



When is enough, enough? Investigating product reviews and information overload from a consumer empowerment perspective[☆]



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ABSTRACT

This study focuses on consumers' processing of online reviews as an empowering experience. We investigate how decision support information (i.e., online reviews) can lead to information overload and decision difficulty, and ultimately affect decision satisfaction. A series of three experimental studies with subjects from a professional marketing agency examine the influence of self-determined review quantity and perceived review quality on satisfaction, as well as the mediating effects of information overload and decision difficulty. Our results show that the effect of perceived review quality on information overload is enhanced when the consumer chooses to read more reviews. Individual characteristics are also relevant; consumers' product knowledge moderates the mediating effect of decision difficulty on satisfaction. This study contributes to the literature by (1) investigating how the characteristics of decision support information affect decision process and outcome, and (2) exploring the boundary conditions wherein online reviews can empower but also overload consumers under various decision contexts.

1. Introduction

The Internet offers a highly interactive environment for consumers to determine which information they would like to examine; the autonomy provides them with a sense of control and empowerment (Liu & Karahanna, 2017). Especially during the decision process of online shopping, the autonomous experience of searching and reading online reviews can enhance shopping enjoyment (Jiang & Benbasat, 2007). Although online reviews play a critical role in purchase decisions, there may be circumstances under which they complicate a decision process (Zhang, Craciun, & Shin, 2010).

The advances in information technologies (IT) offer both more freedom of choice (i.e., more products to choose from), and expanded information opportunities (i.e., more information per product) to create an environment of consumer empowerment (Broniarczyk & Griffin, 2014). Consumer empowerment is the perceived benefit of an increase in control that helps consumers choose what they want, when they want it, and on their own terms (Wathieu et al., 2002). In addition to the product choices and information provided by vendors, consumers can actively search and read online product reviews as a form of electronic word of mouth (eWOM) to fulfill their own information needs.

However, processing eWOM for a purchasing decision demands cognitive capacity; the effort required for reading and processing eWOM may lead to the perception of information overload (Malhotra, 1984). In the context of product reviews, potential information overload can be attributed to factors unique to online settings, such as the virtually unlimited quantity of reviews a consumer can find and read and the largely unknown source and quality of the reviews (Gottschalk & Mafael, 2017; Lee & Lee, 2004). A consumer therefore may exhaust his/her cognitive capacity by reading too much information or assessing review quality to reach a decision. As compared to other contexts within which individuals passively receive information, information overload in this online setting can instead be attributed to the autonomous behavior of choosing to read and process too much information.

We therefore focus on the characteristics of online reviews to investigate their influences on decision processes and consumers' decision experiences. This study concentrates on the fact that in most real-world contexts, consumers are given the option to freely choose how many reviews to read and that the quality of those reviews is unknown. Although online reviews are designed to support consumer decisions, these two unique characteristics can backfire and increase decision difficulty. Using the theoretical lens of consumer empowerment (Li,

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Jiang, Fan, & Hou, 2017; Wathieu et al., 2002) and information overload (Park & Lee, 2008), our study investigates the underlying process for how online product reviews assist or hinder the decision process by assessing the possible mediating effects of information overload and decision difficulty. A consumer's decision experience can influence his/her assessment of the vendor, regardless of the objective decision outcome. A consumer's evaluation of a decision process is primarily determined by the perception of burdens incurred during it (Botti & Iyengar, 2004). Thus, information overload and decision difficulty may play a mediating role in the effect of online reviews on decision satisfaction. We also explore the boundary conditions by taking into account the decision context and consumer characteristics; we expect the cognitive cues of prior knowledge and level of involvement with a product category to affect information overload experiences.

In sum, our study examines the following research questions: (1) Will the option of determining how much information to process affect the perception of information overload? (2) How do the self-determined review quantity and perceived review quality collectively impact information overload? (3) How do information overload and decision difficulty mediate the effects of the self-determined review quantity and perceived review quality on decision satisfaction? and (4) How do the decision contexts, as reflected in product-related individual differences, affect the decision process of online shopping with online reviews?

2. Literature review

2.1. Consumer empowerment theory

Consumer empowerment is defined as giving consumers power through greater information or understanding (Wolf, Albinsson, & Becker, 2015) or as a subjective state caused by increasing control (Wathieu et al., 2002). From this perspective, the Internet environment is critical in that it offers more information resources as decision aids (Broniarczyk & Griffin, 2014). Discussed in the context of empowerment enablers, Li et al. (2017) delineate the emotional and cognitive dimensions of empowerment. The emotional or affective dimension involves affiliation, support, or positive affect; it can be linked to social interaction and community engagement platforms wherein consumers can communicate with other consumers (King, Racherla, & Bush, 2014). The cognitive dimension includes imparting knowledge or information, as well as providing users with autonomy and delivering freedom through choices (Shankar, Cherrier, & Canniford, 2006). Nevertheless, empowering consumers does not necessarily reduce decision difficulty due to increased information that needs to be processed; it remains unclear under what conditions the online reviews will facilitate or hamper a decision process. The perception of empowerment and autonomy is especially relevant in the investigation of a consumers' decision experience, since every experience is directly influenced by the emotions and cognitions that occur during it.

2.2. Electronic word of mouth

Word of mouth (WOM) is one of the most credible channels of interpersonal communication which is critical to the popularity, reputation, attitude, adoption, and purchase of products and services (for reviews, see King et al., 2014; Babić Rosario, Sotgiu, De Valck, & Bijmolt, 2016). With its own special characteristics, eWOM is a unique category of WOM that might not be completely representative of other types of interpersonal communication. In most cases, online users search for eWOM actively, instead of passively receiving messages; they can determine the number of messages they want to read and process prior to making a decision. With more social interactions for users, eWOM activities are a critical part of the emotional aspect of consumer empowerment. In fact, product reviews are considered a type of social commerce, as this information is provided by consumers for consumers (Ahmad & Laroche, 2017). In the context of online retail, consumers

can use product reviews from other consumers, as a type of eWOM (Gottschalk & Mafael, 2017). Product reviews by other consumers may differ in their structure, format, valence, credibility, and quality. The perceived quality of the information becomes critical to its usefulness to readers (Jang, Prasad, & Ratchford, 2012).

Another research stream regarding online product reviews investigates the characteristics that make a product review helpful (Mudambi & Schuff, 2010) or those that influence attribute preferences (Liu & Karahanna, 2017). However, investigation is needed into how eWOM in general and online reviews in particular affect an overall decision experience. The present research takes the user-centric perspective and seeks to further understand how individuals process reviews and change their perceptions. Understanding the decision processes under the influence of online reviews can provide insights into how to design better review systems.

2.3. Information overload

The sheer volume of eWOM can be associated with potential information overload (Park & Lee, 2008) because of how the information is presented to consumers online (Lurie, 2004). Every individual has limited cognitive capability, so when the information load exceeds the individual's cognitive capability, the problem of information overload occurs. Information overload can confuse an individual, affect his/her ability to set priorities, make prior information harder to recall, lead to poor decision making and dysfunctional performance, and create anxiety or stress (Eppler & Mengis, 2004; Hu & Krishen, 2019; Lurie, 2004). Other consequences of information overload include reduced purchase intention and high perceived risk (Soto-Acosta, Jose Molina-Castillo, Lopez-Nicolas, & Colomo-Palacios, 2014).

Information overload occurs when the nature of the information is uncertain, ambiguous, complex, or intense. Specifically, information overload in consumer decisions can be caused by the number of alternatives or the number of product attributes (Krishen, Raschke, & Kachroo, 2011). A majority of the information overload studies on the decision process thus examine the overchoice effect, or choice overload (Gourville & Soman, 2005); this effect is also known as hyperchoice and can lead to unwanted effects on individuals such as increased stress, negative emotions, and decreased satisfaction (Mick, Broniarczyk, & Haidt, 2004). Existing research also underscores the role of perceived information quality; information that can be easily processed by individuals reduces their level of overload and positively affects their decision processes. The decision context and individual differences also warrant further investigation. As suggested by cognitive load theory, motivation, involvement, and prior knowledge affect the level of cognitive effort a user will devote to reaching an optimal outcome (Sweller, 2010).

In addition to the issue of overchoice, decision support information, such as an online product reviews, can also lead to information overload since it also requires processing capability. Although decision support information is meant to reduce ambiguity in the decision process and improve the decision outcome (Liu & Karahanna, 2017), identifying the conditions under which it creates negative consequences (e.g., information overload) demands further research effort.

3. Research framework

This study investigates the issues with online reviews from a new theoretical perspective; that is, the information overload that can be experienced from reading online reviews as a form of decision support information. Consumer empowerment serves as the fundamental theory for this study, since users are given the autonomy and freedom to determine the volume of information they would like to process in online settings. As shown in Fig. 1, we investigate both the emotional and cognitive aspects of consumer empowerment. Specifically, we posit that social interaction and choice freedom empower individuals on the

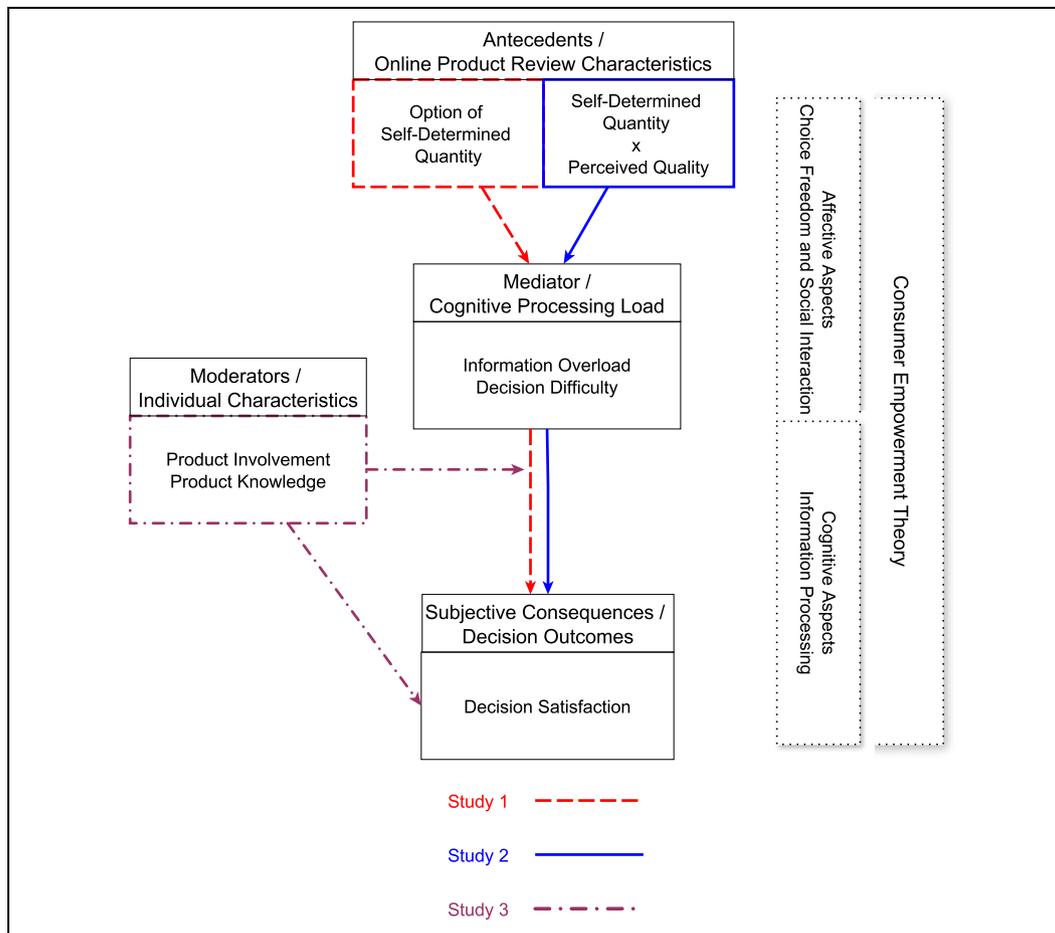


Fig. 1. Methodological and conceptual framework.

emotional dimension and improve the overall decision experience. From the cognitive perspective of empowerment, we also posit that the perceived information overload and decision difficulty play mediating roles between the characteristics of online product reviews (i.e., self-determined quantity and perceived quality) and decision experience. We also examine the role of individuals' characteristics in moderating the effects of information overload and decision difficulty.

Overall, we propose that a sense of autonomy will lead to a lower level of perceived information overload for consumers. While a certain amount of information can be beneficial to a decision maker, we expect that reading too many reviews can lead to overload and hamper the decision process. Specifically, the relationship between information volume and overload may not be linear. We also propose that information quality can lower individuals' perceived information overload and mitigate the effect of information volume on information overload. Individual differences will also affect how consumers evaluate their decision processes under the negative effects of information overload and decision difficulty, based on their prior experiences or levels of involvement, which represent their motivation for the decision task.

We use a series of three studies to empirically test our hypotheses based on the conceptual framework. In study 1, we validate whether having the option to choose review quantity affects a consumer's decision process. In study 2, we examine the interaction effects of review quantity and quality on the consumer's decision process. In study 3, we further take the individual characteristics into consideration.

4. Study 1: effect of determining the volume of online reviews

4.1. Hypothesis

Self-determination theory (Deci & Ryan, 2002) indicates that individuals prefer conditions in which they are able to determine their own outcomes. A consumer is able to take the action of searching for and reading product reviews; having the choice of determining how many reviews to read can elicit a sense of autonomy and empowerment. While the decision contexts and conditions remain the same, a consumer may not feel in control of a choice if he/she is under pressure potentially due to the choice condition such as information overload (Moller, Deci, & Ryan, 2006). Autonomous decisions are not energy depleting to consumers (Moller et al., 2006) and therefore can offer a positive decision experience. The perceptions of autonomy and empowerment can lead to satisfaction from the activity itself (Jiang & Benbasat, 2007; Wathieu et al., 2002). In this study, we therefore emphasize how a consumer's sense of autonomy can affect his/her satisfaction with a decision process, regardless of the actual decision.

An individual should stop receiving additional information once he/she notices that the information volume exceeds his/her cognitive capability. Thus, a consumer should be less likely to experience overload by decision support information (i.e., product reviews) when he/she has the option to choose how many reviews to read. When the quantity of reviews does not exceed cognitive capability, a consumer can pay more attention to the presented information and mentally organize and integrate the information into his/her existing knowledge structures (Mayer & Moreno, 2003). The consumer can thus benefit from reading reviews, experience less decision difficulty, and reach a

more satisfactory decision.

H1. When an individual can choose how many reviews to read before making a purchase decision, his/her (a) perceived information overload is lower, (2) perceived decision difficulty is lower, and (c) decision satisfaction is higher, as compared to when he/she does not have the option.

4.2. Study design and data

To test our hypothesis, we conducted an experimental study. We utilized a professional marketing research agency for data collection to increase ecological validity and achieve appropriate heterogeneity of our anonymous sample. The agency randomly drew the sample from its subject panel in 50 states of the U.S.¹ so as to be broadly representative of the total population in terms of region, age, education, and gender. We targeted general Internet consumers, over 18 years old, who had previously made purchases online.

The experimental context provided consumers with an online purchasing scenario wherein they made a purchase decision of a cell phone. Given a series of online reviews, each participant read them before making his/her purchasing decision. The participants were randomly assigned into one of the two conditions: (a) a fixed number of reviews were shown or (b) after reading the initial set of six reviews, the participant could freely choose whether to read more reviews or opt to stop and make a cell phone purchase.² The study design is summarized in Appendix A. The measurement scales were based on previously validated constructs, consisted of multiple items, and utilized seven-point Likert scales (1 = “strongly disagree” and 7 = “strongly agree”, see Appendix B). Specifically, we measured the information overload with items from Malhotra (1984) and Soto-Acosta et al. (2014). We operationalized perceived decision difficulty with items from Hanselmann and Tanner (2008). For decision satisfaction, we adapted items from Heitmann, Lehmann, and Herrmann (2007).

4.3. Analysis and results

In total, our sample consisted of 514 respondents who completed the experiment; 203 of them did not have the option to choose how many reviews to read, and 311 participants could freely choose how many reviews to read before making a purchase decision. The demographics show that 67.1% of our respondents are female. Most of the respondents are 35 to 44 years old (23.3%) or 45 to 54 years old (22.4%). In order to assess the non-respondent bias, we compared the demographics of respondents with those of the research agency's subject panel and did not observe any significant difference. We further split the respondents into early- and late-respondent groups and compared their age and gender distribution and did not find any difference statistically.

4.3.1. Measurement assessment

To assess item reliability, we examined each item's loading on the corresponding construct using confirmatory factor analysis. The results indicate that all item loadings are significant ($p < .001$) with loadings greater than 0.7, in support of item reliability. Our results displayed internal consistency according to the values of the Cronbach's alphas; the composite reliability of each investigated construct was also greater than 0.7, a common threshold for signifying satisfactory construct

¹ The respondents were offered reward points by the marketing research agency.

² Because the focus of this research is the consumer's subjective evaluation, including information overload, decision difficulty, and decision satisfaction, and not the actual decision quality, we control the review valence (i.e., positive, negative, or mixed) and treat it as a covariate throughout all of the studies.

reliability. To evaluate the convergent validity, we examined the average variance extracted (AVE), which denotes the variance captured by an indicator. Each construct achieved an AVE greater than 0.5, indicating that our instrument exhibits adequate convergent validity. Finally, we analyzed the square roots of the AVEs in relation to the correlation of each pair of latent constructs in our model; the results show that they were greater than the correlation of any pair of latent constructs. Overall, the combined results suggest that the instrument exhibited appropriate convergent and discriminant validity. Table 1 provides a summary of the results.

4.3.2. Common method bias testing

First, we performed Harman's single-factor test (Podsakoff & Organ, 1986) and used an exploratory factor analysis to determine if all items loaded on a single factor. Because the items in our dataset loaded on three factors, with the first factor accounting for only 22.66% of the variance in the items, common method bias did not appear to be a serious problem. Second, we used the smallest positive correlation among items as a conservative estimate (Lindell & Whitney, 2001). We performed Fisher's r -to- z transformation on the smallest positive correlation between two items, and found that the 99% confidence interval includes zero; common method bias was therefore not significant.

4.3.3. Hypothesis testing

The tests of the hypothesis relied on a multivariate analysis of covariance (MANCOVA). Because of their potential effects on perceived information overload, decision difficulty, and decision satisfaction, we controlled for gender, age, and perceived review quality. The MANCOVA results show that participants with a choice of review quantity, as compared to those who have a fixed number of reviews to read, are less overloaded by the information ($F = 9.54, p = .002$), experience less decision difficulty ($F = 6.47, p = .011$), and are more satisfied with their decisions ($F = 21.73, p < .001$). H1 is supported.

4.4. Discussion on the results of study 1

One of the unique characteristics of online product reviews is the consumer's autonomy to freely choose the number of them to read before making a purchase decision. Study 1 validates our hypothesis that this freedom decreases perceived information overload and decision difficulty while increasing satisfaction. This result underscores the importance of consumer empowerment and highlights the need to investigate the effect of online reviews on decision processes with a focus on the self-determined review quantity and perceived information overload.

5. Study 2: interaction effects of review quantity and quality

5.1. Hypotheses

In study 2, we build on study 1 by focusing on how the self-determined review quantity can mitigate (or augment) the effects of perceived review quality on information overload and decision experience. If reviews are of low perceived quality, they will require higher cognitive capacity for processing (Li, 2017). The lowered perceived quality can originate from comments that are overly complex and ambiguous, or ones that are written or presented in a way that is hard to process; these conditions can increase cognitive load. Thus, we expect that low-quality reviews will lead to increased information overload perception.

The concept of perceived review quality is related to how fluently an individual can process the information; the fluency heuristic underscores the significance of information quality as it relates to consumer cognitive effort (Winkielman, Schwarz, Fazendeiro, & Reber, 2003). According to this heuristic, individuals prefer options that can be more easily processed over ones that require greater processing

Table 1
Study 1 descriptive statistics and correlations.

	Mean (SD)	α	CR	AVE	1	2	3
1. Information overload	2.65 (1.44)	0.90	0.94	0.84	0.92		
2. Decision difficulty	3.37 (1.50)	0.84	0.91	0.76	0.35	0.87	
3. Decision satisfaction	4.84 (1.12)	0.69	0.85	0.74	−0.24	−0.31	0.86

α : Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted.

Note: The square roots of the average variance extracted are on the diagonal of the correlation table.

The boldface numbers represent the square roots of the average variance extracted.

effort during a decision process (Gigerenzer & Gaissmaier, 2011). A high level of fluency can have a positive effect and can lead to a more favorable evaluation by a decision maker (Winkielman et al., 2003). Prior research confirms that the perceived fluency of vendor-offered product information positively affects decision satisfaction (Mosteller, Donthu, & Eroglu, 2014). Thus when individuals read high-quality reviews, they should experience higher fluency and have lower decision difficulty. On the other hand, a low level of fluency should reduce the perceived helpfulness of the review and the ease of comprehension (Huang, Tan, Ke, & Wei, 2014).

H2. An individual's perceived quality of reviews is negatively related to his/her (a) perceived information overload and (b) perceived decision difficulty.

Research suggests that the relationship between the amount of information provided and the level of information overload is nonlinear (Eppler & Mengis, 2004). At a certain point, additional information could dramatically lead to the perception of overload. Cognitive load theory argues that individuals experience decision difficulty when the information processing requirement is high (Iyengar & Lepper, 2000). The relationship between information volume and decision difficulty should also be nonlinear. Decision support information does not always lead to decision difficulty; instead, this only happens when too much information is provided, at which point a consumer will experience it (Gao, Zhang, Wang, & Ba, 2012).

Furthermore, the number of reviews determined by a consumer can augment the effect of perceived review quality. Given limited cognitive capacity, when the amount of information to be processed is large, review quality becomes even more important in determining how well an individual can process such information. Hence, increasing the number of reviews can enhance the effect of review quality on perceived information overload and decision difficulty. Thus, we propose that the self-determined review quantity can moderate the effects of perceived review quality on decision difficulty, in a nonlinear way.

H3. The squared number of reviews determined by an individual moderates the effect of his/her perceived quality of reviews on the (a) perceived information overload and (b) perceived decision difficulty.

Information overload creates two major obstacles to decision making: the inability to locate what is relevant due to sheer volume, and lowered ability to determine what is most critical among relevant data (Lee & Lee, 2004). The experience of being unable to process all of the needed information also creates frustration for the decision maker which exacerbates decision difficulty (Krishen & Nakamoto, 2009; Mick et al., 2004). Although this study focuses on decision support information (i.e., eWOM) rather than the numbers of choices available, we expect that information-overloaded consumers will experience higher levels of decision difficulty as well (Gao et al., 2012).

Process satisfaction emphasizes the process of making a decision, rather than satisfaction with the choice itself (Zhang & Fitzsimons, 1999). Ample research shows that difficult decisions lead to lower satisfaction (Gao et al., 2012; Haynes, 2009; Wang & Shukla, 2013). Difficult decisions both online and offline can result from task

complexity, tradeoff difficulty, and preference uncertainty (Broniarczyk & Griffin, 2014), all of which hamper decision satisfaction.

H4. An individual's perceived information overload is (a) positively related to his/her perceived decision difficulty and (b) negatively related to his/her decision satisfaction.

H5. An individual's perceived decision difficulty is negatively related to his/her decision satisfaction.

5.2. Study design and data

In study 2, we allowed study participants to freely choose the number of online reviews they wanted to read before making their purchase decisions. We then collected their self-reported assessments related to their decision making. We again used a professional marketing research agency for data collection and targeted general Internet users over 18 who had previously made purchases online. The study context provided users with an online purchase scenario of a cell phone. After reading the initial set of six reviews, a participant could freely choose whether to read more reviews or to stop and make a cell phone purchase. The study design is similar to study 1 (see Appendix A); however, all participants in study 2 had the option to choose the number of reviews they wanted to read before making their purchase decisions. We measured their perceived review quality and information overload. After making a purchasing decision, the decision difficulty and decision satisfaction were also measured. In addition to the items used in study 1, we used items developed by Lee, Park, and Han (2008) to measure the perceived review quality (see Appendix B).

5.3. Analysis and results

Our sample consisted of 311 respondents who completed the study and were able to recall the study conditions. The demographics indicate that 70% of our respondents are female and most of the respondents are 35 to 44 years old (22.8%) or 45 to 54 years old (22.5%). The demographics of the respondents are comparable to the research agency's subject panel. We also did not observe any statical difference between the early- and late-respondent groups.

5.3.1. Measurement assessment

We followed the same procedure as provided in study 1 to assess the constructs' psychometric adequacy. Overall, the combined analyses indicate that the instrument exhibited appropriate convergent and discriminant validity. The results are summarized in Table 2. We also followed the same procedure as in study 1 to test for common method bias and did not find that any effects of it were significant.

5.3.2. Model testing

We evaluated the explanatory power of our model by examining the R^2 value of each non-endogenous variable. For increased robustness and statistical validity, we used a bootstrap resampling procedure with resamples of 5000. As illustrated in Fig. 2, our model accounts for a significant portion of the variance in information overload ($R^2 = 18\%$), decision difficulty ($R^2 = 40\%$), and decision satisfaction ($R^2 = 42\%$).

Table 2
Study 2 descriptive statistics and correlations.

	Mean (SD)	α	CR	AVE	1	2	3	4
1. Perceived review quality	5.5 (0.87)	0.82	0.88	0.66	0.81			
2. Information overload	2.4 (1.21)	0.88	0.93	0.81	-0.35	0.90		
3. Decision difficulty	3.1 (1.32)	0.82	0.90	0.74	-0.52	0.41	0.86	
4. Decision satisfaction	5.20 (1.02)	0.65	0.80	0.57	0.48	-0.36	-0.56	0.75

α : Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted.

Note: The square roots of the average variance extracted are on the diagonal of the correlation table.

We tested each hypothesis by examining its statistical significance and effect magnitude, as manifested in the corresponding path coefficient.

According to our results, the perceived quality of reviews negatively affects information overload (path coefficient = -0.24 , $p < .001$) and decision difficulty (path coefficient = -0.50 , $p < .001$), which supports H2a and H2b. The squared number of reviews determined by an individual moderates the effect of review quality on information overload (path coefficient = -0.13 , $p < .05$) but not on decision difficulty, which supports H3 a but not H3b. Information overload is positively associated with decision difficulty (path coefficient = 0.26 , $p < .001$); however, its direct effect on decision satisfaction is not significant, which supports H4a but not H4b. Finally, decision difficulty is negatively associated with decision satisfaction (path coefficient = -0.49 , $p < .001$), which supports H5.

Although H4b is not supported, information overload can indirectly affect decision satisfaction via its effect on decision difficulty. We further conducted an *ex-post* analysis of the mediating effects with a bias-corrected bootstrapping strategy (Preacher & Hayes, 2008). The results show that the direct effects of information overload (coefficient = -0.20 , $p < .001$) and decision difficulty (coefficient = -0.36 , $p < .001$) on decision satisfaction are significant respectively; however the effect of information overload on decision satisfaction becomes insignificant (coefficient = -0.06 , $p = .14$) when decision difficulty is added to the model. Thus, the effect of information overload on decision satisfaction is fully mediated by decision difficulty.

5.4. Discussion on the result of study 2

The results indicate that perceived review quality has a more prominent effect on information overload than the squared number of reviews read. This finding underscores the importance of high-quality reviews for products and services. The results also show the interaction effect of the self-determined review quantity and perceived review quality on information overload; however, the interaction effect is not significant on decision difficulty. This suggests that decision difficulty is driven by the perceived review quality and the effect will not be changed even when reading a small number of reviews. Information overload reduces decision satisfaction only if a consumer perceives the decision to be difficult. This result highlights the importance of decision difficulty in a decision process when using online reviews as decision support information.

6. Study 3: individual differences in motivation

6.1. Hypothesis

Given the intriguing relationship between information overload and decision difficulty uncovered by study 2, we further investigate their relationship by taking individual motivation into consideration. We examine whether product involvement and product knowledge will moderate the effects of information overload and decision difficulty on decision satisfaction. We also revalidate the mediating role of decision difficulty between information overload and decision satisfaction.

A decision process is not determined solely by external stimuli (e.g., eWOM); individual differences such as product involvement and prior knowledge can also affect information processing. Individuals will choose to devote more effort in a purchase decision for products that they deem more important and valuable, or for which they have higher product involvement (Füller, Mühlbacher, Matzler, & Jawecki, 2009). For example, an individual may be more willing to process an excessive amount of information, admit the difficulty in making the purchase decision, and still feel satisfied with the decision (Krishen, Nakamoto, & Herr, 2008).

When consumers know more about a focal product, it should be easier for them to memorize and learn new information because of more highly developed knowledge structures in that category (Lee & Lee, 2011). The level of product knowledge possessed by a consumer may affect his/her evaluation of the decision process. For example, an individual with a higher level of product knowledge may be more comfortable and confident regardless of the potential difficulty he/she encounters during the decision process and the negative effect of

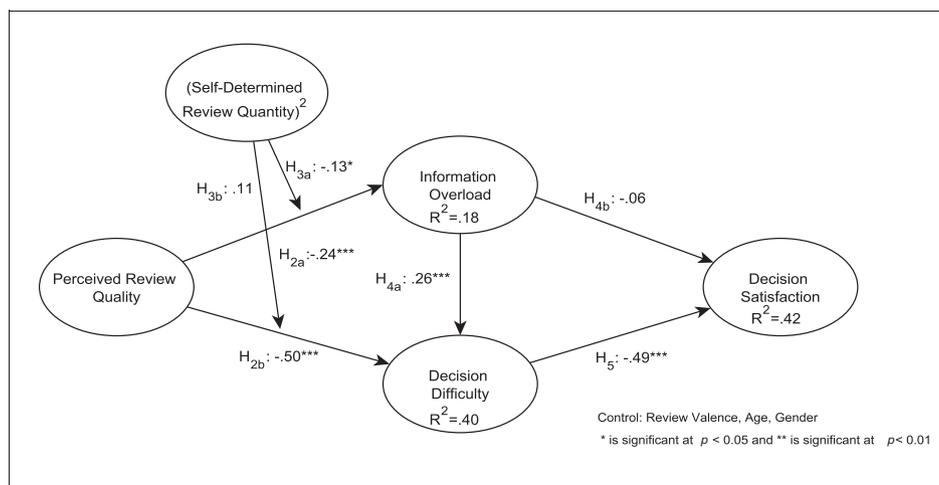


Fig. 2. Model testing results of study 2.

decision difficulty can therefore be reduced (Cowley, 2004).

H6. The mediating effect of perceived decision difficulty between perceived information overload and decision satisfaction is moderated by an individual's (a) product involvement, and (b) product knowledge.

6.2. Study design and data

In study 3, we build on studies 1 and 2 by extending our context with an additional product type (i.e., furniture), to enhance the ecological validity of our findings. The design of study 3 was similar to the first two studies, using a subject panel from a professional marketing research agency. The study context provides users with an online purchase decision for a piece of furniture or a cell phone. After reading the initial set of six reviews, a participant could freely choose whether to read more reviews or stop and make a purchase. After making a purchasing decision, the perceived review quality, information overload, decision difficulty, and decision satisfaction were measured. In addition to the items from studies 1 and 2, we also used items from Zaichkowsky (1985) to measure product involvement and items from Park and Lessig (1981) to measure product knowledge. All scales were based on previously validated constructs and used seven-point Likert items (see Appendix B).

6.3. Analysis and results

Our final analysis comprised of a total of 616 respondents. The demographics show that 66.4% of our respondents are female and most of the respondents are 35 to 44 years old (22.7%) or 25 to 34 years old (20.5%). The respondents are comparable to the research agency's subject panel in terms of demographics; those of the early- and late-respondent groups are also similar statistically.

6.3.1. Measurement assessment

We followed the same procedure as in studies 1 and 2 to assess the constructs' psychometric adequacy; overall, the results indicated that the instrument exhibited appropriate convergent and discriminant validity, as summarized in Table 3. We followed the same procedure as in studies 1 and 2 to test for common method bias and did not find it to be significant.

6.3.2. Direct effects

The tests of the direct effects relied on ordinary least squares (OLS) regression models. Because of their potential effects on decision difficulty and decision satisfaction, we controlled for product type (i.e., cell phone or furniture), gender, and age. The OLS results show that decision satisfaction is affected by information overload

(coefficient = -0.20 , $p < .001$) and the model is overall significant ($R^2 = 0.13$, $F(5, 610) = 18.49$, $p < .001$). In a second regression model, we tested the direct effect of decision difficulty on decision satisfaction, and also controlled for product type, gender, and age. The OLS results show that decision satisfaction is affected by decision difficulty (coefficient = -0.23 , $p < .001$) and the model is overall significant ($R^2 = 0.15$, $F(5, 610) = 22.24$, $p < .001$). Taking a similar approach in testing the direct effects of information overload on decision difficulty, the result shows that decision difficulty is affected by information overload (coefficient = 0.38 , $p < .001$) and the model is overall significant ($R^2 = 0.16$, $F(5, 610) = 22.57$, $p < .001$).

6.3.3. Moderated mediation effects

We analyzed the moderated mediation effect with a bias-corrected bootstrapping strategy with the number of samples set at 5000 (Preacher & Hayes, 2008). As summarized in Fig. 3, the product involvement by decision difficulty interaction is not significant ($b = 0.11$, $t = 1.33$), not supporting H6a, although the overall model is significant ($R^2 = 0.18$, $F(8, 607) = 17.02$, $p < .001$). However, the product knowledge by decision difficulty interaction is significant ($b = 0.12$, $t = 1.99$) in an overall significant model ($R^2 = 0.20$, $F(8, 607) = 19.07$, $p < .001$), supporting H6b.

In sum, the effect of information overload is mediated by decision difficulty while the relationship between decision difficulty and decision satisfaction is moderated by product knowledge. We further estimate the indirect effect of information overload on decision satisfaction under different levels of product knowledge by following the method suggested by Spiller, Fitzsimons, Lynch Jr, and McClelland (2013). The results indicate that the total effect of information overload on decision satisfaction ranges from -0.14 to -0.08 at the 95% confidence interval of product knowledge (i.e., the total effect of decision difficulty on decision satisfaction ranges from -0.36 to -0.21). This finding implies that the negative effect of information overload is largely reduced when consumers have a high level of product knowledge.

6.4. Discussion on the results of study 3

According to our findings, product knowledge is a moderator between decision difficulty and satisfaction, whereas product involvement is not. One potential explanation is that product involvement is volitional and intentional; in contrast, product knowledge comes from memory and mental structures that are not necessarily readily accessible or intentional. In other words, product knowledge is linked with memory structures which are formed over time and allow for faster information retrieval and less effortful processing. On the other hand, product involvement may have more impact on whether a consumer focuses on central versus peripheral cues when making a decision.

Table 3
Study 3 descriptive statistics and correlations.

	Mean (SD)	α	CR	AVE	1	2	3	4	5	6
1. Perceived review quality	5.53 (0.92)	0.84	0.89	0.68	0.82					
2. Information overload	2.49 (1.40)	0.90	0.94	0.84	-0.15	0.91				
3. Decision difficulty	3.07 (1.40)	0.81	0.89	0.73	-0.49	0.37	0.85			
4. Decision satisfaction	5.13 (1.05)	0.60	0.73	0.50	0.28	-0.41	-0.38	0.71		
5. Product involvement	3.76 (1.03)	0.86	0.89	0.68	-0.07	-0.01	0.00	-0.09	0.83	
6. Product knowledge	5.54 (1.00)	0.87	0.92	0.80	0.28	-0.11	-0.18	0.20	-0.32	0.89

α : Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted.

Note: The square roots of the average variance extracted are on the diagonal of the correlation table.

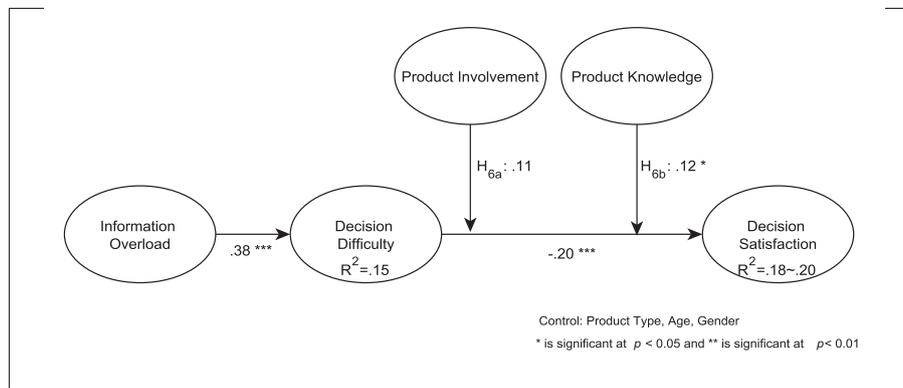


Fig. 3. Hypothesis testing results of study 3.

7. Overall discussion

The results of study 1 show that all else being equal, an individual is less overloaded by decision support information, perceives less decision difficulty, and is more satisfied with a decision when he/she is empowered with the option to freely choose the quantity of online reviews to process. In study 2, we demonstrate the nonlinear effect of the self-determined review quantity on information overload and its moderating role in enhancing the effect of information quality on information overload. Study 2 also underscores the central role of the consumer's perceived decision difficulty by showing that it is driven by the perceived review quality and that the effect of information overload on decision satisfaction is fully mediated by decision difficulty. Finally, in study 3, the consumer's product knowledge exhibits a moderating effect on the mediating effect of decision difficulty on decision satisfaction.

Our study investigates how online product reviews affect information processing and the subsequent perception of the decision process and consumers' decision experience. Since online consumers have control over how much information to receive and process, this autonomy can reduce their sense of overload with the decision support information. Our results provide insights into how both the self-determined quantity and perceived quality of online reviews affect an individual's evaluation of a decision process. Specifically, an individual is less overloaded by information when he/she perceives the quality of the reviews to be high and this effect is moderated by the squared number of self-determined reviews.

In addition, our results indicate that information overload does not impact decision satisfaction directly in our study, but through decision difficulty. That is, information overload leads to lower levels of decision satisfaction, only when the individual perceives the decision to be difficult. The moderating effect of product knowledge on this mediating effect indicates that the negative impact of decision difficulty on decision satisfaction is less of a concern for consumers with abundant product knowledge and more highly developed knowledge structures. This result underscores the differential impact of information overload on expert versus novice consumers. For experts who are capable of processing product related information, decision satisfaction is not greatly affected by information overload caused by low-quality or high-quantity reviews. However, for novices, decision satisfaction relies on the proper presentation of reviews that are easier to process, thereby reducing information overload.

8. Conclusions

8.1. Contributions to theory

First, our study contributes to the literature of consumer empowerment and autonomy by offering empirical evidence regarding the effect of consumer empowerment on reducing information overload.

One of the characteristics of the online environment is the sense of control and autonomy for decision makers; prior research suggests that the Internet environment enables consumer empowerment and can lead to consumers' positive assessments of products or services. Our study expands the consumer empowerment literature by explicating its effect on improving decision processes via reducing information overload. Our study results further show that self-determined review quantity can mitigate the negative impact of review quality. While the extant literature emphasizes the effects of information volume and quality on information overload, this study explains how consumers' experiences are improved by the Internet environment from the perspective of empowerment. Our results further confirm the nonlinear relationship between information volume and information overload, even when the number of reviews to process is determined by the decision maker. Nevertheless, our results still imply that consumers can still possibly overload themselves by making that choice of reading too much although providing the option to freely choose the quantity of reviews can reduce perceived information overload.

Second, we contribute to the literature by investigating the overloading phenomena with decision support information rather than choice options or product attributes studied in previous research. Consumers can make more informed decisions after reading online reviews and possibly extract previously unknown information from the reviews; however, it requires cognitive processing. Although decision support information is meant to improve consumers' decision experiences, it can still create unintended consequences of posing an additional cognitive burden on consumers. Even when a consumer reaches a decision and purchases online after reading reviews, he/she can experience decision difficulty and reduced decision satisfaction. This study uniquely examines the possible negative consequence of decision support information caused by information overload. Our study therefore opens a promising new research direction of investigating the net benefit of using decision support information in decision-making, with an emphasis on the decision process and overall decision experience.

Third, this study contributes to the literature by exploring the underlying mechanism of information overload which influences decision satisfaction. Our study results show the boundary condition of the mediating effect of decision difficulty; the negative effect of information overload on decision satisfaction is minor for consumers with high product knowledge. Instead of investigating the objective decision quality, our study emphasizes consumers' decision experiences. Consumers' decision experiences can affect their loyalty and assessment regarding the vendor no matter whether they make a good purchase decision or not; it is therefore critical to investigate the process underlying the formation of a consumer's decision satisfaction. We propose and test the moderated mediation effect of decision difficulty between information overload and decision satisfaction, and the results reveal the conditional indirect effect of information overload created by decision support information. Our findings suggest that while the

quantity and quality of online reviews lead to information overload, they do not exhibit a direct effect on decision satisfaction. Instead, when a decision is perceived to be difficult, information overload affects decision satisfaction. Further, the strength of the indirect effect depends on personal characteristics (i.e., a consumer's product knowledge). Our study therefore stresses the importance of considering consumer characteristics in conjunction with decision contexts.

8.2. Implications and limitations

Our theory-based empirical studies elucidate the boundary condition of consumer empowerment in the context of online reviews. This result can help managers optimize the effects of online reviews to improve consumers' decision experience and satisfaction. Specifically, novice consumers are more likely to experience dissatisfaction caused by information overload; e-commerce firms can target consumer segments (e.g., expert versus novice consumers) and design better presentation mechanisms for reviews to assist the decision process. For example, they can algorithmically improve the overall quality of the reviews, to increase the processing fluency of reviews for novice consumers.

Several limitations of this study point to promising research directions. First, we analyze the influences of key information factors of online reviews by focusing on the contributors to information overload. However, we do not measure the media characteristics such as format (i.e., video, graphics, and text) and length. To confirm the relationships associated with information characteristics, future studies should include the operationalization of media characteristics to further depict

the influences of online reviews. Second, we control for the review valence in all of our studies to rule out the effects of positive or negative reviews. As such, the interaction effects of review valence and review quantity or review quality on information overload can be investigated in future research. Third, we cannot rule out potential self-selection biases from panel-based respondents. Additional research might achieve other empirical insights with comparative studies to examine consumers across different cultures. Cultural differences may offer rich insights related to decisions and behaviors. Fourth, whereas we conducted a third study to rule out the impact of product type on our model, additional product types and product involvement might also affect the decision process. Future research can test the impact of product involvement more thoroughly and include a broader range of products (e.g., high versus low risk, utilitarian versus hedonic products/services, and tangible versus intangible goods) to augment our overall findings and model. Follow-up research can expand on our model by incorporating individual characteristics, and their ultimate impact on decision difficulty and satisfaction; those could include risk aversion tendency and coping strategies. Another way in which future research can expand our findings would be to consider the impact of social media quantitative metrics such as Yelp stars or Facebook likes when coupled with qualitative reviews, as these are often seen as proxies for WOM effects since our research focuses on the comments themselves. We do not explicitly measure motivation toward decision tasks in our studies but we consider motivation as a critical factor in decision-making tasks. Future studies can incorporate motivation measurement to further examine how it affects the decision-making process.

Appendix A. Design of study 1

After answering the qualification question (i.e., online purchase experience) and providing demographics, the participants in the no-choice condition read six or eighteen comments (randomly assigned) at a time. On the other hand, after reading the initial six comments, participants in the with-choice condition can choose to read more review or not. We specifically controlled the order of the comments shown to the participants; i.e., each participant read the online reviews in the same order. The product reviews were collected from online retailers on the products in our experiments. The reviews were shown three at a time to the participants, as illustrated in Fig. A1.

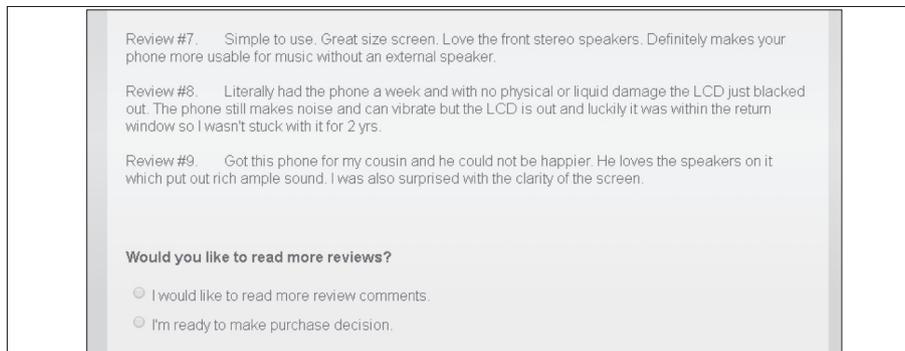


Fig. A1. Reviews showed in the with-choice condition in study 1.

In both no-choice and with-choice conditions, the number of reviews read by the participants was used as a control variable in the analysis. After asking the participant to make a purchase decision (i.e., the likelihood of buying the presented product, and the willingness to pay), we measured their perceived information overload. We also measured the perceived decision difficulty and decision satisfaction.

Appendix B. Question items

Information overload (Malhotra, 1984; Soto-Acosta et al., 2014).

- IO01 There was too much information in the reviews.
 IO02 I was completely flooded by the information in the reviews.
 IO03 There was so much information that I was unable to consider all of it.
 Decision Difficulty (Hanselmann and Tanner 2008)

- DD01 For me, this decision was very difficult.
 DD02 I would need more time to decide.
 DD03 For this decision, I felt certain which option to choose. (Reverse wording)

Decision Satisfaction (Heitmann et al. 2007)

- DS01 I found the process of deciding which product to buy frustrating.
 DS02 I found the process of deciding which product to buy interesting.
 DS03 I was satisfied with my experience of deciding which product option to choose.
 Perceived Review Quality (Lee et al. 2008)

- QC01 The reviews were understandable.
 QC02 The reviews were reliable.
 QC03 The reviews were relevant to my purchase decision.
 QC04 The review in general provided a sufficiency of reasons for the opinions.
 Product Involvement (Zaichkowsky 1985)

- PI01 I feel the product to me is relevant/irrelevant.
 PI02 I feel the product to me is valuable/worthless.
 PI03 I feel the product to me is interesting/boring.
 PI04 I feel the product to me is fascinating/mundane.
 Product Knowledge (Park and Lessig 1981)

- PK01 In general, I believe I am familiar with the product.
 PK02 I have the knowledge of how to select the product.
 PK03 I know which product features would be important in making a choice of the product.

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