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WHAT'S EMBEDDED IN THE TEXTS: HISTORICAL AND
CURRENT TREND OF CONSUMER JUDGMENT AND
DECISION-MAKING

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Abstract

Consumer research has undergone significant evolution over the past decades while the consumer judgment and decision-making lies at the heart of consumer behavior. This study draws on multiple text analysis methods to analyze themes and topics in consumer decision-making since the 1990s. Leveraging citation analysis, keyword frequency, and topic modeling, the research delves into historical trends using metadata from relevant journal article retrieved from the Web of Science database. The study commences with a historical overview of consumer research before summarizing previous literature on research trends and methodologies. Findings reveal nuanced shifts in research topics over time, indicating enduring influences such as cognitive emphasis in the 1990s, reflective of earlier decades. Furthermore, changes in publication emphasis from practitioner-oriented to academic reflect broader policy shifts. Emerging trends, moral judgment and ethical decision-making, signal evolving research priorities. Notably, the BERTopic model unveils trends that highlights a steady increase of application-oriented topics like financial decision-making and online shopping behavior. These findings illuminate the trajectory of consumer research on judgment and decision-making, offering insights into historical patterns and current developments. Scholars are provided with inspiration for future investigations, guiding research agendas and contributing to the ongoing discourse in consumer behavior studies.

Consumer Behavior, Judgment, Decision Making, Historical Trend, Topic Modeling, LDA, BERTopic

1 Introduction

The field of consumer research is composed of a wide range of subsections that have different origins because the development of this field has been largely influenced by the industry and the development of other disciplines, especially psychology, economics and other social sciences. This feature of complex origins makes it impossible to draw a clear family tree of all the topics and theories in this area that were developed throughout its history. It is also due to this characteristic that the review articles trying to summarize the historical trends of research topics in consumer research are usually less likely to follow a clear logic line, but rather resemble a huge picture composed of scattered pieces, which often times creates greater barriers for scholars who would like to grasp the dominating topics and current trends.

What lies at the core of consumer research is the domain of consumer choice and decision making, which was proved to take up almost half of all the publications in Journal of

Consumer Research (Rapp & Hill, 2015). This domain sees an overlap of psychology with many concepts of economics and traditional marketing research. Still similar to other domains of consumer research and less like other social sciences, it is hard to track the theoretical connections among the topics and the historical development from this aspect. Thus it is unclear to us how this field has evolved, what theoretical concepts have been emphasized throughout history and what the current trend is. The previous review articles tend to do a better job when capturing the features of the early research before the 1990s as there was less diversity and limited topics. However, with the expansion of the previous research topics and emergence of new topics after the 90s, the greater diversity in the domain increases the difficulty of conducting a comprehensive review which is capable of capturing all the changes and the weights of all the topics. Most of the current review articles tend to narrow its scope by focusing on one concept or one specific topic of interest, potentially with the aim of summarizing previous research in enough detail, while such an approach provides less information about the general pattern and all the directions of the field, leading to a pattern that seems even fuzzier. The only few review articles that leveraged text mining techniques such as Latent Dirichlet Allocation (LDA) topic model to picture the broad aspect of the consumer research or consumer psychology, however, tend to use data source that comes from one certain journal, drawing conclusions with the scope limited to one or two sources of publications. Thus, the broader features of this field after the 1990s are yet to be unraveled. This complexity and research gap calls for a better approach to reveal what is actually happening within the field.

Therefore, in order to address this issue and to provide researchers in the domain of consumer judgment and decision-making a better overview of the research ideas and a way to engage in the community, this research innovatively adopts the methodology of advanced text-mining with word embedding techniques to summarize the main topics, track the historical trend and current development of the research in the domain of consumer judgment and decision-making.

1.1 Overview of the Current Research

With the aim of addressing the question of how the consumer research has been evolving and what new trend is going on, especially in the area of consumer judgment and decision-making, this study adopts a combination of methods that have been seen in some of previous review articles and the more advanced word embedding model to dig into the topics and current trend in the field of consumer judgment and decision-making. Specifically, analysis of the citation, frequency of keywords, topic modeling using both LDA and BERTopic models have been adopted to dig into the topics and historical trend. The data used for the analysis were metadata of the relevant journal articles since 1990. The metadata containing

information of the publications, keywords and abstracts of the articles related to the theme of consumer judgment and decision-making were retrieved from the Web of Science database. Keywords were analyzed in the way of word frequency. Both LDA model and BERTopic model were used to cluster the articles in order to compare how the two models differ from each other and to gain more perspectives with respect to the topic clustering. Then the historical trend of the keywords and the topics are tracked.

This study started with introducing the field of consumer research by providing a brief history of the discipline. Then the previous literature on research trends and topics with quantitative methods were summarized. The data and method section provides detailed descriptions of the exploratory analysis of the data and the methods used. The results section reports the findings in full detail. The discussion section further summarizes the main findings that can contribute to our understanding of the historical and current trend. The research highlights the on-going trend of the consumer decision-making literature and further suggests potential implication of using word embedding models in identifying research pattern for a discipline featuring fuzzy information and interdisciplinary knowledge.

2 Literature Review

2.1 A brief history of consumer research

Consumer research, despite being a relatively new product of the modern, industrialized society where consumers play an important role in the economy, has a history of over 100 years and went through several phases, with the focus and methods changing constantly. The hodgepodge of consumer behavior research comes from the multiple sources of contributions since researchers from various backgrounds, psychology, economics and even the industry, continued to contribute to research in this realm. Not surprisingly, thus, the development of consumer research is largely influenced by the progress in these relevant fields as well, leaving a complex and messy tracing plot, which complicates the situation such that readers of the traditional review articles are less able to gain the big picture of the area. By tracing the historical changes of the field, we are able to gain a broader view of the role of research on consumer decision-making in the bigger picture of consumer research.

The earliest consumer research was intended to understand how consumers react to advertising which is not surprising since the need for this type of research came mainly from marketers who looked for effective advertising. Formal marketing research started from the study of advertising as early as the 1920s, although there is no serious division of consumer behavior research in the psychology discipline at this early stage. For example, Daniel Starch was one of the earliest scholars in this field. His book on advertising is the earliest attempt to understand and study advertising systematically and theoretically

(Cohen & Wilkie, 2022).

Despite the widespread adoption of field experiment and qualitative analysis, the research methods were various in that researchers of the early years simply were exploring different approaches as many as possible to better achieve their practical goals. For example, the "focus group", which was originally developed by Robert Merton and Paul Lazarsfeld at Columbia University in the late 1930s to study reactions to anti-Nazi radio broadcasts during the Second World War, gained its weight in the field of marketing research as marketers were eager to learn about their clients' opinions (Morrison, 1998). The survey research that is commonly seen in marketing research in the industry nowadays was also adopted to understand the geographical and demographic distribution of the customers, facilitating market segmentation and targeting (Cohen & Wilkie, 2022).

In addition to those early studies and explorations, formal associations and marketing journals were established even before the Second World War. A series of academic organizations were founded: the year 1924 witnessed the formation of the National Association of Teachers of Marketing and Advertising; the American Marketing Society (focus on practitioners) and the American Marketing Association (AMA), which provides bases for sharing marketing thought, were founded in 1930 and 1937 respectively. Moreover, some of the earliest academic journals were established during this period. *Journal of Retailing* began in 1925. *Journal of Marketing*, which later became the center for advancing marketing thought, was released in 1936 along with the formation of American Marketing Association, although it covered a broader range of fields and topics in the early years apart from academic marketing research, including sources of business practice and government (Wilkie & Moore, 2003).

Use of the term "consumer psychology" started in the late 1950s (Haugtvedt et al., 2018) potentially due to a larger role that Psychology played in the motivational studies during this time. Marketers have been interested in understanding what motivates consumer's buying behaviors since the early days. Motivation was a focus of consumer research as scholars were eager to know how to make advertising effective in response to human desires. This emphasis on motivational factors continued to grow throughout the 1950s, when the researchers adopted a more qualitative approach to study consumer motivations in depth instead of simply depicting the consumer profiles with statistics. One of the earliest scholars who contributed to the motivational research was an Austrian-born psychologist Ernest Dichter, whose work centered the application of psychoanalytic concepts in marketing research, especially understanding consumer's desires and motives that they might not be consciously aware of and would hide during the interviews with the methods such as focus group. The formal academic research to come also emphasized research into consumers' motivations that lead to their behaviors. Some papers published in *Journal of Marketing*

demonstrate scholars' interests in consumer motivation, for example, Britt realized the importance of understanding the complex fundamental motives driving consumers behaviors in the early 1950s (Britt, 1950). Later Bayton included motivation as one of the basic factors when he tried to build a complete framework for analyzing consumer behaviors (1958).

Although the goal of the advertising research lies in application and practice, researchers did appeal to theoretical explanations for consumer behaviors rather than simply study the phenomenon in a practical way. For example, the AIDA model (attention/awareness, interest, desire, and action) is one the earliest theoretical models in consumer behavior that has a long-lasting influence on the structure of studying consumer behavior. Some of the succinct theories were built on the prototype such as the hierarchy of effects model (i.e., unawareness, awareness, knowledge, liking, preference, conviction, purchase) (Lavidge & Steiner, 1961). With these early attempts to build theoretical models in explaining consumer behaviors, scholars in this field have had a tendency to be theoretical-driven despite the practical nature of consumer research.

Some of the most important milestones in the early development of consumer research are the foundations of several institutions and journals on consumer psychology in the 1960s and 1970s. Many of the dominant organizations for consumer research and the top journals were established during this period. First, a group focused on understanding consumer psychology formed within the American Psychological Association in 1960. Around the same time, a new research journal called the *Journal of Advertising Research* started. Then in 1964, another journal called the *Journal of Marketing Research* (JMR) began, which welcomed research about marketing using scientific methods, especially from newer experts who knew a lot about numbers, patterns, and how people behave. Then, in the late 1960s, there were a series of meetings and conferences about consumer research. One big meeting at Ohio State University in 1969 and another at the University of Massachusetts in 1970 got a lot of people excited about the idea of studying consumers more deeply. These meetings led to the official formation of the Association for Consumer Research (ACR) in 1971. ACR started publishing conference reports. In 1974, the *Journal of Consumer Research* (JCR) began, focusing on a wide range of topics related to consumer behavior from different academic fields like psychology, sociology, and economics. The *Journal of Consumer Psychology* (JCP), which specifically welcomed research from psychology and related fields about consumers, started much later than the other top journals in 1992.

Apart from the emergence of the organizations specializing in consumer research, some of the advances in research methods and perspectives also marked the progress in the field of marketing research in the 60s. The application of psychological concepts to understand consumer behavior became even more widespread, along with the advancement of general psychological research. Thus, many concepts that are found in the marketing textbooks

and case study handbooks for the following years, even till today, began to appear in the marketing journal articles that focus on consumer behavior. For example, with the study of cognitive dissonance, marketing researchers started their attempt to explain and regularize consumer behaviors with this emerging psychological concept. Not only the paper titled *Cognitive Dissonance and Consumer Behavior* focusing on regulating smoking with the concept of cognitive dissonance got published (Kassarjian & Cohen, 1965), but also the following discussion of the effectiveness and validity of this explanation linking consumer behavior with cognitive dissonance (Oshikawa, 1969) received great attention. Even though applying the concept of cognitive dissonance to consumer research itself continued to receive much debate later on, its influence in the field never vanished: it still can be found in many textbooks and teaching materials on consumer behavior or other aspects of management. In addition to psychological perspectives, the progress in statistical methods and mathematical models, especially those in economic research, also fueled the quantitative research in marketing and consumer behavior. Scholars were seeking the possibility of quantifying and measuring psychological traits and behaviors: for example, an article proposing a mathematical model, relating advertising effort to attitude changes and consumer purchases, with a nonstationary Markov process was published in the *Journal of Marketing Research* (Lipstein, 1965). This form of consumer research continued to gain their influence in these journals in the years to follow.

What the years in the 1970s and 1980s had witnessed was a great expansion of the topics, theories and perspectives due to the joint contribution of the interest in consumer behavior from both psychologists and economists. Many theories and concepts developed during this period are influential and continue to receive attention and discussions till today.

In the 1970s, the research topics in the field of consumer research saw an apparent influence of Economics, especially the efforts in the stream of Behavioral Economics where scholars took a different perspective to study consumer or firm behavior with the consideration of real-world pattern that departs from the assumptions of the neoclassical model. The assumptions about the behavior of the so-called “Homo economicus” states that 1) agents have well-defined and stable preferences; 2) they optimize their benefits based on their beliefs and preferences (which also implies that agents are smart enough and have the ability to obtain the best outcome of whatever their intended); and 3) agents only act out of self-interest. However, the reality is obviously different about people’s behaviors in general in that very few agents (whether it is firm or individual consumers) behave in the way that the model posits, but rather, acts in a way that there are great numbers of irrational choices, biases and altruistic behaviors (that not as a means to achieve a outcome of satisfying one’s own need, especially for human under social context). Such discrepancy between the model and the reality stimulated the review and reassessment of the norma-

tive studies that emphasizes how agents should act, and thus redirected them to further understand how real-life agents make economic decisions through empirical and descriptive research. One outcome of the progress in debating the rational choice model is that there is an increasing and even dominating trend of studying consumers' information processing in the papers published in marketing and consumer research Journals. Although the target of consumer research, which is the purchase process, is broken down into distinct stages such as problem recognition, problem solving, information search, and evaluation of alternatives (Bettman & Zins, 1979; Howard & Sheth, 1969), the study of how consumers search for and retrieve the information (and thus evaluating the choices) was the focus of this period. As the research in the field of Economics studying the same thing (information acquirement) but with a focus on revising some previous theories and models by adding the information process phase of the decision-making (Nelson, 1970), the researchers in the marketing and consumer behavior combined this goal with the psychological toolkit and explanations, thus putting their emphasis on the cognitive and mental process of people's information acquiring and processing. Bettman was one important scholar in studying consumer information process, whose works centered the human cognitive aspects of information processing (Bettman, 1975; Bettman & Jacoby, 1976). He also highlighted memory factors, which is one of the main themes in discussion even till now, in consumers' decision-making as they retrieve information from their memories in this process (Bettman, 1979). This focus on the information process is heavily related to the famous work by Tversky and Kahneman in 1974 that described three important heuristics in people's judgment under uncertainty (1974), which has been a huge influence to consumer research. These ideas of heuristics reveal that the way that people process information and make judgments are systematically biased, especially when there is great uncertainty in the context where people make decisions. The study of human judgment biases not only paralleled the contemporary research on consumer information process that revealed the limitation of human judgment that is influenced by contextual factors and presentations (Bettman & Kakkar, 1977), but also has a profound influence on the later consumer research.

Another important discovery in the 1970s is the violation of rational choices that described in the paper that raised the well-known Prospect Theory. The key finding is that losses and gains are valued differently and people place more weight on perceived gains versus perceived losses. Although the prospect theory was proposed at the end of the 1970s era and has no influence in the area of consumer research, and mainly influenced the Economists in the nearest years to follow, it gained more attention from the scholars in the later years with its application in broader topics, especially those in the realm of consumer financial decisions.

At the beginning of the 1980s, one policy change that had the impact on the patterns

and trends of the research in the years in the new era was that the Journal of Marketing turned its back against the practitioners' publication, which used to take a large proportion of the published articles, stating that it would publish only scholarly articles (Kerin, 1996). Although the shift actually was not a one-night achievement in reality, the year 1980s did see a huge decline of authors from the industry. Even if it is not easy to draw the conclusion that it fundamentally changed the field of consumer research, one could infer that the shift does match with the trend in that the academic publications with attributes of psychological-discipline research seem to dominate the field even till today. As the trend shows, marketing researchers continued to broaden and deepen their understanding of consumer behavior in the way of formal social science research. Following the topics that merely started to grow in the 70s, the years after 1980 see a prosperous growth in the range of the topics and a deeper research into the concepts that are new or old. There has been continuous research that expands the topics in the 70s focusing on memory and other mental processes such as attention and dual systems and how these factors shape consumer behaviors (Biehal & Chakravarti, 1983; Keller, 1987; Lynch & Srull, 1982; Petty et al., 1983). The prospect theory also gained more application in the field of consumer decision-making as scholars attempted to study consumers' choice in the context of financial decisions with this theory, with the extended concepts such as mental accounting (Gourville & Soman, 1998; Prelec & Loewenstein, 1998). An even greater variety of topics began to appear such as how consumers' conceptualization of their possessions influence their social behaviors (Belk, 1985; Belk et al., 1989), the kind of which was rarely seen in previous years.

As this prosperous growth in the topics of research and numbers of publications, along with the formalization of the convention of research methods (that resemble social science research), there seems to be not a dominating topic in the realm of consumer behavior in the 90s and all the way to the 21st century, but rather a extremely inclusive community where there is great heterogeneity and full of possibilities.

2.2 Previous Research

Systematic review articles focusing on the pattern of the literature in consumer judgment and decision-making are rare as the many of the review articles were published with the purpose of facilitating the authors' own research by organizing literature following one stream of research or a limited number of the concepts of interest. Some were published because of their focus on discussing one certain issue in the current research. Other review articles and books show the aspiration of telling the complete story with a long narrative chapter and one such example is *Consumer psychology: Evolving goals and research orientations*. Although able to provide a historical account of the field of consumer research, this chapter acknowledged the fact that there is great diversity in the topics after 1990s and the topics

were discussed without an emphasis on the on-going trend (Cohen & Wilkie, 2022).

Although it is hard to provide a comprehensive in full detail of these previous works, the brief summary of the critical review articles on consumer research provides an insight into how scholars summarize, categorize and analyze the research topics and trend in the broader field of consumer research, notwithstanding the messy sources of inspirations and the multiple lines of research.

Traditionally the review articles are done using qualitative methods: some are through a combination of qualitative design and descriptive statistics such as simple citation analysis. However, with the progress in the computational methods in text analysis and text-mining, an increasing number of the articles are adopting these methods in answering both the traditional questions of review articles and some questions that were less focused on earlier due to the limitation of the research method. The following section summarizes the methods and main findings in these previous reviews.

Most of the earlier works in reviewing consumer research publications with quantitative methods are conducted via Bibliometrics. Bibliometrics are the statistical analyses of books, articles, or other publications. Usually analyses are intended to track author or researcher output and impact. Most of these articles use metadata of one certain academic journal to track the trend or two journals to compare with each other. Although these articles mainly analyze citations and the publications of the authors, they are still various in topics and main findings.

One of the earliest review articles by Cote, Leong, and Cote adopted citation analysis to investigate the articles published in *Journal of Consumer Research (JCR)* between 1974 and 1986 (1991). The results found that they have an impact on other fields such as consumer research, marketing, and psychology. It also reveals the disproportionate influence between empirical articles and review or theory articles, with the former showing greater impact. Some studies focus especially on the diversity of the journals with respect to their degree of multidisciplinary. Previous studies revealed that JCR is less diverse than its peers (Tellis et al., 1999) yet is more diverse than the *Journal of Consumer Psychology (JCP)* (Alon et al., 2002). Others put more emphasis on the influence of the authors and type of articles. Stremersch, Verinens, and Verhoef studied articles published in five major journals in marketing from 1990 to 2002, with the aim of understanding the influence of article and author characteristics on article citations (2007). They found out that the quality and domain, along with the author visibility drive article impacts than factors such as title length, the use of attention grabbers, and expositional clarity.

The reviews conducted with automated methods such as text-mining and big data approaches are seen more in recent articles, especially after 2010. These studies enable an expansion of the research questions and topics included in previous studies since text-analysis

helps more information extracted from the texts in a large scale. In addition to more advanced analyses of the typical questions such as citations and impacts, more detailed topics are extracted from the title, keywords and abstract to address more complicated issues in the area.

One review paper published in *Marketing Science* is a good example of how scholars started this stream of research. Mela, Ross, and Deng focused on analysis of keywords of a total of 1085 articles published in *Marketing Science* during the 18 years between 1982 and 2011 (2013). The results show that “pricing” and “game theory” are top in word frequency and there is a trend of “game theory” and “hierarchical Bayes” gaining popularity. A researcher following this study conducted a similar analysis with index subjects and abstract topics in 2531 articles published in *Journal of Marketing Research* 1964–2012 (Huber et al., 2014). The year 2015 is a year of advancement of automated review articles in JCR in that two papers were published with the aim of summarizing the historical changes and the progress made by JCR in the 40 years since its establishment. One such paper is “Lordy, Lordy, Look Who’s 40!”. This study classified the published articles with the key words drawn from different parts of the full text including abstract, literature review, theoretical development as well as the keywords assigned by the publication database. The authors were mainly interested in the details of the topics and domains of the research articles, the most common research methods and the samples used in these studies. Consistent with our intuition, the topic of consumer choice and decision making has firmly been the center of consumer research, taking up 53.9% of the total sample. In addition, the analysis on research methods reveals a dominant and still increasing trend of the manipulation-based experimentation. However, the authors were also concerned about the sample used in the field of consumer research because of the widespread use of student samples over the general population, which might cause bias and generalizability issues (Rapp & Hill, 2015). Another paper *The Journal of Consumer Research at 40: A Historical Analysis* features the use of topic modeling (latent Dirichlet allocation (LDA) approach) in addition to the typical analyses such as citation analysis (Wang et al., 2015). The 1875 JCR articles extracted from the database were clustered into 16 topics by the LDA model. The analysis of topic trends suggests a decline in family decision-making research while social identity and influence research flourished within the 40 years of the history. The additional citation analysis shows that articles focusing on methodology and consumer culture tend to be heavily cited.

Most of these articles mentioned above focused on digging into one single academic journal. However, scholars are also interested in the broader field instead of the pattern within one certain journal since some of these journals show their own features that do not always represent the general discipline. Thus, researchers started to look at the information

extracted from larger samples spanning multiple journals. Cho et al. examined all papers in marketing, regardless of the source of publication all the way through 1995 to 2014 with a similar approach of topic modeling (2017). The paper revisited the issue of journal diversity and its influence on journals' impactfulness with a new method. The analyses reveal a positive link between topic heterogeneity and the impact of the journal: the most impactful journals are the most diverse. With respect to the topic trend, value network (taking up 11.27%) is the top of all 13 topics. Importantly, in the domain of consumer judgment and choice, the results fail to detect any obvious upward trend in the topics, from "choice context" to "judge priming", with only "loss aversion" showing a slight increase throughout the history. Apart from the topic models and diversity, it is notable that this study pioneers an adoption of social network analysis to detect the co-authorship communities among the journals and the topics in order to further understand the collaboration in this field. There are different clusters of similar topics in the community of the highly cited papers, indicating different scholars working on a bunch of hot topics. This study is a good example of further analysis of the structure of the research field and the organization of the researchers using advanced empirical analysis.

The most recent review is another historical analysis of research in the domain of consumer behavior with LDA topic modeling by Tugce Ozansoy (2022). This study used similar approaches while increasing the sample size by covering 15,707 articles from all the marketing journals within the interval of 1980–2020. It features a comprehensive and systematic review that combines many of the methods in previous studies, incorporating the analysis of the topic trends, citation analysis and the comparisons among countries. Significantly, the author predicts future increases in a bunch of topics such as "(online) shopping behavior", "Customer service satisfaction", "Attitude–behavior models", "Customer service satisfaction" and "emotional decision-making".

To summarize, recent review articles in consumer research and marketing shows the characteristic of adopting text-mining and topic modeling. The LDA model is used mostly in previous studies. However, one tricky part with using the unsupervised LDA model in this area is that the labels are determined by the researchers subjective judgment (Toubia et al., 2019). It is not surprising to find that there is great difficulty in reconciling the topics in previous studies since the topic clustering and naming are not consistent across studies. Nonetheless these analyses are informative in that the keywords in the clusters do reveal the general feature of the topics and thus studies focusing on the same research domain are still comparable to some degree.

3 Data and Methods

3.1 Data

The data is obtained by searching the Web of Science database with the key words “consumer judgment and decision making” excluding all the review articles or book chapters but without limiting the source of the academic articles. The aim is to limit the sample to journal articles making theoretical or empirical contributions rather than those summarizing previous research or making critical comments on the field. There was no limit set on the source of the articles in order to include all the articles related to this theme no matter in which journal they were published. This is also a good way of getting a glimpse of how the relevant articles are distributed among the various publications. A total of 1192 articles were selected, the earliest of which was published in 1990 and the newest 2023. All of the following columns in the metadata were selected and exported: Publication Type (whether it is a journal article), Authors, Article Title, Source Title (title of the journal in this case), ‘Language’, ‘Author Keywords’, ‘Keywords Plus’, ‘Abstract’, ‘Cited Reference Count’(the number of references for this article), ‘Times Cited, All Databases’(number of times that this article get cited by others), ‘Publisher’, ‘Publication Date’, ‘Publication Year’, ‘DOI’, ‘DOI Link’.

3.1.1 Pre-processing

The data pre-processing involves an important task which aims at a second screening of the sample because the process of automatic extracting does not always return all articles that are closely related to the field we are most interested in. An automatic approach combined with human screening was adopted to filter out the articles that were falsely included in the sample. Chatgpt API (See its [official website](#) for detail) was introduced to perform the classification task based on the content of the abstract of each paper. The following instruction was used as an input for the classification task:

“Determine if the journal article is studying consumer behavior with the theme related to judgment and decision making based on the abstract of the journal article. The abstract is ‘abstr’^a If it is difficult to determine the theme of the article, return 2; if this article is related to consumer judgment and decision making, return 1, otherwise 0. Give the response by writing out if the article is related to consumer judgment and decision making and then write out the corresponding number.”

^a‘abstr’is the string formatting for implanting the abstract of each paper

To make sure the classification works fine, the function with the command above was

tested on 20 sample abstracts (with 2 of them being manually included that are irrelevant to consumer judgment and decision-making but with some overlap of the keywords which could possibly be falsely included in the extracted articles) to confirm that it works effectively and accurately. Two abstract examples, being labeled relevant and irrelevant respectively, are available in the [Appendix](#). All the samples were correctly labeled, confirming that Chatgpt has good performance in differentiating the undesired articles from those of interest with the current prompt as an input. The classifier then was used to label all the data, excluding those with missing abstracts. Eight of the articles were missing the abstract content. Instead of simply excluding these articles, they were manually extracted and confirmed that they are relevant to the theme of consumer judgment and decision-making. Thus they are included for the analysis of citations and keywords despite missing abstracts which prevent them from being included in the topic modeling. For other articles in the sample, none were reported to be difficult to classify; 78 of the articles were classified as non-relevant while the rest are relevant to the topic. The titles of the 78 articles labeled as irrelevant were extracted to compare and confirmed that they are from other disciplines such as either political science studies or organizational behavior. These articles were excluded from the sample, leaving a sample of 1114 articles in total.

3.1.2 Exploratory Data Analysis

The exploratory analyses of the data give us a glimpse of the articles included for further analyses and some general patterns regarding the change and development of the field. The bar plot ([Figure 1](#)) shows the top sources of the articles with an article number larger than 10 in the whole data and the corresponding number of publications. It is not surprising that some of the journals with most publications included are the well-known top journals of marketing and consumer behavior such as Journal of Consumer Research, Journal of Consumer Psychology, Judgment and Decision Making and Journal of Marketing Research. It is notable, however, that some of the top journals included in previous research on marketing and consumer behavior are not included such as Journal of Marketing and Marketing Science, which is consistent of the aim of this study since these articles usually emphasize more practical-oriented research or quantitative marketing and research methods rather than the consumer decision process and individual behaviors. Compatible with the previous studies suggesting an emphasis on consumer choice and decision making and history progress of the JCR, this journal tops the list and more than 100 of the articles included are from this source. The JCP (Journal of Consumer Psychology) follows as it is the only journal in the field of marketing and consumer behavior that puts an extra emphasis on the psychological aspects of consumer behavior and welcomes the psychological research the most: over 60 of the articles included in the sample were from JCP. Nonetheless, the

data show great heterogeneity in the source since the top journal such as JCR only takes up about 100 of the sample while there are many journals that are less dominant in the field on the top list. For example, Journal of Business Ethics, despite not being a journal focusing on consumer research and psychological studies, ranks high in the number of articles, with over 40 representations in the sample. Other journals topping the list partly show the features of the essence of the consumer research in terms of decision process, which is the emphasis of the psychological perspective and psychological research methods, as most journals shown in the figure are relevant to a certain area of psychological studies. The Journal of Economic Psychology also reconciles with the process of the development of the marketing and consumer behavior research, during which this field received inspiration from Behavioral Economics.

The general time trend shows a constant increase in the total number of publications since 1990, as Figure 4 shows, indicating a general upward trend of the development of the field, although the explosive increase occurred between 2005 and 2010. The total publication before 2005 only accumulates up to 66. Significantly, the number increased drastically after 2005, 97 articles were published during the 5 years between 2005 and 2010. The number again almost doubled within the next 5 years: 150 journal articles were published. However, the great expansion slows down after this period, with 194 new articles published between 2015 and 2020.

The analysis of the overall citations shows an interesting trend of a discrepancy between the number of the references in each article and how many times each article gets cited. Figure 5 shows how the average number of references of the papers evolves with time. The line plot shows a general trend of increase in the average references, although with the most significant spike occurring before 1995. In the 1990s, on average each paper included about 30 to 50 references. However, the average references in the current research are over 70. Figure 6 shows how the average time of each publication getting cited changes with time. In contrast to the increasing trend of the references, the numbers of each paper getting cited only increased before the 2000, with a tremendous sharp increase right after 1995. The number dropped significantly right after 2000 and fluctuated around 75 until 2007. The period between 2007 and 2010 sees another drastic decrease, though not as sharp as the previous one, and then the decrease slowed down but continues till the present. Apparently, the most influential works in the field cluster around the 90s. The contrast shows an asymmetric pattern of the citation in that the more recent the publications, the more they are referencing, yet the less they are to get cited.

The exploratory analysis of the distribution of the source of publication also gives us a pattern of what journals are publishing the papers on consumer choice and decision making throughout the history of consumer research. The evolution of sources of trend reconciles

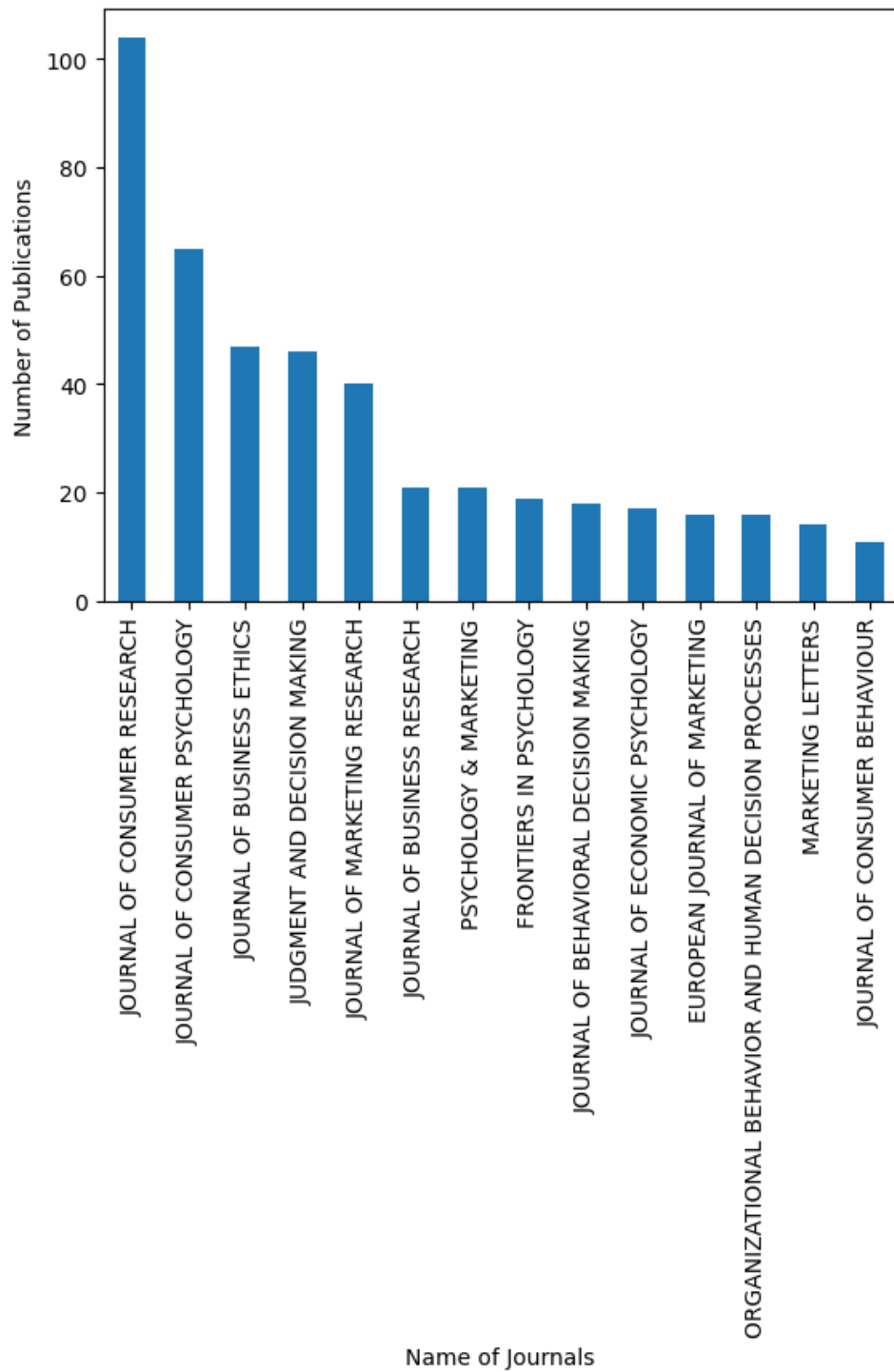


Figure 1: Top sources of publications

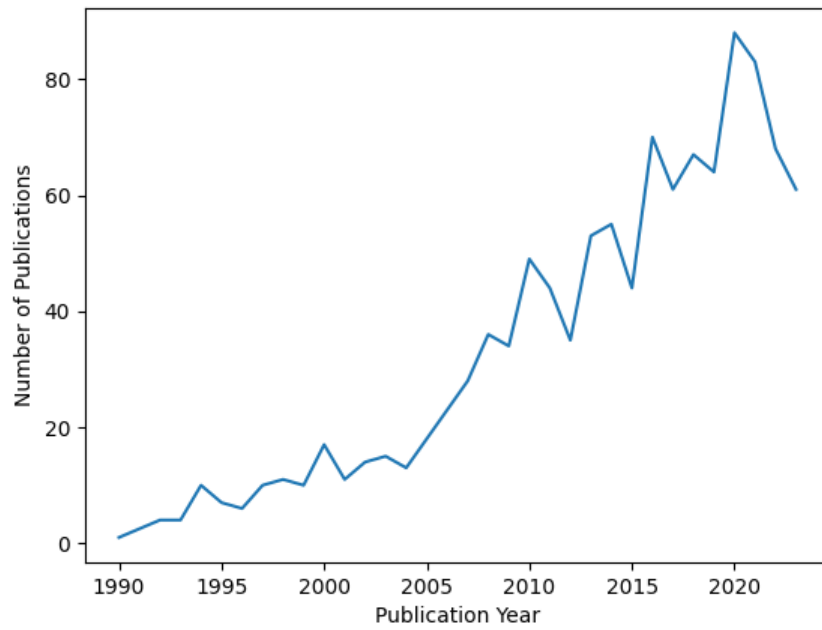


Figure 2: Number of publications over time

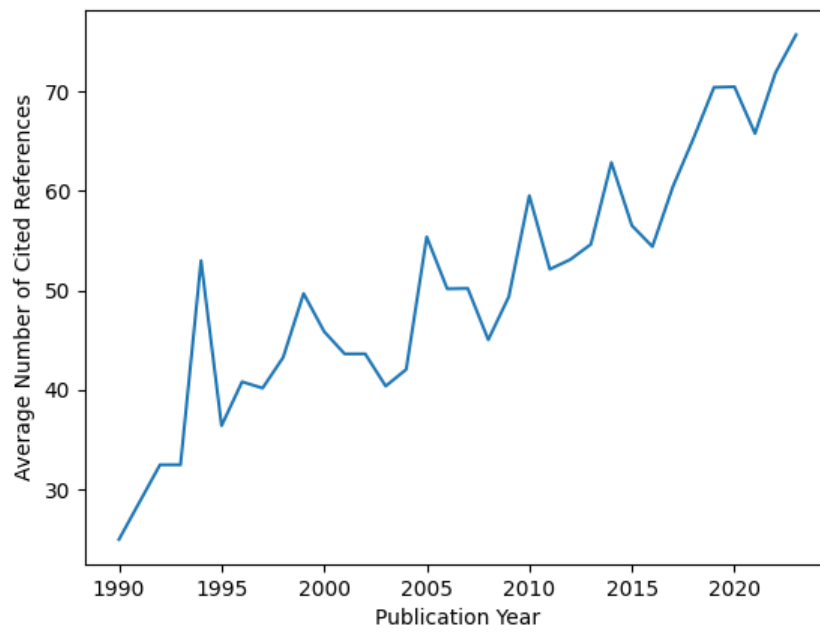


Figure 3: Average number of references over time

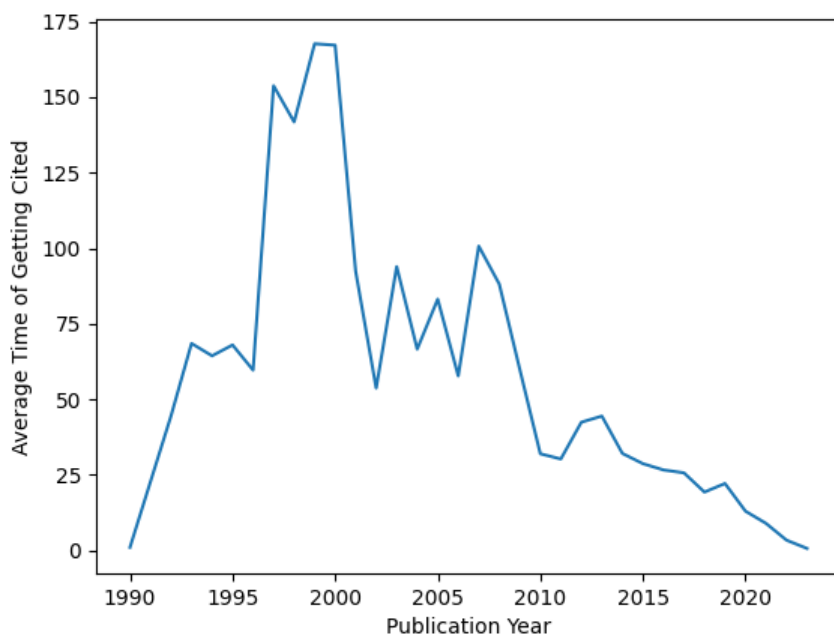


Figure 4: Average times of getting cited over time

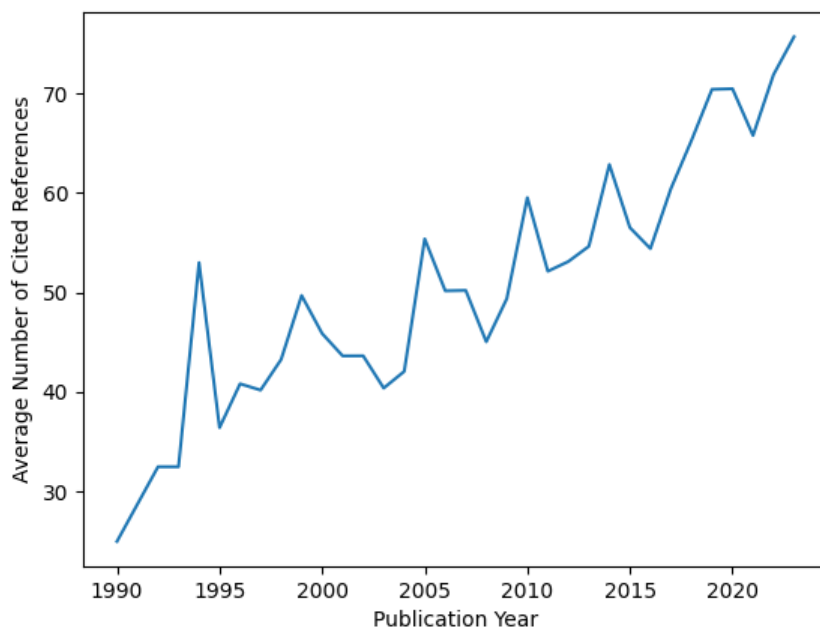


Figure 5: Average number of cited references over time

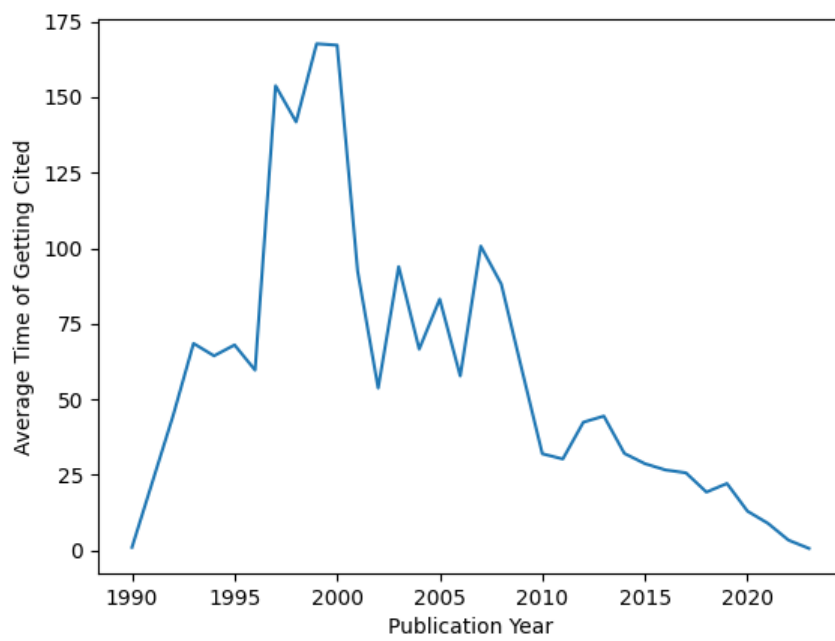


Figure 6: Average time of getting cited over time

with the feature of emphasizing Psychology in the field of consumer choice and decision-making. Counting the frequency of each source of publications for every 5 years, we are able to observe a dominating status of journals relevant to psychological research. The Journal of Consumer Research dominates all the stages, constantly ranking the top on the list. However, the years after 1990 see the quick rising of the Journal of Consumer Psychology following the JCR in the ranking, which was first released in 1992. Another source that ranks high on the list after 2005 is the Judgment and Decision Making, which was established in 2006 as a bimonthly online-only journal covering the psychology of human judgment and decision making. These journals all quickly rose in the ranking over others such as Journal of Business Ethics soon after establishment, revealing the importance of psychology in the field.

3.2 Methods

The main analyses were conducted on the key words, which combines the author keywords and the keywords assigned by the database, and the abstracts. The keyword analysis was conducted in the way of basic word frequency analysis. Then topic modeling with LDA and BERTopic were adopted to cluster the articles based on the contents of the abstracts separately. The data was further labeled manually by checking each of the topics that the BERTopic model generated and the time trend of each topic was plotted to track the changes in the historical trend of the topics.

3.2.1 Keyword Analysis

Word frequency was calculated to analyze the keywords. The original data includes two sources of keywords: one is the keywords from the authors and another is the “Keyword Plus” which is assigned by the database automatically. Previous studies have been using both of these sources in keywords analysis (Huber et al., 2014; Mela et al., 2013). Hence the current study follows the same approach by combining the two sources of keywords and not differentiating between the sources. The processing takes all the keywords of each column and calculates the aggregated word frequency.

However a notable problem of the keywords in the data is that keywords such as “consumer behavior”, “decision making” and “perception”, which are closely related to the theme of consumer judgment and decision making are high in frequency because the sample was retrieved from the Web of Science database with these search terms. Thus it is necessary that these words which are common and frequent in all the article keywords are removed from the final list of most frequent words. The approach of removing these words is to repeat the calculation. For each time of the loop, the top frequent words were taken out for

a second manual selection: if the words are only informative of the common topic, or are simply informative less of the specific topic and methods of each article, these words are put into the list of "stopwords" and will not appear in the next calculation. The screening gives the final list of the words to be removed for the final analysis. Finally, the total word frequency is obtained along with the word frequency of every five years to show the overall hottest topics as well as how the hot topics changed throughout the history since 1990.

3.2.2 Topic Modeling

For the purpose of further clustering the academic articles and understanding the main topics of consumer judgment and decision research, topic modeling has been adopted to conduct the clustering and classification. Two models were used to do the task: Latent Dirichlet allocation (LDA) and BERTopic. The LDA model has already been widely used in previous review articles with big data and automated textual analysis approaches on consumer behavior and marketing research. However, the BERTopic model has not yet seen any application in this field, with application in other contexts less common. Yet the BERTopic model has been applied for other analysis in different contexts especially those involving public opinion and social media probably because of its capability of capturing contextual information with unstructured text data. This research adopted both the methods in order to gain more insights into the information of the journal article abstracts.

Latent Dirichlet Allocation (LDA) Latent Dirichlet Allocation (LDA), first proposed by Blei, Ng and Jordan, is a powerful probabilistic model designed to analyze collections of discrete data text data 2003. At its core, LDA operates as a three-level hierarchical Bayesian model, offering a structured framework for understanding the underlying themes within a corpus. Each piece of data within the collection, such as a document or a word, is treated as a mixture over a set of latent topics. These topics are the hidden structures that govern the generation of the observed data. Each topic, in turn, is represented as an infinite mixture over a set of probabilities, capturing the likelihood of different words appearing within that topic. When applied to text modeling, LDA enables the explicit representation of documents in terms of these underlying topics. This representation allows for a deeper understanding of the content and themes present within a document or across an entire corpus. By uncovering these latent structures, LDA facilitates tasks such as document classification, topic modeling, and information retrieval, making it a valuable tool in natural language processing and machine learning applications. It is one of the mostly adopted method in previous research that applied topic modeling to consumer research analysis (Çadırcı, 2022; Cho et al., 2017; Wang et al., 2015).

The Python package "Gensim" was used to conduct the LDA modeling. See here for

details of the package. For the purpose of the analysis, the pre-process of the textual data includes removing English stop words, both tokenization and lemmatization as well as an additional procedure of removing words by frequency with the TF-IDF method. The tokenization is the process of converting a sequence of text into smaller parts, known as tokens. These tokens usually can be as small as characters or as long as words, yet in this analysis the tokenizer parses the texts into words. Lemmatization is the process that converts the word to its meaningful base form to identify similarity. Tokenization and lemmatization is conducted with the “Spacy” Python package using “en_core_web_sm”, a English pipeline trained on written web text (blogs, news, comments), that includes vocabulary, syntax and entities, which is described [here](#). The ‘TfidfModel’ was used to calculate the Term Frequency - Inverse Document Frequency (TF-IDF) and remove the words with a low threshold of 0.2 (words with a frequencies higher than the threshold are removed from the corpus). The total number of topics was set to 15. The model yields the overall top 30 salient terms and the top terms for each of the topics. After the clustering process, the original data were labeled with the generated topics and the manual label and the overall time trend was plotted and analyzed.

BERTopic BERTopic is a topic model that generates document embedding with a pre-trained transformer-based language model, the bidirectional Encoder Representations from Transformers (BERT) model (Devlin et al., 2019). The model then takes the topic modeling as a clustering task and clusters these embeddings, by which it generates topic representations with the class-based TF-IDF procedure. BERTopic model is different from the conventional LDA modeling as it uses the text embedding techniques which generates powerful contextual representations of the documents. BERTopic generates coherent topics and remains competitive across a variety of benchmarks involving classical models and those that follow the more recent clustering approach of topic modeling (Grootendorst, 2022).

One important feature of the BERTopic model is that as in the word-embedding methods, it does not require preprocessing such as removing stopwords and tokenization, but rather it consumes the original text in order to gain more information from the contexts. In addition, it automatically generates the number of the topics and returns the outliers which are the documents that do not fit in any of the topics. Additional function to reduce the outliers was also used to make sure every abstract was assigned a topic. The BERTopic also provides convenient functions to visualize the topics and track the changes in the data. More details are presented on the [BERTopic](#) website. Similar to the LDA approach, the top keywords were extracted for each topic and interpreted and labeled with meaningful topics manually.

4 Results

4.1 Keyword Analysis

Figure 7 shows the total number of keywords aggregated to each year bin of every five years. The number of total keywords starts to increase drastically around 2000 and peaks at the year 2005, but decreases for the years that follows. The bar plot (Figure 8) shows the top 50 keywords regardless of time period. The top keywords are related to some of the dominating topics in the area of consumer decision-making such as “preferences”, “quality”, “knowledge”, “memory”, “risk”, “attitudes”, “uncertainty”, “ethical decision-making”, “context”, “self”, “emotion” and “beliefs”. The results reconcile with the main topics and research in consumer behavior such as the research on consumer knowledge, memory, attitudes, context, beliefs and the influence of the concept of self and emotions.

The graphs (Figure 9, Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, Figure 15¹) are the top 30 frequent words aggregated by every 5 years. These keywords tell about the hot topics of each time period, as well as how the topics change with time. Up till the year 2000, the keyword “memory” has dominated, along with the word “knowledge” which also ranks high among all the keywords during the early years. These topics, although dropping slightly afterwards, have still been important through the 21st century. Other topics such as context (contextual factors in decision process) and attitudes, in the decision process, also seem to be important across the years. Apart from the dominant trend, the switches of the top keywords across time suggests how the topics emerge and rise and fall in terms of researchers’ attention. In addition to the fall of the topics on memory, persuasion emerges as one of the hottest topics from the beginning of the 21st century and rises quickly to the top and remains important. The years between 2010 and 2015 saw the greater emphasis on study into preferences and risk or uncertainty. However, one notable phenomenon is that as time approach the year 2020, one topic which had been niche before suddenly takes up the high ranking on the top list: the ethical decision-making which was not a traditional topic in consumer judgment and choice in the early years but merely emerged around 2005, yet became the second on the list.

Other interesting patterns emerge in the analysis of the keywords. First pattern is that the cognition and cognitive-related factors were emphasized in the earlier research: for example, information processing, memory, recall studies were seen more often in the area earlier than 2000. These topics seem to have impact on the field as well afterwards, yet less dominant in general, but gives their position to more diverse topics such as risk, emotions, attitudes and moral judgment. The second pattern is a fade of the emphasis on statistical methods and analysis methods. The methods as keywords are common in the

¹The horizontal labels are the keywords whereas the vertical labels are the word frequency

top frequent words in the 1990s, yet never seen again in the top list of other times. The methods mentioned in the 90s, such as structural equation model and protocol analysis in the 1990 period as well as the conjoint analysis between 1995 and 2000 were never the focus of consumer judgment and decision-making research.

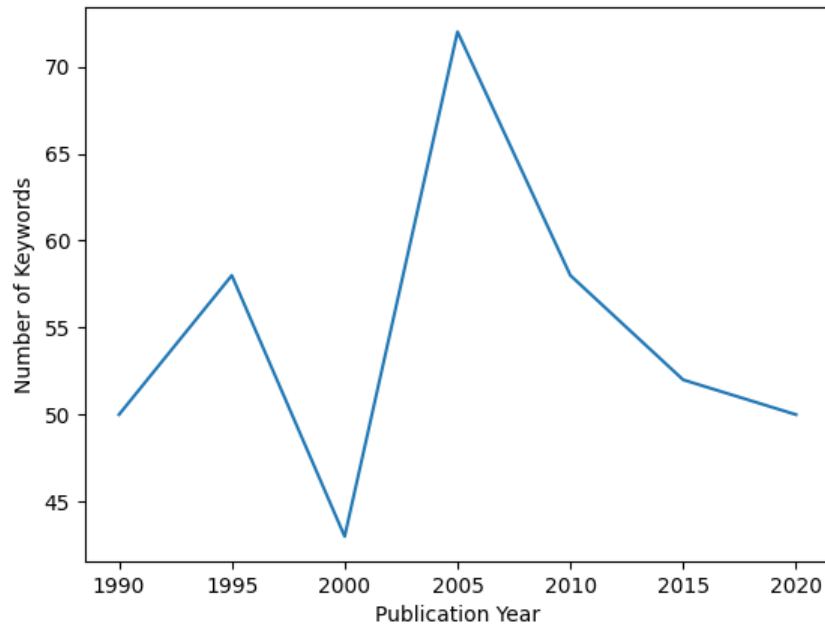


Figure 7: Total number of keywords over time

4.2 Latent Dirichlet Allocation (LDA)

4.2.1 Topics

The overall top 30 terms includes words such as “investor”, “commercial”, “risk” and “price”, which are informative of the main research topics such as financial decision, advertising, choice under risks and pricing. The LDA model clustered all the articles into 15 topics. Details of the top 10 terms of each topic are presented in Table 1. More detailed information on the topic structures and the relationships between topics and their prevalence can be obtained by accessing the interactive version of the Inertopic Distant Map available in the replication package. [See the README page of the package for instructions.](#)

The topics are currently described in topics ids generated by the LDA model. Based on the top terms for each topic and the corresponding abstracts, we are able to obtain a simple

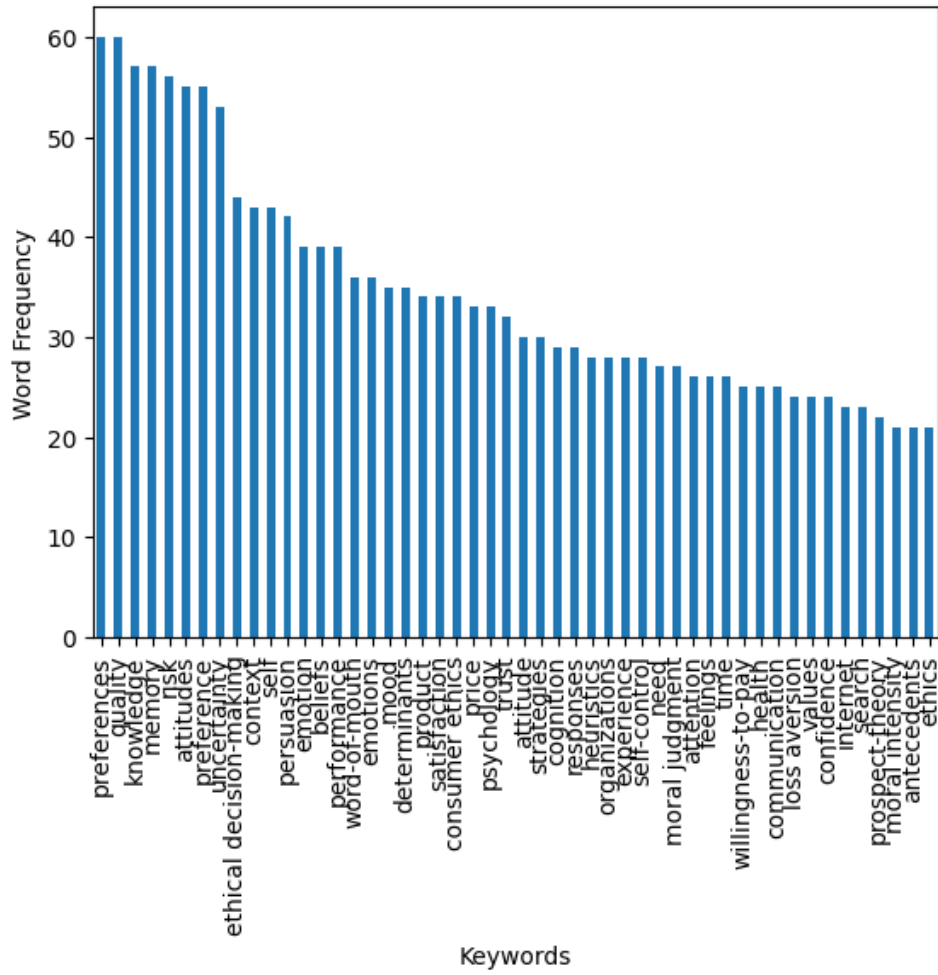


Figure 8: Top 50 keywords regardless of time period

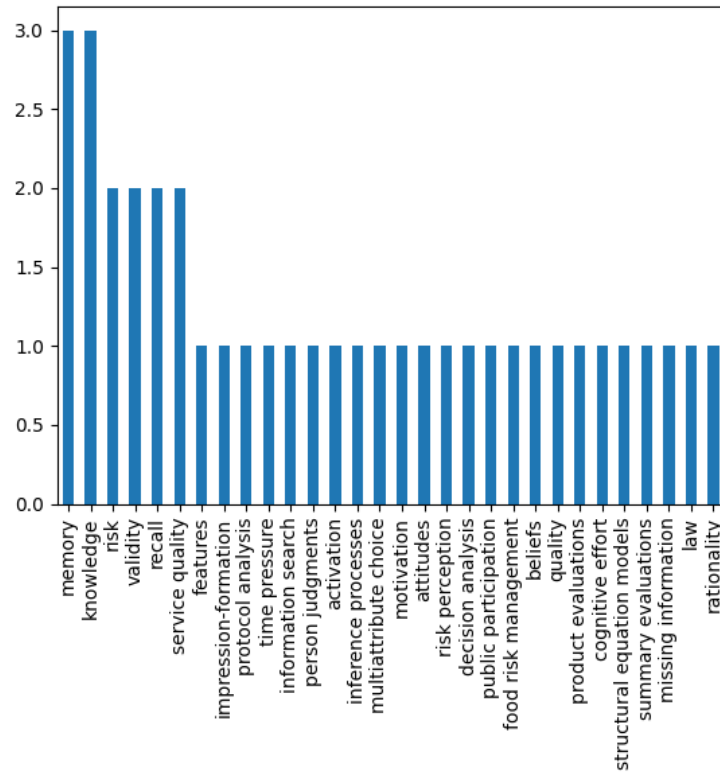


Figure 9: Top 30 words: 1990-1994

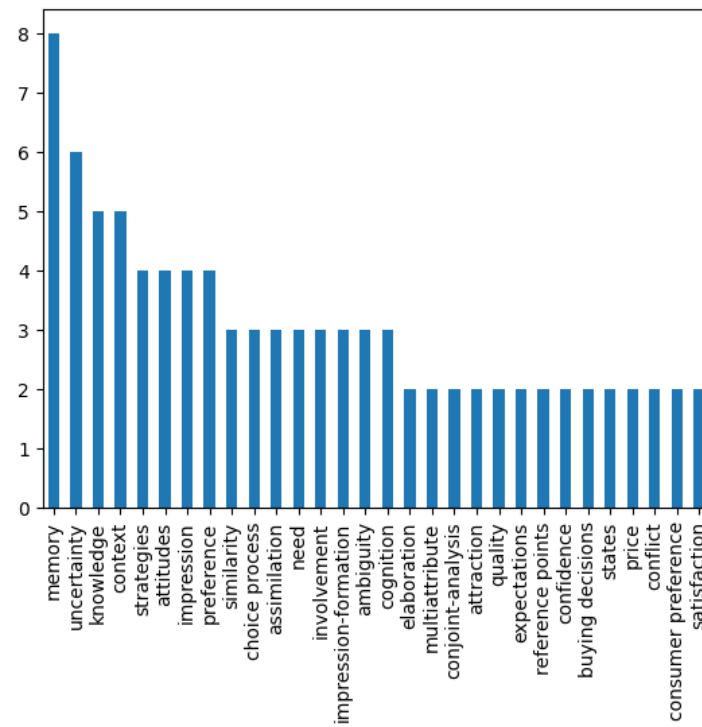


Figure 10: Top 30 words: 1995-1999

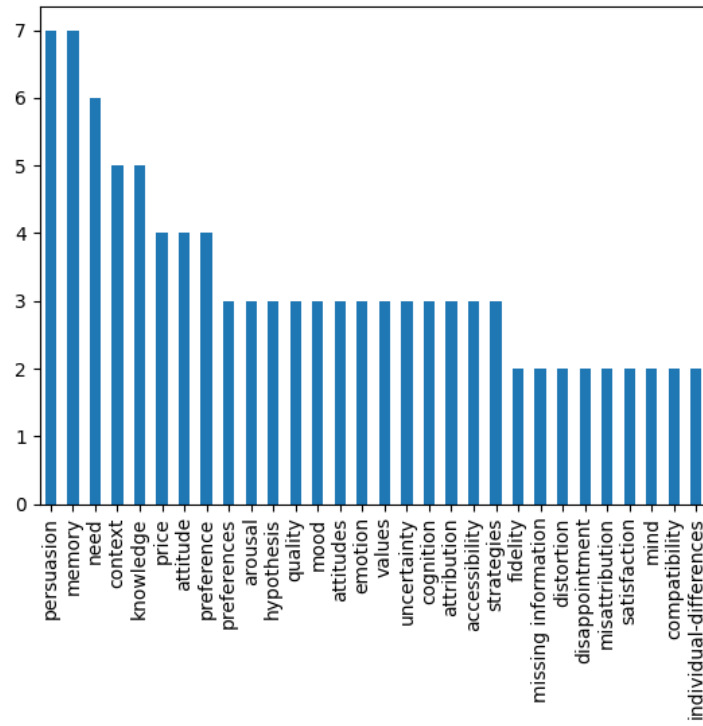


Figure 11: Top 30 words: 2000-2004

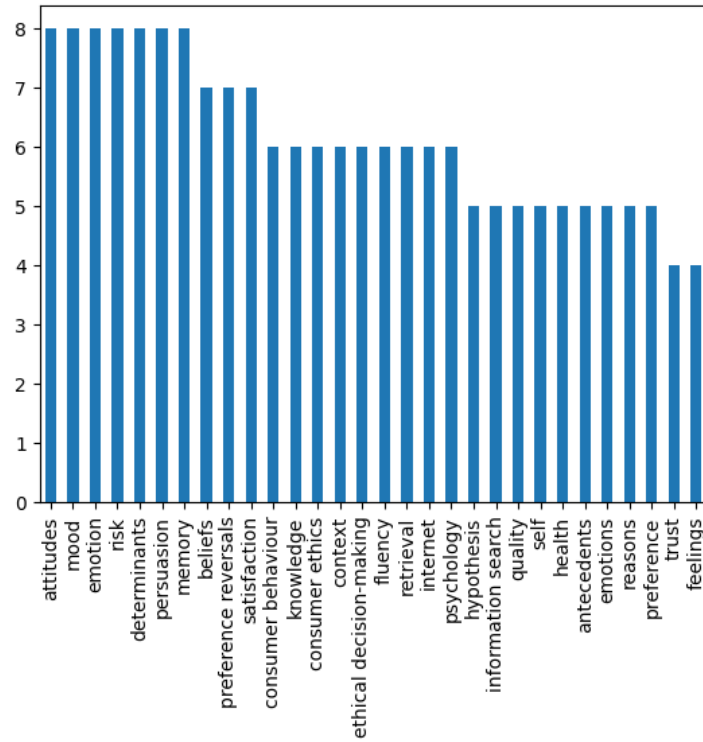


Figure 12: Top 30 words: 2005-2009

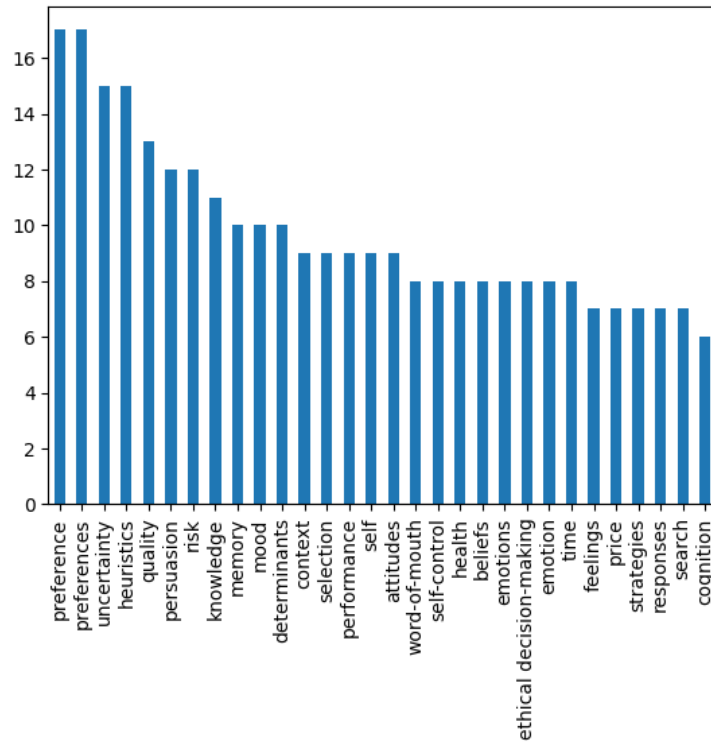


Figure 13: Top 30 words: 2010-2014

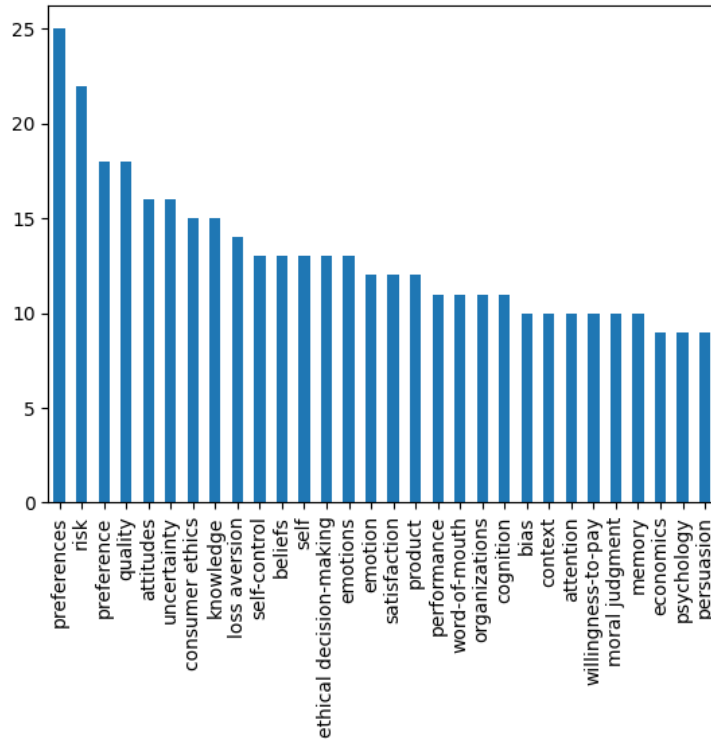


Figure 14: Top 30 words: 2015-2019

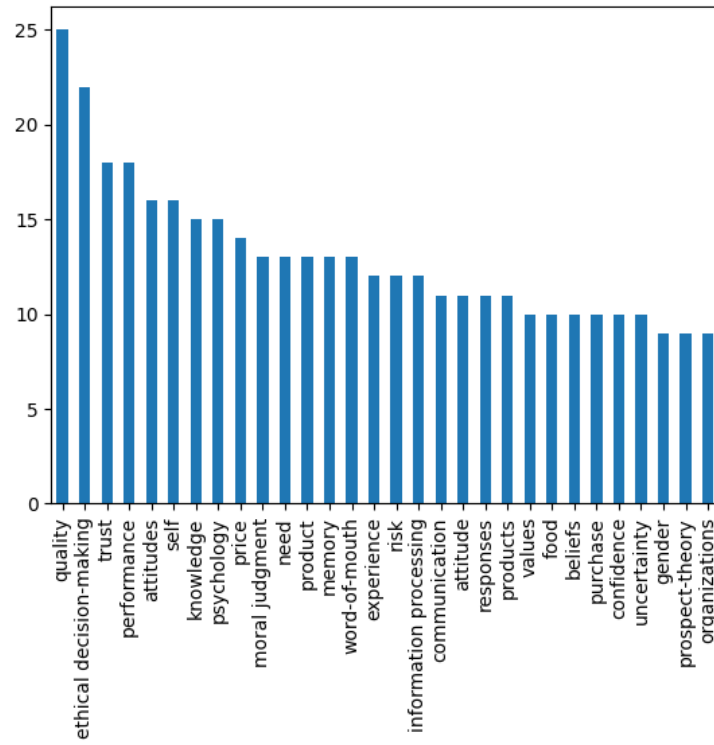


Figure 15: Top 30 words: 2020-2023

interpretable label for each topic. Topic 0 involves “self under health decision contexts; topic 1 is mainly about choice under risks and how factors such as emotion influence such decisions; topic 2 is about consumers’ service evaluation extracting consumer opinions from online reviews; topic 3 centers attitude and identity; topic 4 involves studying responses to commercials through monitoring facial expressions or emotional responses; topic 5 involves memory and mood factors in clinical context; topic 6 focuses on consumer satisfaction; topic 7 involves branding featuring measures such as clickthrough rate (CTR is the number of clicks that your ad receives divided by the number of times your ad is shown); topic 8 is about beauty and design; topic 9 focuses on treatment and intervention; topic 10 is nudge-related research focusing on behavior change in several contexts including promoting health-eating; topic 11 is on consumer knowledge and information processing; topic 12 centers around financial decisions and factors such as emotions and ethics; topic 13 is regarding product and consumer preference; topic 14 involves medical choices.

Table 1: Top 10 terms of each topic

Topic Number	Top 10 Keywords
0	self, health, feature, feeling, construal, provider, physician, healthcare, health_care, issue
1	risk, emotion, choice, option, financial, outcome, item, cue, probability, magnitude
2	service, review, online, heuristic, tourist, tourism, name, economic, reviewer, sentiment
3	attitude, identity, ethic, belief, gap, credit, relativism, predictor, stage, nonconscious
4	commercial, emotional, facial, copy, pretesting, advice, expert, purchase, framing, message
5	search, drug, memory, mood, ad, pharmacy, algorithm, regulation, trial, clinical
6	satisfaction, consumption, perceive, share, industrial_marketer, mobile_phone, energy, retail, behavioral, resource
7	conversion, brand, fear, incentive, promotional, competitor, targeting, ctr, appeal, poaching
8	aesthetic, model, new, accountability, design, interface, destination, creative, theta, beautiful
9	customer, treatment, contribution, intervention, quality, saving, retirement, value, patient, trust
10	nudge, size, orient, enhancement, food, healthy_eating, kcal, behaviorally, expectation, task
11	attribute, information, knowledge, counterfeit, money, time, bias, system, processing, inference
12	investor, price, angry, fearful, ethical, intention, moral, behaviour, social, firm
13	product, preference, confidence, label, wine, astringency, advisor, innovation, reference, mindfulness
14	medical, user, induce, concept, child, subject, parent, verbal, action, scenario

4.2.2 Topic Trend

Figure 16 shows how each topic evolves in terms of frequency from 1990 to 2023. The graph reveals one basic pattern for most topics which is a decrease in fluctuations as time progresses, though with a few exceptions. Many of the topics went through the phases where they were newly discovered and highly active in the field but then the heat slowly went away as we entered the new century. For these topics, there are greater fluctuations and higher spikes back to the 90s and the early 21st century but then the frequency drops after 2005. Examples of such topics are the following: topic 2 service evaluation ; topic 5 memory and mood factors in clinical context; topic 7 branding; topic 10 nudge; topic 11 consumer knowledge and information processing; topic 12 financial decisions. Another trend the analysis captures is that some topics only saw a few pioneers in the early time

back to the 90s but received more attention after 2000. Such topics are topic 3 attitude and identity, topic 8 beauty and design and topic 13 product and consumer preference. Topic 3 attitude and identity sees only a few spikes before 2015 but witnesses a huge boom between the year 2015 and 2000. However, the trend dies down right after and is still going downhill at the moment. Topic 13 went into the phase of being trendy in the field around 2005 while topic 8 did that later, around 2010. Yet none of these topics see significant upward trends at present. Topic 0 the concept of self, topic 1 choice under risks and topic 9 treatment and intervention, yet are rather different in that they seem to have a rather stable status in the field as important topics of all time and are expected to continue growing.

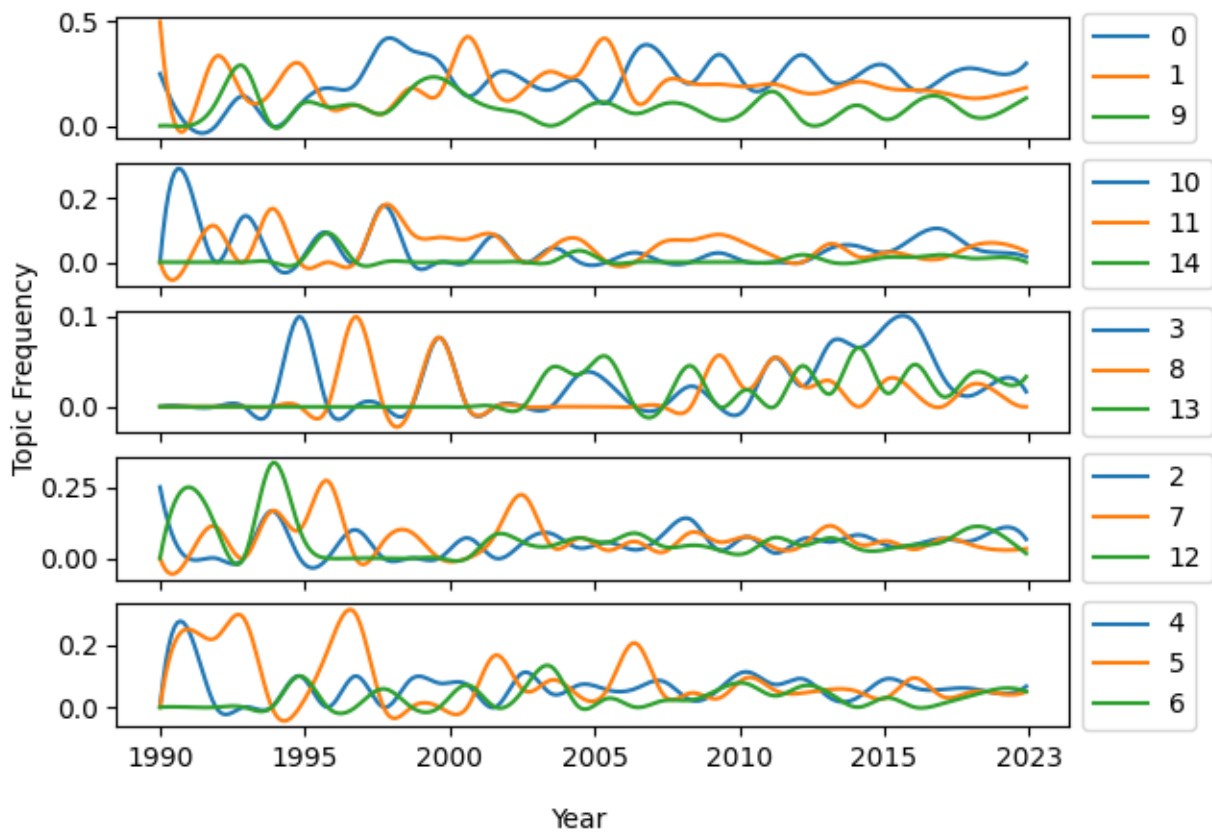


Figure 16: Changes of topic frequency over time²

Here the line of topic frequency is interpolated with a piecewise cubic polynomial, leading to some negative frequency for certain time points

4.3 BERTopic

4.3.1 Topics

Figure 17 is the Intertopic Distance Map of the clusters generated by the BERTopic model. A total of 16 topics (0 - 15) were identified by the BERTopic model. Most of the topics generated by BERTopic clustered together with only a few exceptions such as topic 1 and topic 12. Also see the replication code for generating an interactive version [here](#)³.

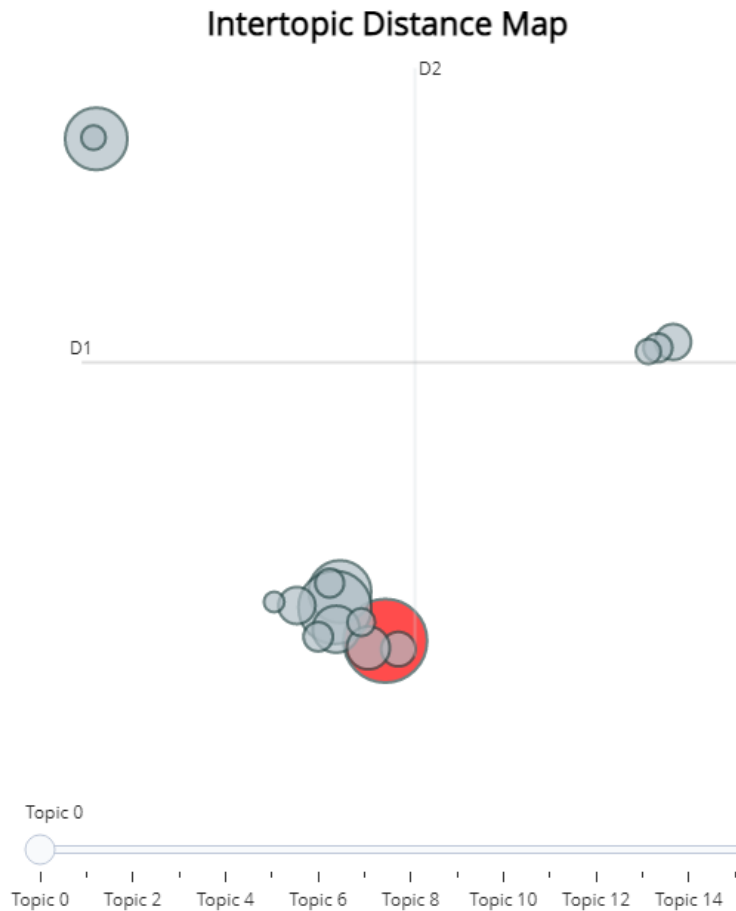


Figure 17: BERTopic: Intertopic Distance Map

The topics generated by the BERTopic are slightly different from the LDA model. Figure 18 shows the top 5 terms and the corresponding topic word scores for each topic. The labels of the topics are extracted from the top 3 terms. Topic 0 is about information, risk

³Note that the plot for BERTopic needs to be manually generated using code. See replication package instructions for details.

and health food; topic 1 involves ethical judgment and decisions; topic 2 is related to the research centering around the concept of the self; topic 3 is mainly on pricing and quality; topic 4 is on options and decision-making; topic 5 centers around financial decision; topic 6 is about consumers' online review; topic 7 is about service quality; topic 8 is research adopting neural methods such as fMRI and brain imaging; topic 9 is about consumers' information acquirement topic 10 is counterfeit and piracy; topic 11 involves consumers' preference and choice in terms of products' attributes; topic 12 is brand image; topic 13 is on green products; topic 14 is about time and duration judgment and topic 15 involves advising consumers.

4.3.2 Topic Trend

Trend plot ([Figure 19](#)) shows the trend of the top topics since 1990. What is similar to the pattern identified by the LDA model is the convergence of most topics in frequency. In addition, most of the topics are going to a downward trend after 2010, albeit being once hot in the history: for example, the research on pricing, consumer preferences and time perception takes up less of the literature after 2000; the emerging topic around 2000 such as self and feelings also sees a downhill trend currently. A limited number of topics are going on an increase at the present because of the new trend in psychological research or newly emerging application contexts: for example, ethical decision making, quality of service, counterfeit and piracy, financial decisions and online reviews. Similar to the results of the LDA model, many topics are rather marginalized and have not been through great ups and downs throughout history.

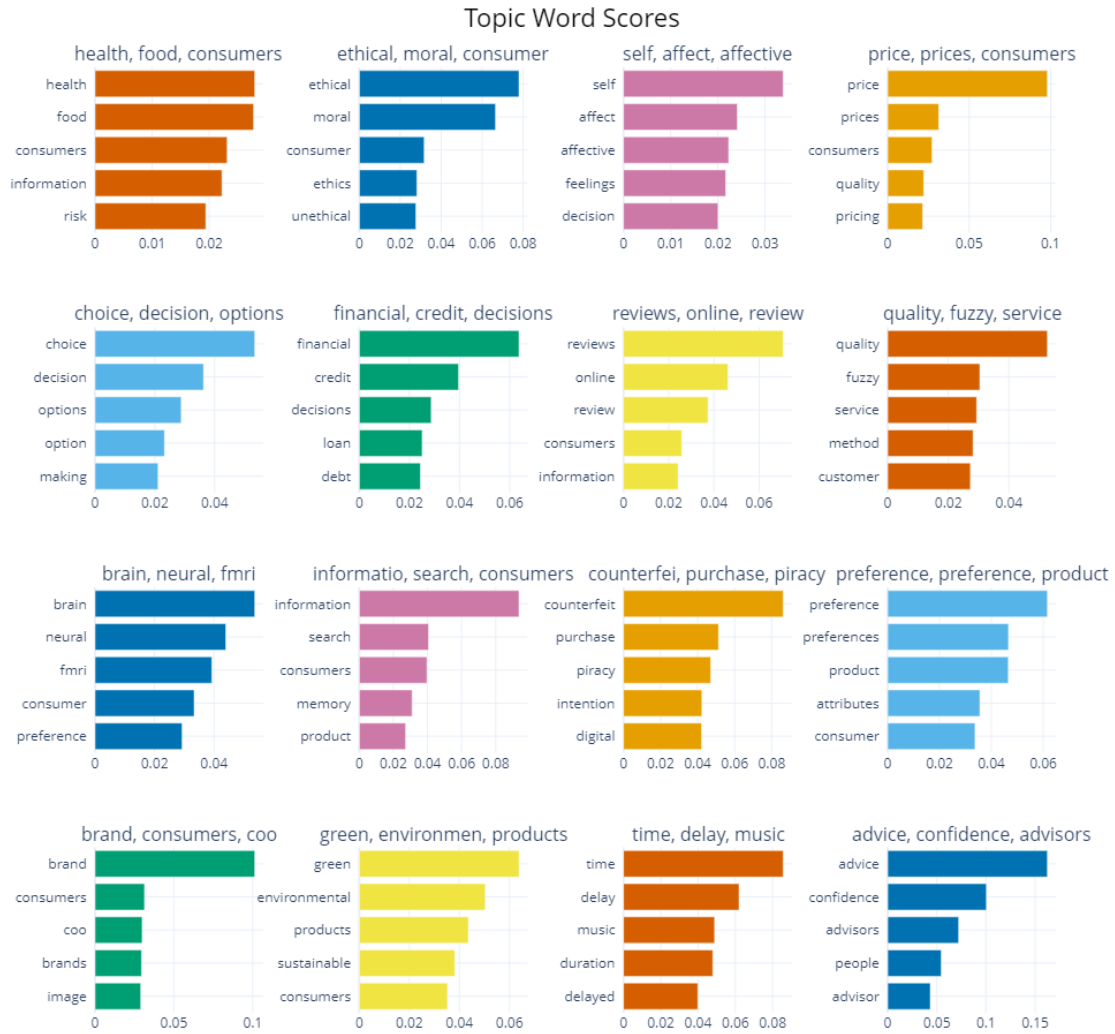


Figure 18: BERTopic: top terms of each topic

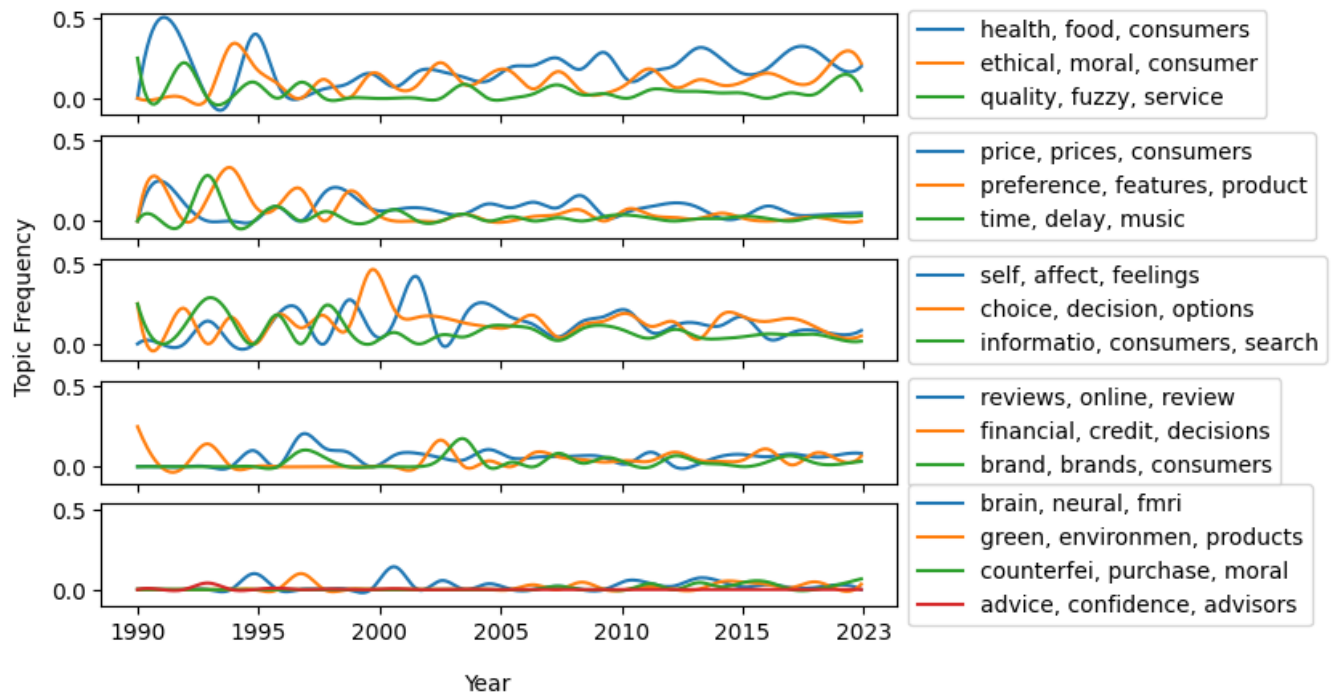


Figure 19: BERTopic: time trend of the topics⁴

Here the line of topic frequency is interpolated with a piecewise cubic polynomial.

5 Discussion

The results above reveal some of the important attributes of consumer judgment and decision research: what people are studying and how the topics change across the time. The analysis provides insights into the evolution of the area of consumer choice and decision after the 1990s and offers valuable reference for researchers working in this field.

The keyword analysis and two topic models compensate each other in that the keyword provides information of the key concepts in the area while the topic models are capable of generating more detailed and comprehensive summary of the topics. For example, the most frequent keywords provide straightforward information on which concepts are most influential while the topics generated by LDA and BERTopic models include more background information of the subjects and contexts of the studies. For example, the keywords are better at highlighting the core concept such as “emotion” while the topic models generate the topics with other terms that are in the same cluster with the term “emotion” such as “risk”, “choice” and “cue”, providing further details on the background of the research centering around the key concept. Although the topics generated by the LDA and BERTopic model slightly differ from each other, the clusters do show some common pattern of the words that co-occur with the article keywords. For example, “brand” and “ctr” (clickthrough rate) co-occur potentially because the CTR measure is used in brand research. The keyword “self” tends to appear in the same cluster as “feeling”, implying a connection between the two concepts in the same research topics. The keyword “preference”, having high frequency compared with other keywords, tends to co-occur with “product”, which is not highly active in the top keyword list. It is not surprising since consumer preference research tends to involve product evaluation and choices.

5.1 General Pattern

Although citation and references analysis has been adopted widely in previous studies on consumer behavior research or broader topics of marketing research, they have not been used in studying the general pattern of the section of consumer decision-making. In addition, previous analysis focuses less on historical evolution. However, this research finds out the critical points of the ups and downs of consumer judgment and decision-making through the history after 1990 when the field started to expand dramatically to include a wider range of topics. According to the analysis of the citation trend, the most influential works in the field are those published between 1995 and 2000, followed by those published around 2005. It is worth noting that what accompanies this is the booming era of the years between 2000 and 2010, where the analysis of the total number of keywords and the publications consistently show an explosive increase. Although lacking any evidence of causal relations, the influential

works in the years before the new century potentially facilitated the prosperity of 2005. Yet what comes after the prosperity is the diverse and huge numbers of publications which made them less likely to win over the halo of the pioneers. As the articles are citing more and more papers, they are less and less likely to be cited.

5.2 Source of Publications

Another feature of the area of consumer decision research is the tradition of a psychological perspective. While consumer research seems to be more inclusive after the 1970s and widely welcome different types of research in various social science disciplines, psychological research has sustained its dominant status in the realm of consumer judgment and decision-making. The academic journals that the articles get published in tend to be more related to psychological research and welcome consumer research from the psychological perspective. The most influential journals seen in this study are *Journal of Consumer Research*, *Journal of Consumer Psychology* and *Judgment and Decision Making*. The last two journals were established rather late so that it is notable that other journals such as *Psychology and Marketing* were among the top journals for this stream of research. However, as its importance grew and it became a more independent sub-discipline, the top journals specialized in this area were released and they quickly became the most important sources of these articles.

5.3 Changes in Topics and the Historical Development

The historical changes of the top frequent keywords and the topic trend reflect the changes of the focus and hot topics in the field, some of which are consistent with some policy changes of the journals.

The cognitive era (Cohen & Wilkie, 2022) that started in the 1970s when researchers turned their focus to cognitive factors in decision-making seems to continue to have its impact on the field even until the 1990s. Keyword analysis shows that the classical topics in this line of research such as information acquiring and information processing, memory and metacognition are still heavy in the realm and some of them (i.e. memory) even dominated the focus of the research throughout the 90s and all the years before the 21st century. The year 2000 somehow acts as a cut point in that it witnessed the dominant topic of cognition giving way to a range of more diverse topics, spanning multiple areas such as choice under uncertainty (risk), consumer preference and other social or psychological factors such as emotion, self and moral judgment. The outbreak of the publications around 2005 seems to be in parallel with this expansion of topics in the new century. Nonetheless, the end of the cognitive era does not mean that the research on these factors simply died away, but rather it remains one of the most important topics.

The policy change of Journal of Marketing that took place in the 80s may be influential to the direction of the field. The selective approach that prioritized academic articles over those from practitioners directed the field of consumer research to a discipline that is more theoretical rather than practice-oriented. The disappearance of some of the classical methods that are nowadays only seen in practice and marketing textbooks such as protocol analysis and conjoint analysis from the keyword list provides further evidence for this gradual change. The division of the academic publications from the practice-oriented articles eliminates the line of research that focuses on developing methods used for consumer behavior analysis in the area of consumer behavior. Along with this change, the statistical methods, which was more salient in 90s' keywords, seem to also fade and be taken as less important in the area.

5.4 Current Trend

Both the topic models fail to find obvious and consistent upward trends for most of the topics including some of the dominating topics such as information, choices under risks and research on self and emotions. This is somewhat consistent with the previous findings by Cho et al., though it is hard to further reconcile with the findings of this research since the topics are determined differently (2017). Nevertheless, some of the trends in the current research are identified. One significant trend that has been observed both in the keywords and the topic trend is that there has been steady growth in the research on ethical decision-making since the years around 2005. Even though this topic has not yet dominated the area as its predecessors, the great number of the publications relevant to this topic even till 2020 is not neglectable. It is reasonable to anticipate that these topics will continue to gain attention from the scholars and rise in terms of popularity.

Another salient trend is the emerging topics that focus on specific contexts of the application and some emerging business contexts. For example, the topic trend shows the topics of online review, financial decision-making and counterfeit and piracy are going through steady increase. These increase in the less dominant topics with an emphasis on application reconciles with previous research predicting continuous future development in the topics such as “(online) shopping behavior” and “Customer service satisfaction” (Çadırcı, 2022).

5.5 Implications

The findings provide some inspirations for scholars working in the area of consumer judgment and decision making. First of all, the topics in this area are diverse and heterogeneous and are expected to be so in the future. The classic topics centering around the cognitive aspects no longer dominates this field, yet even more psychological concepts on other topics

are constantly active. The psychological concepts and research is still the source of inspiration. The on-going trend of topics such as self, moral judgment and ethical decision making demonstrates a broader perspective of applying psychological concepts to consumer behavior research.

It is also worth noting that one other feature of this field is that the research orientations tend to be in line with actual marketplace trends. The upward trend in topics such as online-shopping and e-commerce demonstrates the research that aims at solving issues in the market. As a discipline that is closely related to business practice, the area of consumer research never shut its door to the research that aims at addressing current pain points for the practitioners.

In addition to the findings of the literature in consumer choice and judgment, the results of the topic modeling suggests greater implications for conducting literature review and study academic disciplines with similar features. The topic models, especially the word-embedding model, show their advantage in extracting the dominant topics from a large amount of textual data and identifying specific research landscapes, which were once unavailable in traditional review articles. Such an advantage is expected to contribute to other domains where the general patterns might be hard to grasp with manual searching due to the multidisciplinary feature or the overload of information.

5.6 Limitations and Future Research

Inevitably a few limitations of this study exist. First, the coverage of the journal articles are limited to the search results of the Web of Science database. Despite with few missing observations and missing information, the sample limited to one database might not be exactly the same as the whole discipline. Admittedly, it has long been a question in this stream of research of deciding which articles to include in the analysis. Previous studies have used both limited sample from Web of Science or other database and a broader coverage of the articles. It would be ideal, though, if future research could continue to solve this problem. Second, the issue of inconsistent labels among different models remains. As an unsupervised approach, the topic models are mainly completing the task of clustering rather than labeling the data. Thus it is always hard to compare between the models. The LDA and BERTopic models are complementary of each other yet not capable of generating interpretable comparisons between them. Finally, the study provides a broader observation of the field of consumer decision-making, with less focus on the details of each topic and theory. It would be ideal, though, if further review articles that combine the qualitative design and quantitative approach continue to unravel the mysterious pattern of the consumer research.

6 Conclusion

The current research utilizes a combination of various analyses including descriptive and citation analysis, keywords analysis and topic modeling to further understand the main topics in the realm of research on consumer judgment and decision-making. By tracking the historical changes in the topics, this study provides some detailed evidence of how dominating topics transfer throughout history. The findings of certain patterns such as the emphasis on cognitive topics during the 1990s shows the influence of the 1970s never dies out until the 2000. The disappearance of practice-oriented marketing methods also reconciled with the impact of the policy change that leans towards academic paper over practitioner articles. In addition to the historical trend, the analysis of topics further identifies several ongoing trends that might help researchers in this area better understand the current research topics. Moral judgment and ethical decision-making has been identified as an emerging topic that is expected to keep rising in the future. Furthermore, the BERTopic model is capable of generating topics that are more precise and specific, thanks to which, the trend of an increase in the less valued, application-oriented research topics such as financial decision-making, online shopping behavior and piracy and counterfeit are discovered. These findings provide some insights into the history of research on consumer judgment and decision-making, as well as further addressing the concern of what is actually going on in the field at the present. The study provides scholars working on consumer judgment and decision-making with some inspiration about what to look at in their future work.

Data and Code Availability Statement

Data used and code for data cleaning and analysis is provided as part of the replication package in the Github repository. It is available [here](#) for review.

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Appendix

Below are two example abstracts with corresponding titles used in the test sample for testing the Chatgpt classifier in the pre-processing procedure, with each being classified as relevant and irrelevant to consumer judgment and decision-making.

Relevant example

Title: *Judgments of acquisition value and transaction value: A consumer decision-making styles perspective*

Abstract: Purpose An open question of behavioral pricing literature is: What are the factors which influence consumers' judgments of acquisition value and transaction value? An important framework to explain consumers' shopping and purchase decisions is their decision-making styles. This paper aims to examine the influence of consumers' decision-making styles, that is, perfectionistic high-quality conscious, brand conscious-price equals quality, novelty-fashion conscious, recreational-hedonistic, price conscious-value for money, impulsive-careless, habitual-brand loyal and confused by overchoice on their judgments of acquisition value and transaction value. Design/methodology/approach From the literature, a conceptual framework was formulated. Data was collected from a survey of 304 respondents. The measurement model was tested using exploratory factor analysis and confirmatory factor analysis. The structural model was tested using structural equation modeling. Findings The consumers' judgments of acquisition value and transaction value vary with their decision-making styles. The measurement and structural models exhibited good fit, and 12 of the 16 proposed hypotheses were found to be significant. Research limitations/implications The respondents for this research study were urban and postgraduate students. Practical implications The results of this study can help managers personalize their promotional offers and market offerings targeted at consumers with different decision-making styles. Originality/value Behavioral pricing literature has not convincingly shown that consumers make the judgments of the two values, acquisition value and transaction value, in a purchase scenario. There is limited literature on the impact of decision-making styles on the marketing variables. The results of this study contribute to the literature by showing that consumers make the judgments of these two values, and these judgments vary with their decision-making styles. Also, this is one of only a few studies to examine the two components of the purchase value in an Indian context.

Irrelevant example

Title: *A judgment-analysis perspective on entrepreneurs' resource evaluations*

Abstract: Our study extends resource-based theory (RBT) by developing an understanding of how entrepreneurs judge the importance of the resource attributes of value, rareness, inimitability, and nonsubstitutability for the success of their ventures, and whether they make trade-offs between these attributes or follow RBT, which maintains that all attributes must be attained simultaneously. Resource judgments made by a sample of 181 entrepreneurs reveal that, while value and inimitability have a positive impact on resource importance, nonsubstitutability is only marginally positive, and rareness has a negative impact. Moreover, and contrary to RBT, entrepreneurs make trade-offs between resource attributes. Given prior empirical support for the critical influence of all four attributes on venture success, our findings uncover a systematic influence of judgment heuristics, cognitive biases, and institutional constraints in entrepreneurial resource judgments, and thereby provide a starting point for researchers and entrepreneurs alike to improve both theoretical models and outcomes of resource judgments. (C) 2011 Elsevier Inc. All rights reserved.