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Online Reviews Summarisation: The Way to Increase eWOM
Efficiency and Consumer Decision Satisfaction

Navn: Huan Chen, Anastasiia Nikitina

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The Way to Increase eWOM Efficiency and Consumer Decision Satisfaction

Supervisor: Auke Hunneman

Content

Introduction.....	4
Literature Review.....	7
Consumer decision satisfaction.....	7
Online customer reviews.....	8
Information overload	9
Environmental Clues: opinion mining and attribute-based review summarization.....	10
Methodology	11
Sample.....	12
Manipulations and Measurements	12
Manipulation Check.....	13
Statistical Method for Testing.....	13
Thesis Progression	13
References.....	16
Appendix: Measurement Scales.....	22

Summary

In our preliminary thesis, we describe the general idea of our research project. Focusing on product choice in an online environment, we decide to investigate how information from customer reviews can be automatically processed so to facilitate the purchasing process. We examine the body of literature about the decision satisfaction and the information overload and find out that the way the information is structured can help people to process information better. Thus, we want to check whether automatic summarization of customer reviews based on the most frequently-mentioned product features can help customers to receive more satisfaction from the purchasing process. This topic seems important due to the increasing popularity of eWOM and large share of e-commerce in overall retail. Furthermore, we describe the methodology part of our research. The research consists of technical and experimental parts. During technical part, we extract information from the Web and apply natural language processing tools to generate summaries. The experimental part focuses on testing, how the summaries generated earlier assist customers in making a decision. We finish data collection with a questionnaire about participants' overall choice experience during the experiment. The last part of preliminary thesis is our plan of thesis progression.

Introduction

The wide coverage of Internet, the increased security of e-payments and the convenience of searching and comparing products and services contribute to the growing popularity of e-commerce. With an estimated value of around \$ 1.915 trillion, e-commerce has witnessed significant growth over the years (eMarketer, 2016). Alibaba broke the record for initial public offering with an estimated value of \$25 billion (Mac, 2014). Amazon's market capitalization (appr. \$542 billion) is comparable to the GDP of Sweden (\$511 billion) (Cherney, 2017). A recent study shows that e-commerce account for 9% of all retail sales in the US and 23% in China in 2017 (Statista, 2018). E-commerce market is a blue ocean with immense potential.

Along with the development of e-commerce grows exponentially the number of consumer reviews. Consumers' habits of shopping have changed dramatically, and it is now a common practice for people to share their usage experience after purchase and consult product reviews before making a choice. Generating from average people, online reviews supplement information from product descriptions and expert reviews (Mudambi & Schuff, 2010). Different from traditional WOM, electronic word-of mouth (eWOM) are more public conversations with a wide network of people who are not acquaint with each other but share similar interests in specific products/services or topics (King, Racherla, & Bush, 2014). Consumer reviews is considered as one of the most important types of eWOM. Its increasing availability is beneficial as it helps consumers to form comprehensive overviews of products and services and to make more informed decisions based on previous consumers' experiences (Kostyra et al., 2016). However, the sheer number of reviews, in hundreds and thousands, could be overwhelming and complicate consumers' decision-making process. Reading through reviews manually and detecting helpful reviews is time-consuming as consumers encounter many reviews that are lengthy but uninformative, ambiguous, repeat identical information, show polarized attitudes towards the same products and even fake with ingenuine descriptions. Thus, for those low-involvement consumers who only view a few reviews to make decisions, they may form biased opinions towards the products, which leads to unsatisfied purchase (Kangale et al., 2016). While for those who devote time and energy to search for items that match with their preferences, they may experience "decision fatigue" (Tierney, 2011) and quit the purchase, which could be one of the reasons for the high abandonment shopping cart rate (Baymard

Institute, 2017). As this decision fatigue provokes significant sales losses for the businesses, we decided to focus our research on this topic and investigate the ways to facilitate decision-making process.

To simplify consumers' decision-making process, many e-commerce merchants have developed mechanisms to assist consumers in making purchase decisions, such as helpful votes, averaged ratings, and reviewer information disclosure (Singh, et al., 2017). However, the effectiveness and relevance of these attempts are questionable. Highly voted reviews are often the ones posted earlier, and according to Sipos, Ghosh and Joachims (2014), consumers' voting behaviours incorporate both context and a review's inherent quality. Meanwhile, though average rating is intuitively straightforward, it may distort the real distribution of consumers' evaluations and offers little use for further inquiries of a product's specific features. Moreover, since Internet is a relatively anonymous medium (Ku, Wei, & Hsiao, 2012), it is still difficult to verify a consumer's profile even with certain user information disclosed.

Though been widely acknowledged as a valuable part of consumer information, unlike the above mentioned numerical and categorical data, consumer textual reviews have not gain significant attention in the e-commerce research arena (Kangale et al, 2016; Xu, Datta, & Dutta, 2012). Existing studies concentrate on addressing antecedents of eWOM, such as consumers' motivation to engage in eWOM (Angelis et al., 2011; Huang, Lin, & Lin, 2009; Sun et al., 2006), delineating processing methods of review data, such as using conjoint experiment to evaluate review valence, volume, and variance (Kostyra et al., 2016) and using text mining approaches to generate feature-based review summary (Hu & Liu, 2004; Kangale et al., 2016; Xu et al., 2017), and investigating applications of eWOM from companies' perspectives, such as consumer needs identification (Timoshenko & Hauser, 2016) and new product development (Qi et al., 2016). Research that takes consumers' perspectives and examines implications of summarized reviews on consumers' purchase decision-making remains scarce.

The objective of our research is to disentangle the effect of summarized reviews on increasing eWOM efficiency and facilitating consumers' product choice. To the best of our knowledge, there is no online store today that summarises customer reviews based on the features described. Yet, based on the theory provided we expect that short structured pieces of information available to the reader will first, decrease the time needed for processing and second, provide the customer with

more confidence as he/she will be able to analyse more product alternatives than before. Therefore, the *research question* we are interested in is *whether feature-based summary of customer reviews decrease information overload and increase decision satisfaction?*

The research will be divided into two parts. Firstly, we will extract the most frequently mentioned product features that people are talking about in online reviews and will create a summary of them using natural language processing tools. Specifically, we will take three steps: 1). identify features of a product that consumers have commented on; 2). identify the positive and negative emotional orientation regarding each feature/attribute in the review sentences; 3). Produce a feature-based summary using mined information (Hu & Liu, 2004). Secondly, we will test the usefulness of the review summary through an experiment design and a regression analysis. The last part of the experiment will be a questionnaire where participants can answer to the questions regarding their choice experience.

This study is expected to contribute to both researchers and business practitioners. Academically, we aim to enrich literature on both business intelligence and eWOM on consumer decision satisfaction through programming-aided generation of summarized reviews and experiment-based examination of its applications on consumer decision making. Practically, the feature-based review summarization, which can support consumers make more objective choices confidently and quickly, is expected to decrease the shopping cart abandonment rate, increase merchants' sales and enhance consumer relationships in the long term. To the best of our knowledge, no research has been done to test whether such a summary provides benefits to the consumer (choice facilitation) and to the business (sales increase). Thus, by answering our research question, we will be able to provide insights to the interdisciplinary research area of marketing and computer science and to contribute to the improvements of user experience in an online store.

The rest of preliminary thesis will be organized as follows: we will critically review the related literature on eWOM, consumer decision satisfaction, information overload and opinion mining and review summary. Then, we will describe the methodology of data collection. We conclude our report by presenting the plan of thesis progression.

Literature Review

Consumer decision satisfaction

Aiello, Czepiel and Rosenberg (1977) found that satisfaction is not only determined by the choice outcome but also by the choice process itself. Feelings accompanying the choice process may influence judgements of product satisfaction (Diehl & Poynor, 2010) and regret (Inbar, Botti, & Hanks, 2011).

Overall satisfaction of the product can be decomposed to decision (choice-process) satisfaction and consumption satisfaction. This decomposition is important primarily because it affects different stakeholders: while lack of consumption satisfaction negatively affects a manufacturer, lack of decision satisfaction has a negative impact on a retailer to the greater extent (Fitzimons, Greenleaf, & Lehmann, 1997).

Decision satisfaction is influenced by intentions and behavior of a customer before and during the choice process. Their intentions are the motivation or goals they have before starting the choice process and the behavior is the actions they need to make to attain their goals. According to Bettman (1979), consumers have multiple goals they need to achieve during the product selection process in order to be satisfied. It is suggested that four most important goals of purchasing process are maximizing the accuracy, minimizing evaluative costs, minimizing the experience of negative affect and maximizing the ease of decision justification (Bettman, Luce, & Payne, 1998). Accuracy is important due to the rational choice theory of maximizing utility behavior. Moreover, humans strive to minimize the costs as their resources (both time-wise and cognitive-wise) are limited (Anderson, 2003). Furthermore, ease of justifying the decision is important because of social part of human's nature – people often feel evaluated by others or themselves (Tetlock, 1992). Finally, negative affect means the feeling of regret due to the trade-off difficulty. Every choice implies dealing with trade-offs, therefore minimizing regret because of choosing one product instead of the other is one of the main product choice goals (Luce, Bettman, & Payne, 1997; 2001). As online reviews are becoming one of the sources to make a choice and attain decision-making goals in an online environment, they are worth being investigated deeper.

Online customer reviews

Unlike offline store where consumers can physically touch and examine the products and interact with sales assistants to identify their preferences, online shopping embeds more uncertainty as it provides limited possibility to direct test the product before purchase. Consumers usually take a critical view regarding merchant-provided product descriptions and consider consumer reviews, based on previous consumers' personal experiences, to be more trustworthy and credible (Chen & Xie, 2008; Kangale et al., 2016).

Consumer reviews, as a powerful form of eWOM communication, are composed of quantitative and qualitative reviews (Sridhar & Srinivasan, 2012). Quantitative reviews show in a form of rating or grading and is often a summary statistic that averages consumers' single ratings. Qualitative reviews offer a user-oriented written description accounting the product features, the usage experience and the related services. Comparing to quantitative reviews, qualitative reviews grant consumers much freedom to decide which to describe and evaluate and how to present their arguments, and therefore is a more reliable and timely source of consumer information (Dellarocas, 2003; Kostyra et al., 2016).

The nature of Internet determines wide reach and quick updates of online consumer reviews (Park, Lee, & Han, 2007). The perceived anonymity encourages consumers to share their opinions freely while the distant relationships between sellers and consumers motivates the generation of more objective reviews (Park, Lee & Han, 2007). Abundant reviews that are available for a large variety of products have allowed consumers to overcome information asymmetries that pervade in traditional consumer markets. As suggested by Rezaabakhsh et al. (2006), throughout the eWOM activity, consumers are able to gain higher levels of market transparency.

From consumers' perspectives, online reviews serve as a good proxy for overall WOM and an assistance tool that reduces decision risk. A recent research found that 85% of consumers trust online reviews as much as a personal recommendation (BrightLocal.com, 2017). From organizational perspectives, online reviews allow companies to promote products and boost sales, especially for those with low brand equity (Kostyra et al., 2016; Nga et al., 2013) and new products (Qi et al., 2016), and identify customers' urgent and hidden needs (Zhan, Loh, & Liu, 2009) to improve products and to exploit market potential.

Information overload

As Bawden and Robinson (2009) stated, “there is no single definition of information overload. The term is usually taken to represent a state of affairs when an individual’s efficiency in using information in their work is hampered by the amount of relevant and potentially useful information available to them”. The linkage between increasing number of consumer reviews and potential information overload seems relevant: although existing consumer reviews offer potential consumers insights about product, they may also cause cognitive strain and dysfunctional results (Park, Lee, & Han, 2007).

Information overload has become one major concern of online consumer reviews. Without a standard format for consumers to post reviews online, each review is different from others. Facing numerous reviews, consumers can feel overwhelmed and become less engaged as the information input exceeds his/her processing capacity (Grisé & Gallupe, 2000). Dealing with information that surpasses the handling capacity may subject consumers to reduced ability to set priorities and adverse judgmental decisions. Previous researchers have found that information overload results in less confident, less satisfied, and more confused consumers who are uncertain about their decision-making and are more likely to regret for their purchase (Lee & Lee, 2004; Chen, Shang, & Kao, 2008; Greifeneder, Scheibehenne, & Todd, 2010). Moreover, the more information a customer has to process on one product, the less number of product alternatives he can analyze (Jiang & Punj, 2010). This makes his choice less justifiable and violates choice-process goal of accuracy.

Traditional approaches to information overload varies the number of options and attributes (features) of each option in a choice set to examine the effect of information overload on consumers’ decision process and decision quality (Jacoby, Speller, & Kohn, 1974; Jacoby, Speller, & Berning, 1974). The process of choice always implies a trade-off between the amount of information analyzed for each product option and the number of options. To maintain the balance and not to experience information overload, a person has to analyze less information per each option in order to deal with the increasing number of product options available. In context of e-commerce, it is especially worth-mentioning as online stores have wider assortment than traditional brick-and-mortar ones. Nevertheless, the amount of information per each option is also increasing due to eWOM. Thus, we hypothesize that:

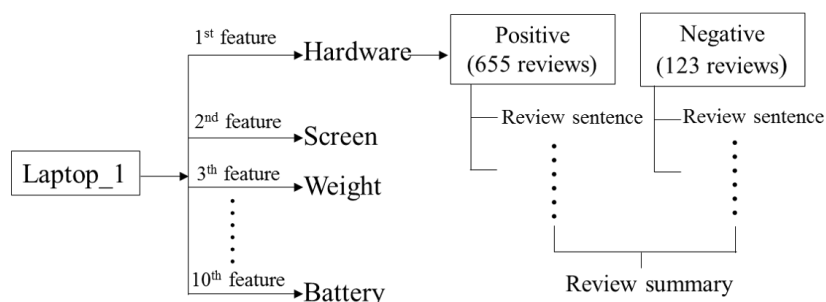
H1: *large number of customer reviews creates information overload and has a negative impact on decision satisfaction.*

With the increasing complexity of choice, consumers pay more attention to the environmental clues in the choice environment, tending to help them. That said, customers start to pay more attention to the way the information is structured. This adaptability to the environment (Johnson, Payne, & Bettman, 1988) makes the exploration of information structure crucial for understanding the consumer information processing and decision quality.

Environmental Clues: opinion mining and attribute-based review summarization

Open form of writing and lack of structural restrictions make textual reviews difficult to analyse comparing to ratings and gradings (Xu et al., 2017). Recent business intelligence and analytics literature has suggested opinion mining to be effective in discovering product features and reviewers' sentiments (Al-Obeidat et al., 2018; Lin et al., 2012; Kangale et al., 2016). Opinion mining is the “process of a set of search results for a given item, generating a list of product attributes (quality, features, etc.) and aggregating opinions about each of them (poor, mixed, good)” (Dave et al., 2003). Two important sub-tasks of opinion mining are identifying product features and extracting (positive or negative) opinions associated with these features (Pang & Lee, 2008). Frequent nouns or noun phrases are likely to be features while adjectives that appear in the same sentence as the features can be used to identify expressions of opinions associated with features (Hu & Liu, 2004). Figure 1 illustrates a feature-based summary of a laptop. Hardware, screen, weight and battery are the product features. 655 consumer reviews express positive opinions about hardware while 123 express negative opinions. The proportion of positive and negative opinions for each feature of the product is provided separately and will be used to generate a final summarized sentence for all features from discovered information.

Figure 1: an illustration of a feature -based summary for a laptop



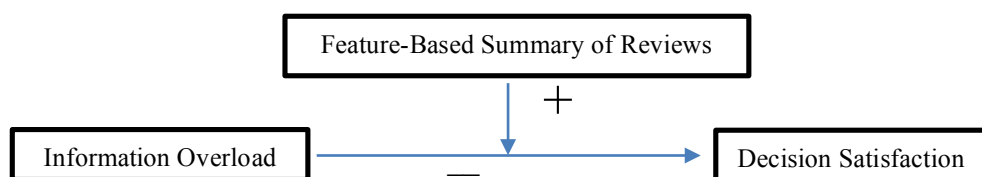
Opinion mining implies processing large amounts of text, extracting frequently mentioned patterns and weighing the overall sentiment of the text. All these steps, usually executed by a potential customer, require lots of cognitive efforts and can be an antecedent of information overload. Opinion mining tends to automate this process and omit inefficient steps in decision-making. Thus, the result of opinion mining - feature-based review summary - will provide a customer with a same amount of information in a concise form that require less cognitive efforts. The ease of decision-making simultaneously increases accuracy of a decision (due to the increasing number of product options that can be analyzed) and saves efforts and costs, which eventually, contributes to the improved consumer decision satisfaction (Heitmann, Lehmann & Herrmann, 2007). Thus, we hypothesize that:

H2: *Feature-based summary of consumer reviews moderates the negative effect of information overload on decision satisfaction.*

Methodology

Our study will examine if the information overload caused by the large number of customer reviews has the negative impact on product choice satisfaction (Hypothesis 1). Feature-based summary of customer reviews is suggested as a moderator of the relationship between the information overload and product choice satisfaction (Hypothesis 2). Our research model is illustrated in Figure 2, where a negative effect of information overload on consumer decision satisfaction is moderated by the presence of feature-based summary.

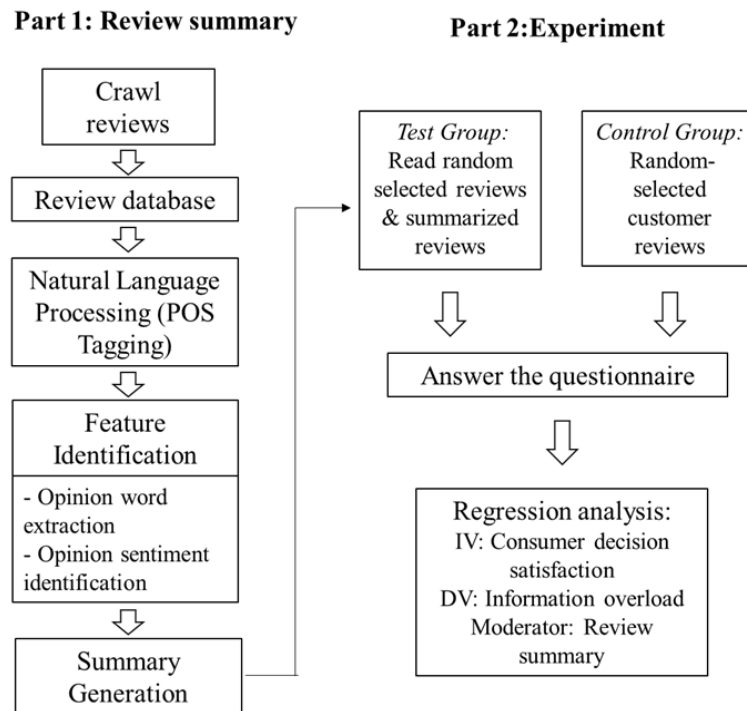
Figure 2: Conceptual Model



We choose laboratory experiment as a method as thus we can follow the choice process of each participant through the data from a web-server and an eye-tracking device. Before the experiment we will conduct a pretest to exclude those participants who have strong preferences and/or negative emotions towards brands/products we use in the experiment as previous knowledge as well as strong emotions may influence the choice process during the experiment and subsequently create bias and violate the results. By introducing a pretest, we strengthen the internal validity of the experiment. After the experiment participants will fill in the

questionnaire about their choice process. Figure 3 depicts the methodology of opinion mining and regression.

Figure 3: the methodology of the research



Sample

A sample of 50 business school students will participate in the experimental part of the research. A pretest will be organised to ensure that participants have no strong preferences or negative emotions towards the products/brands chosen for the research.

Manipulations and Measurements

In order to confirm or reject aforementioned hypotheses, we need to measure decision satisfaction as dependent variable (DV) and information overload – as independent variable (IV). Variables are measured on a 1-7 Likert scale. We also introduce binary variable – summary (Yes/No) – as a moderator of the relationships between IV and DV. Scales of both IV and DV are described in Appendix.

According to Bettman, Luce and Payne (1998), four choice goals are the most relevant to decision-making: accuracy maximization, costs minimization (time, cognitive capabilities), easiness of justifying the choice and minimization of negative affect (trade-offs they eventually face while choosing among several options). Thus, we consider these four elements to describe our DV.

According to Aljukhadar et. al (2010) and Sweller (1994), information overload is a construct that can be described by three variables – number of alternatives, level of attributes and information quality. As we are not interested in how people assess the number of alternatives, we adapt the scale by measuring the information quantity (how the product attributes are described) and information quality.

Manipulation Check

The questionnaire following the choice task will include questions related to the assessment of both customer reviews' and summaries' helpfulness and easiness of processing (processing fluency). These questions will reveal how participants use customer reviews to make a choice, whether they consider them helpful and how difficult it is to process these reviews. We expect to see significant difference in processing fluency between two conditions (with and without summary). We will measure processing fluency using 5-item scale, the validity of which is confirmed by Graf, Mayer, and Landwehr (2017).

Statistical Method for Testing

We will adopt regression analysis to test the hypotheses. Before that, we will conduct a factor analysis as both IV and DV consist of multiple dimensions and we need to apply dimension reduction.

Thesis Progression

1) Technical Part – January-February 2018

Input: web-pages with product description and customer reviews of 10 products (2 product categories with 5 products in each)

#	Step Description	Tools	Time Needed
1.	Extracting customer reviews from Amazon.com	Python web-crawler	January 2018
2.	Creating database of the reviews extracted	SQL	January 2018
3.	Parts-of-Speech Tagging of the words in reviews	Python Natural Language Processing ToolKit	February 2018

4.	Identification of frequencies of the words	Python frequencies computing tool	February 2018
5.	Identify feature words	Manual	February 2018
6.	Extract collocations with feature words (noun+adjective)	Python Natural Language Processing ToolKit	February 2018
7.	Sentiment analysis of collocations	Python	February 2018
8.	Extracting opinion sentences with the features collocations	Python	February 2018
9.	Creating a summary of each feature of a product based on opinion sentences	Python	February 2018

Output: summary of customer feedback regarding most important product characteristics

Intended view of the summary:

Top positive features of iPhone 7 based on customer reviews:

Size	203 mentions + summary
Screen Touch	122 mentions + summary
iOS	58 mentions + summary
Sound	39 mentions + summary

Top negative features of iPhone 7 based on customer reviews:

System Portability	115 mentions + summary
Battery	103 mentions + summary
Bluetooth	44 mentions + summary
Sound	10 mentions + summary

Hyperlinks to the opinion sentences describing each of the features are provided to establish trust and transparency.

2) Experimental Part – March-May 2018

Series of experiments will be conducted in order to test the aforementioned hypotheses (March-April 2018).

Data analysis will be performed using statistical tools (May 2018).

3) Finalizing the Thesis – June 2018

Final write-up will be created and prepared for submission.

References

1. Aiello, A., Rosenberg, L. J., & Czepiel, J. A. (1977). *Scaling the heights of consumer satisfaction: An evaluation of alternative measures*. New York University, Graduate School of Business Administration.
2. Al-Obeidat, F., Spencer, B., & Kafeza, E. (2018). The Opinion Management Framework: Identifying and addressing customer concerns extracted from online product reviews. *Electronic Commerce Research and Applications*, 27, 52-64.
3. Aljukhadar, M., Senecal, S., & Daoust, C. E. (2010). Information overload and usage of recommendations. In *Proceedings of the ACM RecSys 2010 workshop on User-Centric Evaluation of Recommender Systems and Their Interfaces (UCERSTI)*. CEUR-WS. org.
4. Anderson, Christopher J. (2003). The Psychology of Doing Nothing: Forms of Decision Avoidance Result from Reason and Emotion. *Psychological Bulletin*, 129 (1), 139–67.
5. Angelis, M. D., Bonezzi, A., Peluso, A. M., Rucker, D. D., & Costabile, M. (2012). On braggarts and gossips: A self-enhancement account of word-of-mouth generation and transmission. *Journal of Marketing Research*, 49(4), 551-563.
6. Baymard Institute. (2017). 37 Cart Abandonment Rate Statistics. Retrieved from: <https://baymard.com/lists/cart-abandonment-rate>
7. Bawden, D., & Robinson, L. (2009). The dark side of information: overload, anxiety and other paradoxes and pathologies. *Journal of information science*, 35(2), 180-191.
8. Bettman, J. R. (1979). Memory factors in consumer choice: A review. *The Journal of Marketing*, 37-53.
9. Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of consumer research*, 25(3), 187-217.
10. BrightLocal. com (2017) Local Consumer Review Survey. Retrieved from: <https://www.brightlocal.com/learn/local-consumer-review-survey/>
11. Chen, Y. C., Shang, R. A., & Kao, C. Y. (2009). The effects of information overload on consumers' subjective state towards buying decision in the internet shopping environment. *Electronic Commerce Research and Applications*, 8(1), 48-58.

12. Chen, Y., & Xie, J. (2008). Online consumer review: Word-of-mouth as a new element of marketing communication mix. *Management Science*, *54*(3), 477–491.
13. Cherney, M.A. (2017). Amazon headed for \$1.6 trillion market cap, analyst suggests. Retrieved from: <https://www.marketwatch.com/story/amazon-headed-for-16-trillionmarket-cap-analyst-suggests-2017-09-07>
14. Dave, K., Lawrence, S., & Pennock, D. M. (2003, May). Mining the peanut gallery: Opinion extraction and semantic classification of product reviews. In *Proceedings of the 12th international conference on World Wide Web* (pp. 519-528). ACM.
15. Dellarocas, C. (2003). The digitization of word of mouth: Promise and challenges of online feedback mechanisms. *Management science*, *49*(10), 1407-1424.
16. Diehl, K., & Poynor, C. (2010). Great expectations?! Assortment size, expectations, and satisfaction. *Journal of Marketing Research*, *47*(2), 312-322.
17. EMarketer.com (2016). Worldwide Retail Ecommerce Sales Will Reach \$1.915 Trillion This Year. Retrieved from: <https://www.emarketer.com/Article/Worldwide-Retail-Ecommerce-Sales-Will-Reach-1915-Trillion-This-Year/1014369>
18. Fitzsimons, G. J., Greenleaf, E. A., & Lehmann, D. R. (1997). Decision and consumption satisfaction: Implications for channel relations. *Marketing Studies Center Working Paper Series*, *313*.
19. Gris , M. L., & Gallupe, R. B. (1999). Information overload: Addressing the productivity paradox in face-to-face electronic meetings. *Journal of Management Information Systems*, *16*(3), 157-185.
20. Graf, L. K., Mayer, S., & Landwehr, J. R. Measuring Processing Fluency: One versus Five Items. *Journal of Consumer Psychology*.
21. Heitmann, M., Lehmann, D. R., & Herrmann, A. (2007). Choice goal attainment and decision and consumption satisfaction. *Journal of marketing research*, *44*(2), 234-250.
22. Ho-Dac, N. N., Carson, S. J., & Moore, W. L. (2013). The effects of positive and negative online customer reviews: do brand strength and category maturity matter?. *Journal of Marketing*, *77*(6), 37-53.

23. Hu, M., & Liu, B. (2004, August). Mining and summarizing customer reviews. In *Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining* (pp. 168-177). ACM.
24. Huang, C. C., Lin, T. C., & Lin, K. J. (2009). Factors affecting pass-along email intentions (PAEIs): Integrating the social capital and social cognition theories. *Electronic Commerce Research and Applications*, 8(3), 160-169.
25. Inbar, Y., Botti, S., & Hanks, K. (2011). Decision speed and choice regret: When haste feels like waste. *Journal of Experimental Social Psychology*, 47(3), 533-540.
26. Jacoby, J., Speller, D. E., & Berning, C. K. (1974). Brand choice behavior as a function of information load: Replication and extension. *Journal of consumer research*, 1(1), 33-42.
27. Jacoby, J., Speller, D. E., & Kohn, C. A. (1974). Brand choice behavior as a function of information load. *Journal of Marketing Research*, 63-69.
28. Jiang, Y., & Punj, G. N. (2010). The effects of attribute concreteness and prominence on selective processing, choice, and search experience. *Journal of the Academy of Marketing Science*, 38(4), 471-489.
29. Johnson, E. J., Payne, J. W., & Bettman, J. R. (1988). Information displays and preference reversals. *Organizational behavior and human decision processes*, 42(1), 1-21.
30. Kangale, A., Kumar, S. K., Naeem, M. A., Williams, M., & Tiwari, M. K. (2016). Mining consumer reviews to generate ratings of different product attributes while producing feature-based review-summary. *International Journal of Systems Science*, 47(13), 3272-3286.
31. Keller, K. L., & Staelin, R. (1989). Assessing biases in measuring decision effectiveness and information overload. *Journal of Consumer Research*, 15(4), 504-508.
32. King, R. A., Racherla, P., & Bush, V. D. (2014). What we know and don't know about online word-of-mouth: A review and synthesis of the literature. *Journal of Interactive Marketing*, 28(3), 167-183.
33. Kostyra, D. S., Reiner, J., Natter, M., & Klapper, D. (2016). Decomposing the effects of online customer reviews on brand, price, and product attributes. *International Journal of Research in Marketing*, 33(1), 11-26.

34. Ku, Y. C., Wei, C. P., & Hsiao, H. W. (2012). To whom should I listen? Finding reputable reviewers in opinion-sharing communities. *Decision Support Systems*, 53(3), 534-542.
35. Lee, B. K., & Lee, W. N. (2004). The effect of information overload on consumer choice quality in an on-line environment. *Psychology & Marketing*, 21(3), 159-183.
36. Lin, C., He, Y., Everson, R., & Ruger, S. (2012). Weakly supervised joint sentiment-topic detection from text. *IEEE Transactions on Knowledge and Data engineering*, 24(6), 1134-1145.
37. Luce, M. F., Bettman, J. R., & Payne, J. W. (1997). Choice processing in emotionally difficult decisions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 23(2), 384.
38. Luce, M. F., Bettman, J. R., & Payne, J. W. (2001). Emotional decisions: Tradeoff difficulty and coping in consumer choice. *Monographs of the Journal of Consumer Research*, (1), 1-209.
39. Mac R. (2014). Alibaba Claims Title For Largest Global IPO Ever With Extra Share Sales. Retrieved from: <https://www.forbes.com/sites/ryanmac/2014/09/22/alibaba-claims-title-for-largest-global-ipo-ever-with-extra-share-sales/>
40. Malhotra, N. K. (1982). Information load and consumer decision making. *Journal of consumer research*, 8(4), 419-430.
41. Mudambi, S. M., & Schuff, D. (2010). What makes a helpful review? A study of customer reviews on Amazon. com. *MIS Quarterly*, Vol. 34 (1), 185-200.
42. Pang, B., & Lee, L. (2008). Opinion mining and sentiment analysis. *Foundations and Trends in Information Retrieval*, 2(1-2), 1-135.
43. Park, D. H., Lee, J., & Han, I. (2007). The effect of on-line consumer reviews on consumer purchasing intention: The moderating role of involvement. *International journal of electronic commerce*, 11(4), 125-148.
44. Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14(3), 534.
45. Qi, J., Zhang, Z., Jeon, S., & Zhou, Y. (2016). Mining customer requirements from online reviews: A product improvement perspective. *Information & Management*, 53(8), 951-963.

46. Rezaabakhsh, B., Bornemann, D., Hansen, U., & Schrader, U. (2006). Consumer power: a comparison of the old economy and the Internet economy. *Journal of Consumer Policy*, 29(1), 3-36.
47. Russo, J. E. (1974). More information is better: A reevaluation of Jacoby, Speller, and Kohn. *Journal of Consumer Research*, 1, 68-72.
48. Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2010). Can there ever be too many options? A meta-analytic review of choice overload. *Journal of Consumer Research*, 37(3), 409-425.
49. Singh, J. P., Irani, S., Rana, N. P., Dwivedi, Y. K., Saumya, S., & Roy, P. K. (2017). Predicting the “helpfulness” of online consumer reviews. *Journal of Business Research*, 70, 346-355.
50. Sipos, R., Ghosh, A., & Joachims, T. (2014, April). Was this review helpful to you?: it depends! context and voting patterns in online content. In *Proceedings of the 23rd international conference on World wide web* (pp. 337-348). ACM.
51. Sridhar, S., & Srinivasan, R. (2012). Social influence effects in online product ratings. *Journal of Marketing*, 76(5), 70-88.
52. Statista. (2018). E-commerce sales as percentage of total retail sales in selected countries in 2017. Retrieved from: <https://www.statista.com/statistics/255083/online-sales-as-share-of-total-retail-sales-in-selected-countries/>
53. Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and instruction*, 4(4), 295-312.
54. Sun, T., Youn, S., Wu, G., & Kuntaraporn, M. (2006). Online word-of-mouth (or mouse): An exploration of its antecedents and consequences. *Journal of Computer-Mediated Communication*, 11(4), 1104-1127.
55. Tetlock, P. E. (1992). The impact of accountability on judgment and choice: Toward a social contingency model. *Advances in experimental social psychology*, 25, 331-376.
56. Tierney, J. (2011). Do You Suffer From Decision Fatigue? Retrieved from: <http://www.nytimes.com/2011/08/21/magazine/do-you-suffer-from-decision-fatigue.html>
57. Timoshenko, A., & Hauser, J. R. (2017). Identifying customer needs from user-generated content.

58. Xu, X., Datta, A., & Dutta, K. (2012). Using Adjective Features from User Reviews to Generate Higher Quality and Explainable Recommendations. In *Shaping the Future of ICT Research*, pp. 18-34.
59. Xu, X., Wang, X., Li, Y., & Haghghi, M. (2017). Business intelligence in online customer textual reviews: Understanding consumer perceptions and influential factors. *International Journal of Information Management*, 37(6), 673-683.

Appendix: Measurement Scales

Latent Variables and Indicators		Scale Based on
<i>Decision Satisfaction</i>		Fitzsimons (2000); Fitzsimons, Greenleaf, and Lehmann (1997); Zhang and Fitzsimons (1999)
1	I found the process of deciding which product to buy frustrating	
2	I found the process of deciding which product to buy interesting	
3	I was satisfied with my experience of deciding which product option to choose	
<i>Justifiability</i>		Heitmann, M., Lehmann, D. R., & Herrmann, A. (2007)
1	I thought it would be easy to justify a purchase in case someone challenges it	
<i>Evaluation Costs</i>		Burnham, Frels, and Mahajan (2003); Cooper-Martin (1994)
1	I concentrated a lot while making this choice	
2	It was difficult for me to make a choice	
3	It was tough to compare the different products being offered	

<i>Choice Accuracy</i>		Bruner, James, and Hensel (2001); Urbany et al. (1997)
1	It was impossible to be certain which product fits my preferences best	
2	I feel confident while identifying one product that best matches my preferences	
3	I was convinced to find a product that best fulfills my needs	
<i>Final Negative Affect</i>		Luce, Bettman, and Payne (1997); Watson, Clark, and Tellegen (1988)
When I ultimately selected a product I felt...		
1	ashamed	
2	upset	
3	guilty	
4	hostile	
5	nervous	
6	distressed	
<i>Information Overload</i>		Aljukhadar et. al (2010), Sweller (1994);

1	Information quantity: There are too much information on product features and/or product options presented for the given products	
2	Information quality: <ul style="list-style-type: none"> • Information is difficult to understand • Information provided is not clear • Information is often repetitive 	
<i>Processing fluency</i>		Graf, L. K., Mayer, S., & Landwehr, J. R. (2017)
When I read customer reviews, I feel that the processing of them was...		
1	Difficult...Easy	
2	Unclear...Clear	
3	Disfluent...Fluent	
4	Effortful...Effortless	
5	Incomprehensible...Comprehensible	