms of meeting your expectations?	O	O	O	O	O	O	O
Sat_outcome3: with the solution being favorable for you?	O	O	O	O	O	O	O
Sat_outcome4: when looking at what you originally desired?	O	O	O	O	O	O	O

Satisfaction with self-performance	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Sat_self1: I am satisfied with my performance.	O	O	O	O	O	O	O
Sat_self2: I tried to do well in this negotiation / auction.	O	O	O	O	O	O	O
Sat_self3: I was effective in accomplishing my tasks.	O	O	O	O	O	O	O
Sat_self4: I represented my client adequately.							

Satisfaction with the process **Regarding the exchange process (i.e. offers and / or messages)...**	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Sat_process1: I am satisfied with the experience gained.	O	O	O	O	O	O	O
Sat_process2: I am pleased with its effectiveness.	O	O	O	O	O	O	O
Sat_process3: I believe it was adequate for this business scenario.	O	O	O	O	O	O	O
Sat_process4: I believe it met my task requirements	O	O	O	O	O	O	O