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MANAGING UNCERTAINTY: AN EXPLORATORY STUDY OF INFORMATION SEEKING STRATEGIES OF ONLINE CONSUMERS

Completed Research Paper

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Abstract

Uncertainty has been widely recognized as a primary barrier in online C2C transaction processes. This research explores the effectiveness of strategies typically employed to reduce uncertainty in C2C electronic commerce based upon the uncertainty reduction theory and Kelley's attribution theory. We inspect the effects of the information from four information seeking strategies on online consumers' perception of uncertainty when initially transacting with an unknown seller in an online marketplace in China; we also integrate the two most prominent contextual factors, information consistency and seller reputation, to explore their direct effects, as well as their interactive effects with information from the four strategies on uncertainty. An online survey is used to collect data from the three most prestigious online store marketplaces in China. The results specify the exact effects of these factors on uncertainty in different contextual conditions. Finally, the theoretical and practical implications of this research are discussed.

Keywords: C2C Transaction, Uncertainty Perception, Information Seeking Strategies, Information Consistency, Seller Reputation

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Introduction

The continued growth of Electronic commerce (EC) has made it a persistently hot research topic. At the initial stage of an online transaction with an unknown store, consumers possess a high level of uncertainty towards transacting at the store since the consequence of the transaction cannot be perfectly predicted (Ba et al. 2003; Pavlou et al. 2007). A high level of uncertainty perception will raise online consumers' risk perceptions, their sense of unease (Chiles and McMackin 1996), and thus eventually restraining their online purchase intention (Pavlou 2003). As many previous studies have reported (Gefen 2000; Ramirez et al. 2002; Tidwell and Walther 2002), in order to reduce the high uncertainty perception, a fundamental activity that consumers engage in is to seek required transaction information (e.g. product information, seller information, etc) from various information sources or cues. This would help them to conquer their anxiety on information asymmetry arising from the spatial and temporal separation between sellers and consumers, and thus to enhance their confidence to more accurately predict the consequence of the transaction, and finally help them make rational transaction decision (Ba et al. 2003).

In fact, the Internet has provided online consumers with numerous information sources to seek transaction information; however, extant IS and EC research has not adequately addressed how these sources are utilized by consumers. Specifically, it is unclear how the information from different information sources or cues can affect online consumers' uncertainty perception. Theoretically, Uncertainty Reduction Theory (URT) (Berger and Calabrese 1975) categorizes people's information seeking behaviors from various information sources or cues into three general information seeking strategies in the traditional face-to-face (FtF) communication context, namely, passive information seeking strategies (PAIS), active information seeking strategies (AIS) and interactive information seeking strategies (IIS). The computer-mediated communication (CMC) information-seeking strategies model (ISSM) (Ramirez et al. 2002) adopts this categorization and extends the classification based on the novel attributes of the Internet, by introducing a unique group of information seeking strategies which is only available on CMC, namely, extractive information seeking strategies (EIS). Grounded in this theoretical framework, this research seeks to uncover how the information from these four seeking strategies can affect online consumers' perception of uncertainty, when initially transacting with an unknown seller in an online marketplace in China. This could have important implications for the design of online stores' websites, particularly in deciding what kinds of information sources to harness for such websites, to effectively manage consumers' uncertainty.

Additionally, online consumers face different contextual conditions embarking on an online transaction. Under different contextual conditions, the acquired information will have different effects on consumers' perception (Zhang and Watts 2003; Cheung et al. 2009). According to Kelley's Attribution Theory (KAT) (1967, 1971) and numerous empirical studies (e.g. McKnight et al. 2002; Wathen and Burkell 2002; Zhang and Watts 2003), information consistency and seller reputation are the two most significant contextual factors to affect the online consumers' perception of the acquired information during the transaction process. These studies indicate that if the information is consistent with others, or the seller is known to be highly reputable, positive information about it would be more persuasive and lead consumers to feel that "this is likely to be true," and thus reduce their uncertainty perception. To date, there have been relatively little studies exploring the different effects of different kinds of information (acquired through various information seeking strategies) on consumers' perception under these different contextual conditions. To fill this gap, we will investigate these issues in this study. Further, KAT proposes that information consistency and seller reputation can jointly affect online information seekers' perception on the acquired information. Thus, it should be interesting to investigate the joint moderating effects of these two contextual factors on the casual relationship between information from various information seeking strategies and uncertainty.

In sum, this research will utilize the categorization of information seeking strategies proposed by URT and ISSM and incorporate it with the contextual factors proposed by KAT, to investigate these factors' direct effects, as well as their interactive effects on consumers' uncertainty perception when initially transacting with unknown online sellers.

C2C Online Transaction Marketplace

Currently in China, C2C is the most popular type of EC activity, as it constitutes 92.3% of the whole EC gross transaction amount. It has been touted as main engine for growth in EC in the next foreseeable few years (iResearch 2008). According to iResearch 2008, most C2C transactions are processed based on online transaction marketplaces. An online transaction marketplace is a community of buyers and sellers who transact under the aegis of a virtual intermediary who provides the institutional infrastructure with the aid of Internet technologies (Gefen and Pavlou

2006). In China today, many companies have established their online marketplaces, such as Alibaba (www.taobao.com), Tencent (www.paipai.com), and Ebay (www.eachnet.com). Currently, these three marketplaces have the greatest market share of China's C2C electronic market, each of which is reported to host more than 1 million online stores/sellers, with average daily visits exceeding 10 million (iResearch 2008). Of these, taobao.com has assumed the leading position, taking 83.6% of the entire C2C transaction market share in China in 2008.

Theoretical Foundation and Research Hypotheses

Definition of Uncertainty

Uncertainty refers to the absence of information (Downey and Slocum 1975; Tushman and Nadler 1978). Galbraith (1977) defines uncertainty as "the difference between the amount of information required to perform the task and the amount of information already possessed by the person." Pfeffer and Salancik (1978) consider uncertainty as the degree to which future states of an environment cannot be accurately predicted due to imperfect information. Uncertainty exists when a framework for resolving a task is available, but there is a lack of information to process (Dennis and Valacich 1999). Therefore, in order to reduce uncertainty, additional information beyond what an individual already knows needs to be acquired. In online transactions, uncertainty refers to the extent to which the outcome of the transaction cannot be accurately predicted due to imperfect information (Ba and Pavlou 2002). Although classical theory suggests that greater amount of information acquired can reduce the perceived uncertainty (Shannon and Weaver 1949), more recent research contends that the quality of information should also be a strong predictor of uncertainty (Berger 1987; Friedrich et al. 1996). In other words, both information quantity and quality should be associated with information receivers' perception of uncertainty. Thus, in online C2C transactions, more and higher quality transaction information should significantly affect consumers' uncertainty perception.

The Categorization of Information Seeking Strategies in URT and ISSM

Uncertainty Reduction Theory (URT) (Berger and Calabrese 1975) provides a theoretical perspective to deal with the initial stage of interpersonal Face-to-Face (FtF) interaction. It posits that initial interactions between different parties will typically involve high levels of uncertainty, which can be reduced by high amounts of verbal communication, nonverbal affiliative expressiveness, information seeking behavior, intimacy, reciprocity, liking, and perceived similarities between interacting parties. Further, URT predicts that individuals will utilize three major information seeking strategies, namely, passive, active and interactive information seeking strategies, as a means to acquire information and reduce uncertainty. URT indicates that the more information obtained from these seeking strategies, the lower the uncertainty the information seekers will perceive.

Douglas (1990) argues that tests of URT in FtF conversation necessarily involve seeing others before speaking and potentially gleaning information from physical appearances and other nonverbal indicators. Tidwell and Walther (2002) argue that the dynamics of URT in computer-mediated communication (CMC) settings might differ from FtF settings. Most CMC environments involve limited nonverbal and contextual information to help form impressions, develop relationships and shape uncertainty perceptions. However, CMC and new technological developments open up alternative means for gathering information that is not present in FtF contexts. Thus, ISSM states the information seeking strategies adopted in FtF contexts would still be available in CMC conditions with modified formats (Ramirez, et al. 2002; Tidwell and Walther 2002). In particular, technological developments (e.g. Web 2.0) in CMC highlight the need to incorporate additional information seeking strategies into current theorizing, namely extractive information seeking strategies. The current research adopts this extended categorization to investigate the influences of information sourced from these four strategies on online consumers' perception of uncertainty.

PAIS refers to acquiring information about a target through unobtrusive observation without affecting the target's behavior. Online consumers seeking information about an unknown online seller using PAIS can browse the website of the target online store. For example, they can scrutinize the product information on the home pages to understand more about the products; they can browse on the FAQ section to better understand how the store handles sales or delivery, etc. Altogether, through passively browsing the home page of the store, consumers will get various kinds of transaction information to shape their perception, and thus help them make rational transaction decisions. According to URT and ISSM, the more information that is obtained through PAIS, the lower uncertainty they would perceive. Thus,

H1. *The more transaction information is obtained from passive information seeking strategies, the more uncertainty reduction the online consumers will perceive.*

AIS involves acquiring information about the target from other individuals/parties proactively but without direct interaction with the target (Berger 1979). In C2C transactions, consumers can actively seek transaction information from various third-party sources. For instance, they can join in some interest-oriented virtual discussion groups, which are organized based on certain interest (Taobao buyers' group, digital camera group, etc. can be the examples of such interest-oriented virtual groups). Employing AIS, they can seek other group members' opinions about a certain product or seller. In fact, these groups have already become a popular online communication style currently. Besides, they can go to some famous third-party evaluation websites or comprehensive gateway websites they previously knew to get more third-party comments on the issues of concern. We predict that with more information acquired from these active seeking strategies, online consumers' anxiety on uncertainty would be reduced. Thus,

H2. *The more transaction information is obtained from active information seeking strategies, the more uncertainty reduction the online consumers will perceive.*

EIS is the unique information strategy available only in CMC, which utilizes the aggregation and storage function of the Internet technologies based on social information provided by various Internet users. Specifically, in C2C transactions, consumers can easily adopt EIS by using the "search" tools such as search engines or websites (e.g. Google.com, Baidu.com, etc) to acquire required transaction information. Apart from using search engines, the consumers can also conveniently browse online consumer discussion forums to find other consumers' comments about a certain product or seller. Commonly, these discussion forums draw upon a vast storehouse of comments written by various online users which provide information seekers with more comprehensive information. In EIS, the search engines or forums only act as intermediaries that provide the consumers with a platform to obtain information, instead of providing information themselves. This is the distinct characteristic of EIS information, differing from AIS information in which third-parties directly propose their own viewpoints to consumers (Ramirez, et al. 2002). With the help of the powerful aggregation and storage ability of Internet technologies, online consumers can get more socialized and far-ranging information from various Internet users, compared with FtF contexts; thus, EIS should be an important source of information to affect the consumers' uncertainty perception. Thus,

H3. *The more transaction information is obtained from extractive information seeking strategies, the more uncertainty reduction the online consumers will perceive.*

IIS requires information seekers to directly exchange information with the target to elicit desired information, which can be easily realized with CMC. In C2C transactions, online consumers can have direct contact with sellers through instant messengers (IM) to acquire required transaction information synchronously. For example, Wangwang is a specific IM tool on Taobao. Consumers can also use asynchronous IIS if the seller is unavailable online at a specific time; in this case, they can leave their inquiries on the message board of the online store website, or send an email to the seller and wait for a reply. Some research considers IIS in the CMC context to be unreliable because individuals' nonverbal cues are difficult to observe, which are often used to help them detect deception (Donath 1999). Nevertheless, other research has noted that direct communication through IT tools could still exert a strong social influence on the communication parties, and thus can significantly affect the communicators' uncertainty perception (Davis et al. 1989). For example, social presence, a critical cue differentiating CMC and FtF communication (Sia et al., 2002; Short et al., 1976), has been empirically established in IM communication by Rossade et al. (2005). Thus, we believe that IIS information obtained through CMC tools such as IM should also have a significant role in shaping online consumers' uncertainty perception. Thus,

H4. *The more transaction information is obtained from interactive information seeking strategies, the more uncertainty reduction the online consumers will perceive.*

In sum, the developments of CMC technologies will shift passive, active and interactive information seeking strategies into new forms relying on the affordances of the CMC technologies (Burgoon et al. 2006). These technologies may also offer alternative new modes of information seeking strategies (Ramirez et al. 2002). This can shift the information seekers searching information from the social network to the socio-technical, electronic network. Generally, based on URT and ISSM, we hypothesize that more information from all of these four information seeking strategies would significantly reduce the online consumers' perception of uncertainty. We do not consider information quality in this research because online marketplaces typically institute policies and regulations to avoid low quality or fraudulent information. Thus, we will focus on the influence of information quantity obtained from these four information seeking strategies on online consumers' uncertainty perception.

Contextual Factors' Interactive Influences on Uncertainty – Attribution Theory

Kelley's Attribution Theory (KAT) (Kelley 1973) proposes that people process information differently depending on several contextual factors. This theory is concerned with how people make causal inferences and what they do with the information obtained in different contextual conditions. According to KAT, an individual who reflects on the cause of a certain event and forms a perception of it may take into account information about distinctiveness over entities, consensus across persons and consistency over time or modality. Distinctiveness indicates the extent that the actor performs different behaviors with different attribute objects; consensus expresses the degree to which other actors perform the same behavior with the same object; and consistency indicates the degree to which an actor performs the same behavior toward an object on different occasions (including different time or modality). Attributors would use some or all of these factors, separately or jointly with the obtained information, to form their cognition.

Within the C2C transaction context, we identified two contextual factors found to be the most important in influencing information judgments (McKnight et al. 2002; Wathen and Burkell 2002; Zhang and Watts 2003; Cheung et al. 2009): information consistency and seller reputation. Seller reputation is derived from the distinctiveness concept of KAT, whereas information consistency is rooted in the consistency (in information from same person) and consensus (in information from different persons) concepts. As an initial research, we focus on the consumers' general consistency perception based on all information they have obtained. The following two sections elaborate on the effects of these two contextual factors on consumers' uncertainty perception.

Information Consistency

Information consistency is the extent that the information a person possesses is consistent with one another (Zhang and Watts; 2003). In C2C transaction, consumers can conveniently utilize any or even all four information seeking strategies, which could sometimes lead to inconsistencies in the information acquired through two or more information seeking strategies.

Barry and Schamber (1998) propose that information consistency could be a key criterion employed by the information recipients in making judgment on the obtained information. They believe that consistent information would help information receivers to verify the authenticity of the information, and thus reduce their perceived uncertainty. Zhang and Watts (2003) purport that the high level of consistent information from different sources persuade the information recipients to feel that "this is likely to be true" and reduce their perception of uncertainty level; this viewpoint is also confirmed by Cheung et al. (2009). Thus, we predict that in C2C transactions, the perception of a high level of information consistency will enhance online consumers' confidence in accurately predicting the outcome of a transaction. As a result, this will directly reduce their uncertainty perception. Also, high information consistency can lead consumers to believe in the authenticity of the acquired information from various seeking strategies and thus increase the effects of the information on online consumers' uncertainty perception. Conversely, if the obtained information is inconsistent with that from other strategies, the favorable impact on online consumers' uncertainty perception will be attenuated. Thus, we hypothesize:

H5. *The higher the information consistency level from the four information seeking strategies, the more uncertainty reduction the online consumers will perceive.*

H5a. *The higher the information consistency level, the greater the information from passive information seeking strategies reduces uncertainty.*

H5b. *The higher the information consistency level, the greater the information from active information seeking strategies reduces uncertainty.*

H5c. *The higher the information consistency level, the greater the information from extractive information seeking strategies reduces uncertainty.*

H5d. *The higher the information consistency level, the greater the information from interactive information seeking strategies reduces uncertainty.*

Seller Reputation

Previous studies have found the attributes of sellers to be pivotal factors in influencing the cognition of consumers (Cheung et al., 2009; Lee and Turban 2001; Ba and Pavlou 2002; McKnight et al. 2002). Hovland (1951) further points out that the reputation, attractiveness, physical appearance, familiarity and power, are the attributes of the information provider that have an impact on the information seekers' cognition. In CMC where textual messages are exchanged, some attributes, such as attractiveness and physical appearance of the information provider, are difficult to assess because the nature of the virtual communication may not permit the availability of such cues, thus leaving the seller reputation to be a more salient cue. Online seller reputation is defined as the extent to which buyers believe a seller is honest and is concerned about its customers (Doney and Cannon 1997). This information can easily be found by consumers from the online sellers' profile in an online marketplace.

Although the online sellers' reputation is only a "virtual credential" awarded by the administrators of certain online marketplaces, many previous studies have shown that such a "virtual credential" still has a similar effect as it does in the real world. They report that high online seller reputation could induce the online consumers to form a positive attitude of the seller, and help them overcome the perception of transaction uncertainty. This is because high seller reputation would lead consumers to believe that the seller would not indiscreetly violate the transaction contract, thus achieving a satisfactory transaction consequence (McKnight et al. 2002; Wathen and Burkell 2002). Also, studies have also shown that online consumers perceive that the transaction information acquired from highly reputed sources are more reliable and thus would have a stronger effect on online consumers' uncertainty perception (Cheung et al. 2009; Zhang and Watts 2003). In this research, we also hypothesize that online consumers will perceive a lower level of uncertainty while transacting with a seller with higher reputation. Further, we predict that information provided by higher reputation sellers will be more persuasive than that provided by lower reputation sellers. Since only PAIS and IIS information are provided by online sellers, we hypothesize that seller reputation only interacts with PAIS and IIS information to affect the consumers' uncertainty cognition: when such information is provided by a highly reputed seller, its effect on uncertainty reduction will be increased, and if it is provided by a lower reputation seller, its effects will be attenuated. We did not propose any similar hypotheses for AIS and EIS because the information originates from third-party sources. Thus:

H6. *The higher the seller reputation, the more uncertainty reduction the online consumers will perceive.*

H6a. *The higher the seller reputation, the greater the information from passive information seeking strategies reduces uncertainty.*

H6b. *The higher the seller reputation, the greater the information from interactive information seeking strategies reduces uncertainty.*

Research Methodology

The research model was tested using the online survey method; the reason for the choice is that we believe it permits the gathering of field information from people who use online marketplaces in their daily lives, thereby enhancing the realism of this research. We first adapted and developed an instrument for the constructs in this research; we then carried out a pilot survey with interviews, before proceeding to the main study. The constructs in this study were operationalized by adopting validated instruments from previous research wherever possible: items of seller reputation and information consistency were adopted from Doney and Cannon (1997) and Cheung et al.'s (2009) study separately. As there were no standard instruments on information from PAIS, AIS, EIS and IIS, as well as uncertainty, we developed the corresponding items for each of the constructs following the instrument design steps recommended by Moore and Benbasat (1991). The two round of results showed that the raw agreement were all above 0.90, the Cohen's Kappa were above 0.85, and the overall hit ratio was above 95%, thus confirming the validity of the new items in this research. The questionnaire of the survey was displayed in simplified Chinese.

In order to ensure that the respondents could distinguish the four information seeking strategies easily, brief descriptions of them were presented on the online survey. In the descriptions, we specially reminded them that they should base their responses on the perception of the acquired transaction information which is useful in the transaction process. Then, a pilot test was conducted on 35 random selected persons who had online C2C transaction experience. This was done to check the understandability and face validity of the questions. Next, an interview on them was carried out, in which we also asked questions to help point out potential deficiencies. We were especially concerned about the potential for information overload, which might vitiate the effectiveness of the information.

However, all respondents replied that they would not torture themselves to seek extraneous information during online purchasing, but simply obtain sufficient information to help them with the purchase decision. Thus, we believe information overload should not be a confounding factor in our research. We are also concerned about the information quality issue. According to the interviews, all respondents admitted they would only adopt the relevant high quality information from various information sources or cues and simply ignore low quality ones. Altogether, these findings indicated that there were no major problems in the questionnaire and we could proceed to the main data collection.

The members of the three online marketplaces (www.taobao.com, www.paipai.com, and www.eachnet.com) mentioned above were invited to participate via two routes: we first sent out emails to randomly selected members containing the invitation letter having a hyperlink to the online questionnaire; we also put up the same invitation letter on some discussion forums relevant to the three marketplaces, and members who had experience with C2C transactions and who showed interest in our investigation could pick up our letter and fill in our questionnaire. The duration of this data collection was about 3 weeks.

The 7-point Likert-type scale anchored from ‘strongly disagree’ (1), to ‘neutral’ (4) and finally to ‘strongly agree’ (7) was utilized in our research. Altogether, we received 245 eligible samples to continue our analysis. Among these, most of them utilized various information seeking strategies (more than 84% claimed to have utilized all of the four strategies, and more than 93% claimed to have utilized at least three of the four strategies) to seek required information. Table 1 provides the summary demographics of the sample. We compared the demographic characteristics of the respondents in this research with the general demographic characteristics of the whole Chinese online consumers reported by iResearch 2008, and no significant differences were found (iResearch reports that 69.1% online consumers are younger than 30 years old, and 70% of them take bachelor degree or above). Thus, our sample distribution is deemed to be sound, and the bias on demographic characteristics of the participants should not be a problem.

		Number (N=245)	Percentage
Past experience of online transaction	Little	22	9.0%
	Neutral	138	56.3%
	Rich	85	34.7%
Gender	Male	111	45.3%
	Female	134	54.7%
Age	<25	106	43.3%
	25-29	111	45.3%
	>29	28	11.4%
Education Level	Below	47	19.2%
	Bachelor	93	38.0%
	Above	105	42.8%
Internet experience	<5	49	20.0%
	5-8	120	49.0%
	>8	76	31.0%

Analysis and Results

Measurement Model

Fornell and Larcker (1981) recommend that the value of composite reliability (internal consistency of each item) be equal to or above 0.80, and the Cronbach's Alpha above 0.70 to be acceptable reliability of the instruments. As shown in Table 2, all of the constructs' composite reliability and the Cronbach's Alpha exceed the corresponding threshold criterion values; the value of AVE in each construct is above 0.65, which is higher than the threshold value of 0.5. Most of the loadings of each construct are higher than 0.8 (only two items are above 0.7) and all cross

loadings are much lower than the loadings, as shown in Table 3. Thus, the constructs exhibit sufficient internal consistency and confirm that convergent validity would not be a confounding problem in this study.

Construct Items	No. of Items	Means	Standard Deviation	Cronbach's Alpha	Composite Reliability	AVE
PAIS	3	5.336	1.050	0.770	0.863	0.678
AIS	3	4.358	1.823	0.942	0.963	0.896
EIS	3	4.426	1.903	0.939	0.961	0.891
IIS	3	5.335	1.545	0.941	0.963	0.896
Information consistency (CON)	4	4.672	1.065	0.822	0.884	0.656
Seller reputation (REP)	2	5.384	1.125	0.913	0.959	0.921
Uncertainty (UNT)	4	3.728	1.342	0.887	0.922	0.749

	PAIS	AIS	EIS	IIS	UNT	CON	REP
PAIS1	0.7676	0.0423	0.0563	0.1464	-0.0911	0.1149	0.1306
PAIS2	0.8327	0.0612	-0.0137	0.1562	-0.1676	0.2179	0.2597
PAIS3	0.8661	0.2023	0.1369	0.1318	-0.1827	0.1496	0.2437
AIS1	0.1258	0.9597	0.2409	-0.0236	-0.1286	0.0446	0.0527
AIS2	0.1347	0.9503	0.2227	-0.0391	-0.097	0.0477	0.0449
AIS3	0.1362	0.9289	0.2704	-0.0307	-0.0968	0.0353	0.0944
EIS1	0.0548	0.2186	0.9469	-0.1161	-0.1318	0.0218	0.0544
EIS2	0.1017	0.2616	0.9498	-0.1388	-0.0934	0.0246	0.0056
EIS3	0.0653	0.2588	0.935	-0.1277	-0.1002	0.005	0.0044
IIS1	0.2	-0.0163	-0.1421	0.936	-0.3075	0.2961	0.3073
IIS2	0.1785	-0.019	-0.128	0.9562	-0.3651	0.316	0.3661
IIS3	0.1183	-0.0539	-0.112	0.948	-0.362	0.2562	0.3623
UNT1	-0.1092	-0.0077	-0.1032	-0.2687	0.8034	-0.4513	-0.2218
UNT2	-0.1694	-0.1077	-0.1187	-0.3143	0.9058	-0.5114	-0.3515
UNT3	-0.1982	-0.1605	-0.0913	-0.3416	0.8851	-0.414	-0.3613
UNT4	-0.1768	-0.118	-0.0926	-0.3422	0.863	-0.4127	-0.2793
CON1	0.1867	0.0858	0.0558	0.247	-0.4054	0.8373	0.458
CON2	0.2182	0.0323	0.0208	0.2341	-0.3792	0.8113	0.453
CON3	0.0934	-0.0203	-0.0287	0.2463	-0.4886	0.861	0.3085
CON4	0.1759	0.0608	0.0215	0.263	-0.3918	0.7225	0.3518
REP1	0.2763	0.0364	0.011	0.3525	-0.3462	0.4514	0.9613
REP2	0.2448	0.0922	0.0404	0.3512	-0.3321	0.4669	0.9579

According to Fornell and Larcker (1981), the discriminant validity is acceptable when the square root of every AVE of each construct is larger than any correlation among any pair of the constructs (the AVE shared between the construct and its indicators is larger than the AVE shared between the construct and other constructs). Table 4 confirms that the variance explained by the respective construct is larger than the measurement error variance (Fornell and Bookstein 1982).

	PAIS	AIS	EIS	IIS	CON	REP	UNT
PAIS	0.823						
AIS	0.139	0.947					
EIS	0.076	0.258	0.944				
IIS	0.173	-0.032	-0.134	0.947			
CON	0.202	0.045	0.018	0.305	0.81		
REP	0.272	0.066	0.026	0.367	0.478	0.96	
UNT	-0.19	-0.116	-0.118	-0.366	-0.518	-0.354	0.865

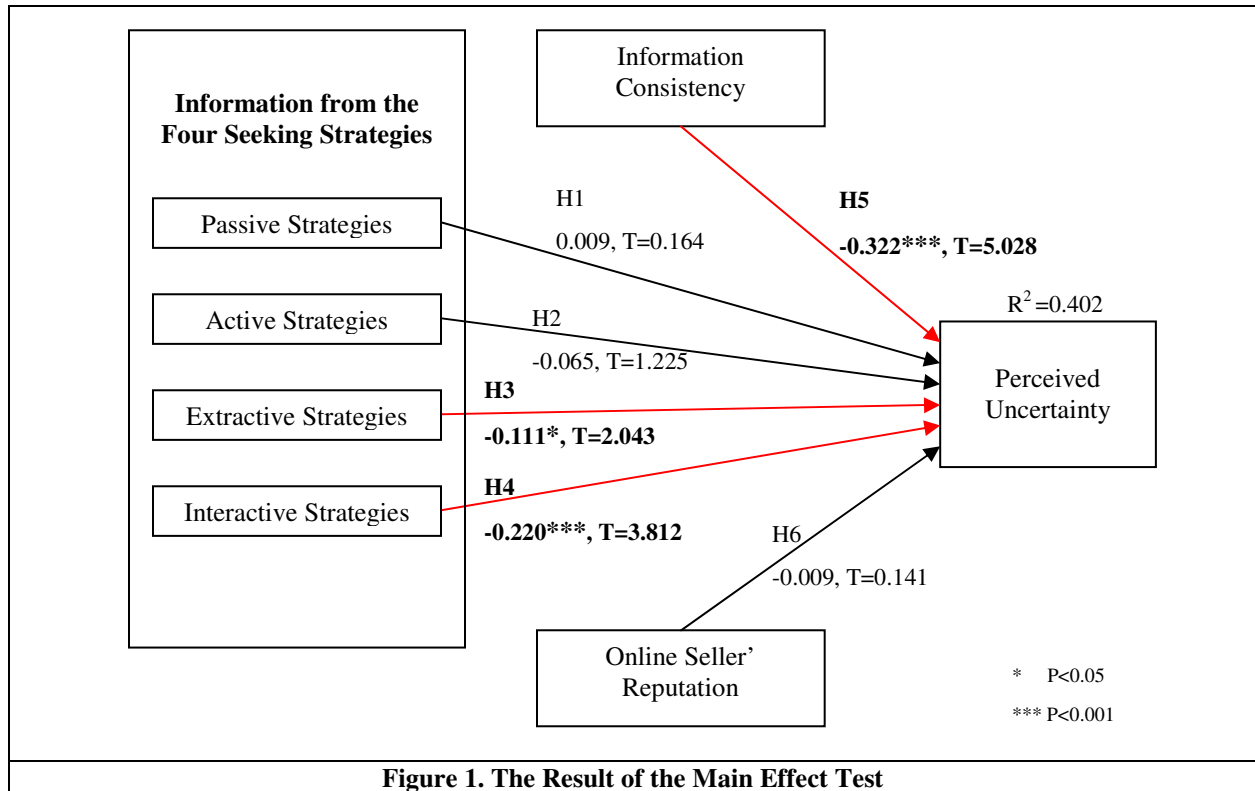
Multicollinearity indicates the extent to which an independent variable varies with other independent variables. Both Tolerance and Variance Inflation Factor (VIF) are statistical tests to determine the problem of multicollinearity. Lower Tolerance or Larger value of VIF indicates a higher risk of multicollinearity. The Tolerance values of all independent variables have to be larger than 0.1, and VIF lower than 10, to indicate the absence of multicollinearity. In this research, all the tolerance values are larger than 0.6, and VIF values are lower than 2.0, which suggests that multicollinearity should not be a problem in this study. Further, we applied Harman's single factor test to see if there was any common method bias present in our study. The result of the principal components factor analysis reveals that the first factor does not account for a majority of the variance (31.94%), and no single factor emerges from the factor analysis (Podsakoff et al. 2003). This indicates that common method bias is not a major problem in our data.

Structural Model Analyses

SPSS 13.0 was used for structural model analyses in this study, and all data were standardized before proceeding with the data analyses. First, we tested the main effects hypotheses proposed in our research model (including H1 to H6). We then tested the moderating effects (two-way interactions) of information consistency and seller reputation on the four information seeking strategies (including H5a to H5d and H6a, H6b).

As shown in Figure 1 and Table 5, the results of the full model are rather significant, as is consistent with our prediction, with $F=14.227$ and $P<0.001$, and adjust R^2 is 40.2%. Three of the six hypotheses on main effects (H3, H4 and H5) are supported; whereas H1, H2, and H6 are rejected in the Linear Regression Test. H3 is significant at 5% significance level, whereas H4 and H5 are significant at the 1% significance level. In order to confirm that our findings are mainly due to the quantity rather than quality of the information, we ran an additional linear regression test, including information quality factors of the four strategies into the full model. All of the information quality's influences are insignificant ($p>0.5$), and the significance of H1 to H6 is similarly so. This suggests that information quality is not a confounding factor in this research.

MODEL	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
PAIS	.011	.069	.009	.164	.870
AIS	-.048	.039	-.065	-1.225	.222
EIS	-.078	.038	-.111	-2.043	.042
IIS	-.191	.050	-.220	-3.812	.000
CON	-.405	.081	-.322	-5.028	.000
REP	-.011	.080	-.009	-.141	.888



To test the two-way interaction effects, moderated multiple-regression models were built and product terms were generated by multiplying the information from the four information seeking strategies and information consistency or seller reputation individually. In order to avoid the confounding influences between the two moderating variables which could impact each other in the model (additional three-way interaction analyses are shown below), these two moderating variables were analyzed separately. The results indicate that the information consistency could only moderate the effects between the IIS information and uncertainty with significance at the 5% level; whereas all other moderating effects are insignificant. Thus H5d is supported and H5a, H5b and H5c are rejected. The score of F change is 2.003 and the score of R² Change is 0.02 in the model with information consistency's moderating effects. For seller reputation, it only moderates the effects between the IIS information and uncertainty with significance at 1% level; thus, H6b is supported whereas H6a is rejected. The score of F change is 3.966 and the score of R² Change is 0.039 in the model with seller reputation's moderating effects. The results of these two-way interaction tests are presented in Table 6.

MODEL	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
CON					
PAIS*CON	-.035	.049	-.037	-.712	.477
AIS*CON	-.021	.051	-.023	-.413	.680
EIS*CON	.048	.049	.054	.983	.327
IIS*CON	-.127	.052	-.129	-2.445	.015
REP					
PAIS*REP	-.077	.048	-.085	-1.595	.112
AIS*REP	-.071	.055	-.071	-1.290	.198
EIS*REP	.037	.056	.037	.652	.515
IIS*REP	-.181	.057	-.164	-3.146	.002

KAT suggests the possibility that the contextual factors could jointly affect online information seekers' perception on the acquired information. This could help to generate insights on the conditions under which the impacts of the information from four information seeking strategies to reduce uncertainty can be altered. To test the possibility of a three-way interaction, the significance test of slope differences for three-way interactions in moderated multiple regression analysis proposed by Cohen and Cohen (1983), Aiken and West (1991), and Dawson and Richter (2006) was adopted. Again, in order to avoid the confounding interactive influences among the variables, as well as the produced terms, which could impact the target three-way interaction effects in our research, we separately analyzed the independent variables with the moderating variables, as well as the produced two-way and three-way interactive predictor variables. Following their algorithmic procedure, we first regressed the independent variables and the moderating variables. Then all pairs of two-way interactive predictor variables were added to the regression. Finally, the produced three-way interactive predictor variable was entered into the regression. According to the algorithm, only when the three-way interactive predictors are significant in the regression equation, can the interaction be meaningful and interpretable.

As shown in table 7, the produced three-way interaction predictor variable AIS*CON*REP is significant at 1% level; the score of F change is 7.041 and the R² Change is 0.02. EIS*CON*REP is also significant at 1% level; the score of F change is 14.241 and the R² Change is 0.039. But the other two three-way terms are insignificant. Thus, we found that AIS and EIS information can have three-way interactions with the two contextual factors to affect the online consumers' uncertainty perception.

MODEL	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
PAIS*CON*REP	.050	.048	.073	1.046	.296
AIS*CON*REP	.141	.053	.170	2.654	.009
EIS*CON*REP	.192	.051	.247	3.774	.000
IIS*CON*REP	-.039	.059	-.044	-.651	.516

Further, in order to further analyze the significant three-way interactions, the Simple Slopes Test proposed by Cohen and Cohen (1983), Aiken and West (1991) and Dawson and Richter (2006) were used, which allowed us to interpret the significance level of the causal relationships between the independent variable and dependent variable under different combinations of moderators. Separate regression lines were computed, plotted, and tested with one standard deviation below the mean on the moderating variables as well as one standard deviation above the mean. We find that only under high consistency and low reputation, or under low consistency and high reputation condition, could AIS and EIS information significantly (or marginally significantly) reduce the online consumers' uncertainty perception. For AIS information, the B=-0.313, T=2.415, p<0.05 in Low CON and High REP condition, and the B=-0.286, T=1.820, p<0.1 in High CON and Low REP condition. For EIS information, the B=-0.340, T=3.040, p<0.01 in Low CON and High REP condition, and the B=-0.517, T=2.929, p<0.01 in High CON and Low REP condition. No significant effects were found in the high consistency and high reputation, or in low consistency and low reputation conditions.

Discussion

In this study, we applied URT and ISSM to examine how online consumers in C2C transaction could be affected by the information acquired from different information seeking strategies. We further incorporated the contextual variables of information consistency and seller reputation, which were extracted from KAT, into the theoretical model. With the main effects test, we found that only information from two of the four information seeking strategies significantly affected the online consumers' uncertainty perception. Only EIS and IIS information's influence was significant, but PAIS and AIS information was insignificant. This indicates that in an online C2C transaction, generally, when the amount of information obtained from EIS and IIS increases, the online consumer's transaction uncertainty will be reduced. With regards to the insignificant causal relationships for PAIS and AIS information, one possible reason may be that the online consumers treat such information as hygiene information. Another possible explanation may be that information obtained from these sources can only exert a significant effect on uncertainty under certain contextual conditions. Further, regarding the two contextual factors, we found only

information consistency could substantially reduce consumers' uncertainty. This implies that if online consumers perceive the obtained information to be generally consistent, they will correspondingly perceive lower transaction uncertainty. But we found that seller reputation could not directly reduce consumers' uncertainty, this finding contradicts many previous studies that found seller reputation could help consumers to form a positive attitude towards the seller. This finding indicates that consumers will not directly perceive more certainty when executing a transaction with a highly reputed seller, compared to one with lower reputation.

According to the results of the two-way interaction test, we found that information consistency and seller reputation could only moderate the causal relationship between IIS information and uncertainty, but not two-way interactions involving information from other information seeking strategies. This indicates that if the consumers perceive IIS information, obtained by directly interacting with the seller, to be consistent with information from other strategies, it will help consumers to substantially reduce their uncertainty perception. Similarly, IIS information provided by a highly reputable seller will more significantly affect consumers' uncertainty, compared to a lower reputation seller. This finding further demonstrates that only IIS information can have distinct effects on consumers' uncertainty perceptions under these different contextual conditions, compared information from any other seeking strategies.

From the results of the three-way interaction test, we found that only AIS and EIS information, both of which was gathered from third-parties, can reduce uncertainty perceptions under the joint influence of information consistency and seller reputation. However, the information obtained from PAIS and IIS, which was gathered from the sellers directly, did not have such an interactive influence. Using the simple slope test, we found that under high consistency and low reputation, or under low consistency and high reputation conditions, AIS and EIS information involving opinions of third-parties, could reduce the online consumers' uncertainty perception. But under low consistency and low reputation, or high consistency and high reputation conditions, more AIS or EIS information would have no significant effect on consumers' uncertainty perception.

Limitation and Future Research

Several limitations of this study need to be recognized. First, as shown in the results, the main model could only explain more than 40% of the variance of the dependent variable. Although the interaction effects among the independent and moderating variables also contribute to more variances for the model, we still suspect that there might be some other important factors which could affect online consumers' perceived uncertainty, but are not included in our theoretical model. Thus, future research is encouraged to explore more significant factors to further supplement and reinforce our theoretical model.

Second, as an initial research on transaction uncertainty based on the influences of different information seeking strategies, we proposed a comprehensive model instead of emphasizing only a few factors for in-depth study. For this reason, we included only the general perception of information consistency level in our survey, which might not be able to clearly distinguish the effects of information consistency, such as the consensus and consistency criteria of KAT.

Third, as PAIS information does not appear to significantly affect online consumers' uncertainty perception in this study, its role in online transaction is still unclear. We speculate that PAIS information might be the hygiene information in online transaction: online consumers might still need it, but it is not sufficient to reduce uncertainty. Thus, consumers may need more information from other information seeking strategies. We suggest further research to address this issue, and to investigate the actual role of PAIS information in online transaction process.

Fourth, this research was conducted in China only. It is thus necessary to exercise caution to avoid over-generalizing the findings of this research. Future research is strongly recommended to adopt this theoretical model to other countries or contexts, especially in cultures that are dissimilar to Chinese culture, so as to compare the results to better understand how different kinds of culture shape people's response to uncertainty.

Implications

Understanding how online consumers could reduce their perception of transaction uncertainty is particularly important for researchers and practitioners of IS and EC because uncertainty has been widely viewed as a primary barrier to online transactions (Pavlou et al. 2007). A low level of uncertainty would help online consumers to more accurately predict the outcome of their transaction, and thus increase their confidence to complete the transaction.

This exploratory research applied URT and ISSM's information seeking strategies categorization, integrated with KAT, to develop an integrative research model to investigate how online consumers' perceived transaction uncertainty was affected by these factors. We believe the findings of this research could provide both theoretical implications for future researchers in IS and EC domains and practical implications for the practitioners of EC.

This research makes several important contributions to theory development. To our knowledge, this is one of the first studies in the IS and EC domains to empirically test the influences of information from different information seeking strategies on uncertainty. Also, this is one of the initial investigations to test the interactive effects of obtained information (from various information seeking strategies) and the key contextual factors (proposed by KAT) on uncertainty perception with empirical data. This study found that in initial contacts with an unknown online store in an online C2C marketplace in the Chinese context, only EIS and IIS strategies, and the contextual factor of information consistency, could directly reduce online consumers' uncertainty perception. It also showed that only IIS information can reduce uncertainty perceptions differentially under high versus low information consistency, or high versus low seller reputation conditions. But information from the other three seeking strategies did not. Further, the results of the three-way interactions revealed that only AIS and EIS information could have a three interaction with information consistency and seller reputation. Specifically, only under high consistency and low reputation, or low consistency and high reputation conditions, could AIS and EIS information reduce consumers' uncertainty significantly. These suggests that with third-party information (obtained through AIS and EIS), which are presumably more neutral compared to seller-provided information, seller reputation and consistency amongst different sources have less impact on it to affect the consumers' uncertainty perception. Conversely, for seller provided IIS information, higher seller reputation could compensate for lack of information consistency amongst different sources, or highly consistent opinions amongst different sources could compensate for low seller reputation, thus to help such information effectively reduce the uncertainty perceptions. In general, this research not only uncovers the information from various seeking strategies that could effectively reduce uncertainty perceptions amongst consumers, it also highlight the need to consider other contextual factors that could alter the way consumers reduce their uncertainty towards online sellers and their products.

The results of our research permit us to make several practical recommendations. Since AIS, EIS and IIS information could have significant effects on online consumers' uncertainty perception conditionally or unconditionally, online sellers thus need to adopt effective measures to help consumers to obtain comprehensive AIS, EIS and IIS information more conveniently. For example, they could cooperate with related famous evaluation websites, or online consumer discussion forums, by affiliating the hyperlinks of their websites on their online store websites, to help consumers to obtain more AIS and EIS information more expediently. They could also provide instructions to consumers on how to obtain comprehensive EIS information related to their business from search engines by elaborating on the detailed steps of the searching process. Besides, they could organize correlative interest-oriented virtual groups on their online store websites, thus allowing online consumers to obtain AIS information from other group members more conveniently. Furthermore, online marketplaces could incorporate communication tools that facilitate direct interaction between sellers and consumers. Sellers could also try to be available online or accessible as much as possible to give relevant clarifications or timely information to consumers, instead of in a perfunctory fashion, to help them obtain more IIS information. Finally, since consistent information could help consumers reduce uncertainty substantially, sellers on their part could to reference the relevant opinions or feedback information offered by other sources before publishing their own information, so as to ensure that their communication with and responses to consumers are consistent with various information sources.

Conclusion

This research examines a theoretical model which adopts the information seeking strategies categorization from URT and ISSM, and integrates the two contextual factors proposed by KAT, to investigate how online consumers' could reduce their perception of uncertainty when initially interacting with an unknown online store in an online marketplace in China. The results identified the effective information seeking strategies proposed by URT and ISSM, as well as the crucial contextual factors proposed by KAT on online consumers' uncertainty perception. The theoretical and practical implications have also been discussed to underscore the significance of this research. We believe our findings have important instructional theoretical implications for relevant researchers, and practical implications for relevant practitioners.

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Appendix 1 Items of the Constructs

Information from passive information seeking strategies
I obtained much transaction information by browsing the online store website
I understood many transaction related issues through browsing the website of the online store
I knew much about this transaction by browsing the online store website
Information from active information seeking strategies
I obtained much transaction information from third-party information sources
I understood many transaction related issues from third-party information sources
I knew much about this transaction by seeking information from third-party sources
Information from extractive information seeking strategies
I got much transaction information by using extractive IT tools to seek information
I understood many transaction related issues by utilizing extractive IT tools to seek information
I knew much about this transaction by utilizing extractive IT tools to seek information
Information from interactive information seeking strategies
I got much transaction information by directly communicating with the seller
I understood many transaction related issues by directly contacting with the seller
I knew much about this transaction by directly contacting with the seller
Transaction Uncertainty
It is difficult for me to predict the future behavior of the seller due to limited transaction information I obtained
I am unsure if the seller will fulfill the transaction obligation because I do not have enough transaction information
It is very hard to predict the transaction outcomes due to lack of transaction information
It is difficult to make an informed transaction performance prediction because I have not obtained necessary transaction information
Information consistency
The information I got from various strategies was consistent
The information I got from various strategies did not match or agree
The information I got from various strategies was too inconsistent to use
The information I got from various strategies matched or agreed
Seller reputation
According to the record of the store, this seller is known to be dependable
According to the record of the store, this seller has a good reputation