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A study of influential authors, works and research network of consumer behavior research

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With the proliferation of consumer behavior research in recent decades, the ability to effectively identify the most influential and representative collection of research articles had become significantly important. Research in the consumer behavior area had developed rapidly, but no recent studies had examined contemporary consumer behavior research. This paper employed author co-citation analysis, a bibliometric methodology and social network analysis methodology to highlight the most influential authors, to analyze citation relationships, to exploit changes in the intellectual base and to show trends and patterns in the consumer behavior field over two consecutive time periods, 1989 to 1998 and 1999 to 2008. In order to analyze the dynamic intellectual structure of consumer behavior research, author co-citation analysis was conducted of 16,536 references from 606 articles found in the SSCI and SCI databases from 1989 to 2008. In addition, factor analysis was used to examine the breadth of the authors' research areas. The aims of this paper were twofold: to provide a valuable direction for future consumer behavior research, and to propose an objective means of establishing the relative importance of different knowledge nodes in the recent development of the consumer behavior field.

Key words: Consumer behavior, bibliometric analysis, author co-citation analysis, social network analysis, knowledge of network.

INTRODUCTION

Understanding what customers want is extremely important in consumer behavior. As customers become increasingly self-conscious and discerning in their spending, many companies seek greater awareness of customers' desires in order to meet their expectations. Consumer behavior is the study of when, why, how, and where people do or do not buy products. Belch and Belch (2004) define consumer behavior as "the process and activities people engage in when searching for, selecting, purchasing, using, evaluating, and disposing of products and services so as to satisfy their needs and desires." In other words, consumer behavior is influenced by demographics, psychographics/lifestyle, personality, motivation, knowledge, attitudes, beliefs, and feelings.

There are many ways to trace consumer behavior studies' evolution over the past two decades, from 1989 to 2008. This study employs the widely accepted bibliometric method of author co-citation analysis (White and Giffith, 1982; Culnan, 1986, 1987; McCain, 1990) to research the joint citations of key researchers in the consumer behavior field and thereby examine the central theoretical and conceptual approaches in contemporary

consumer behavior research. Bibliometrics encompasses a number of empirical methods citation and co-citation analyses are two major bibliometrics tools that are commonly used for mapping the intellectual structure of a research field (Small, 1973; Zuccala, 2006). According to Pritchard (1969), bibliometrics is "the application of mathematics and statistical methods to books and other media of communication", and it provides a method for examining communication among scholars in a field through their scholarly publication (Borgman, 1990). Also, Diodato (1994) points out that the term bibliometrics refers to the mathematical and statistical analysis of patterns that appear in the publication and the use of documents. In general, bibliometrics utilizes quantitative analysis and statistics to describe patterns of publication within a certain field or body of literature. Researchers may thus use these methods to evaluate and determine a particular writer's influence or examine the relationship between two or more writers or works. In other words, bibliometrics is a set of methods used to study or measure texts and information. Generally speaking, the social science citation index, the science citation index,

and the arts and humanities citation index are very commonly used to trace citations when conducting bibliometric research. In this study, author co-citation analysis is used to map the changes in the intellectual structure of the consumer behavior field over the past twenty years. For the purpose of analysis and comparison, this twenty-year period is further divided into two ten-year period, 1989 to 1998 and 1999 to 2008.

Citation and co-citation analysis (Small, 1973; Marshakova, 1973; McCain, 1990; Pilkington and Teichery, 2006) and factor analysis (McCain, 1990; Pilkington and Teichert, 2006) are considered to be the fundamental research tools for evaluating the core knowledge of a field. This study employs co-citation analysis to identify influential authors or works and to examine the relationships between authors or works. By counting the frequency of citation and analyzing how often authors are cited together at the same time, it is possible to identify the most influential authors or works. This study aims to fill a gap in consumer behavior research by providing researchers with an overview of contemporary consumer behavior studies in the past two decades and by mapping the objective structure of different research topics in the development of the consumer behavior field.

LITERATURE REVIEW

Bibliometric methods

This paper utilizes bibliometric methods to identify topically related "core documents" and "core document groupings" (Schneider and Borlund, 2004). The most commonly used units in bibliometric analyses are journals, documents, authors and descriptive terms (White and McCain, 1997). Each particular unit presents a unique aspect of a field, enabling different analyses (Schneider and Borlund, 2004). Documents are the preferred units of analysis for examining the topical structures of knowledge domains (Börner et al., 2003) whereas author units are commonly used to analyze the intellectual structure of a field (White and McCain, 1998).

Bibliometric methods make it possible to quantify similarities or dissimilarities between different units and are thus useful in revealing relationships and structures. According to White and McCain (1997), the most commonly used bibliometric methods for tracing relationships in academic journal citations are inter-citation, inter-document, co-assignment, co-classification, co-citation, and co-word analysis where "inter-" refers to relationships between documents (or units), and "co-" refers to joint occurrences within a single document (or unit).

Author co-citation analysis

The bibliometric technique of author co-citation analysis

was devised in information science by researchers in order to determine the intellectual structure of disciplines (White and Griffith, 1982). The units of analysis in this technique are authors who have made significant contributions to a discipline (McCain, 1990), and the citation of an author represents a reference to the concept or concepts for which the author is known (Culnan, 1986). Co-citation analysis of documents records the number of papers that have cited a particular pair of documents, and this information is used to measure the similarity of the content of the two documents. This approach is instrumental in identifying groupings of authors, topics, or methods, and it can help us understand the way in which these clusters interrelate with each other (Pilkington and Liston-Heyes, 1999). Co-citation analysis is the most commonly used bibliometric method for mapping and visualization studies (Small, 1973; Small and Griffith, 1974; McCain, 1990; White and McCain, 1998). This study adopts co-citation analysis because it is considered to be a good method for illustrating grouping of authors, topics, or methods, and because it can help researchers and scholars to understand how these clusters relate to each other (Pilkington and Liston-Heyes, 1999; Teichert and Pilkington, 2005). Author co-citation analysis (ACA) records the number of papers that have cited a particular pair of documents, and it therefore indicates the similarity of content of the two documents' contents, as well as revealing the pattern of citations of authors contributing key concepts in a field. In addition, the analysis of citations identifies groups of authors who are frequency co-cited (McCain, 1990), and authors essentially fall into distinct clusters or groups because of the conceptual correspondence of their works (White and Giffith, 1981; McCain, 1990).

In this study, ACA is used to develop an understanding of the intellectual structure of the consumer behavior field. Authors are grouped together based on their co-citations and the similarity of their patterns of citations with other authors (McCain, 1990). ACA is a bibliometric technique that uses as its input the matrix of co-citation frequencies between authors (McCain, 1990). Authors as the units of analysis and the co-citations of pairs of authors (the number of times they are cited together by a third party) are the variable that indicates their "distances" from each other (Andrews, 2003). The underlying assumption of ACA is that the more two authors are cited together, the closer the relationship between them (White and Griffith, 1981).

The use of ACA in previous studies

Many research fields use ACA, a well-established technique in bibliometrics that is a potentially productive method of examining the intellectual structure of science specialties and exploring the impact of their field. Numerous studies have used ACA to map the intellectual

bases of specialties such as tourism (Chou and Tseng, 2010; Ma and Wang, 2007), conflict management (Ma et al., 2008), family business (Casillas and Acedo, 2007), strategic management (Nerur et al., 2008; Acedo et al., 2006), international management (Acedo and Casillas, 2005), knowledge management (Ponzi, 2002), management (Acedo et al., 2001), small enterprise (Ratnatuga and Rinabm, 1997), marketing (Heischmidt and Gorden, 1993), organizational behavior (Culnan et al., 1990), communication science (Paisley, 1990), information science (Persson 1994), marriage and family research (Bayer et al., 1990), scholarly communication in sociology of science and information science (Karki, 1996).

Social network analysis (SNA)

Social network analysis is a powerful diagnostic method used for analyzing the nature and pattern of relationships among members of a particular domain (Krebs, 2002). Essentially, SNA is a method for visualizing our people and connection power, helping us to identify how we can best interacts to share knowledge. SNA is an analytical tool that reveals the number of interactions and the closeness of relationships between nodes within a network. In the representation of the social network, the nodes are the people and groups, and the links show relationships or flows between these nodes. SNA was initially developed for the purpose of analyzing networks in social science, computer networks, and communication studies. This method is useful because it mathematically defines certain characteristics of the actors and the network itself. The characteristics defined include the power of actors, range of influence, cohesion, equivalence, and brokerage (Bonacich, 1987; Burt, 1992) and these characteristics are expressed in terms of corresponding network-structure parameters which are derived from the relationships among the actors.

According to Burt (1992), a social network is a group of collaborating entities that are related to one another. Mathematically, this is a graph in which each participant in the network is called an "actor" and depicted as a node in the network. Actors can be people, organizations, or groups, or other set of related entities. Relationships between actors are depicted as links between the corresponding nodes.

METHODS

The intention of this study is to develop a chronological perspective and also a comprehensive understanding of the evolutionary path of consumer behavior studies over the past two decades, from 1989 to 2008. This research adopts citation analysis, author co-citation analysis, factor analysis, and hierarchical clustering analysis to map and study changes in the intellectual structure of consumer behavior research over the past consecutive twenty years. The time frames were divided into two ten-year periods (1989 to 1998 and 1999 to 2008) for analysis and comparison, and in order to recognize a change or evolution in the pattern of knowledge.

This study utilizes co-citation analysis (Culnan, 1986; Sharplin and Mabry, 1985), a method which addresses the importance of journals and articles, based on the notion that the most frequently cited journals and articles cited are the most important in the field. In addition, this study uses author co-citation analysis (Garfield, 1963; Small, 1973; McCain, 1990), an approach based on analyzing the frequency with which any work by an author is linked to any work by another author to a third and later work (White and Griffith, 1981). ACA is a set of data gathering, analytical, and graphic display techniques that can be used to produce empirical maps of prominent authors in various areas of scholarship. Furthermore, ACA assumes that two authors' frequency of co-citation and similarity in patterns of co-citations with others are indicative of the closeness of the relationship between them.

The validity of ACA has been demonstrated by many researchers, as described earlier in "The Use of ACA in Previous Studies". The following paragraphed describes the methodology process used in this study, which is adapted from McCain (1990) and summarizes the steps that were used in this study.

Selection of author

According to White (1989), the usefulness of co-cited author maps depends on the authors chosen for inclusion by the analyst. Identifying a list of seminal authors in the field is thus the first step in ACA (McCain, 1990). A list of the 60 most cited authors was generated by searching the online SSCI and SCI databases for titles, descriptors, and abstracts of papers published between 1989 and 2008 with the keyword "consumer behavior" (Table 1). A detailed analysis of 16,536 cited references of 606 articles found in the online SCI and SSCI databases was used to identify the important publications and the influential scholars as well as to trace the historical leadership study development and to map the intellectual structure of consumer behavior studies during the period 1989 to 2008. In this study, books, journals, publication titles, author names, publication dates and citation index were used as the source of data. The citation counts were tabulated and filtered with Excel, and the data was subsequently sorted, summed, subtotaled, ranked, and screened according to the total citation counts each received. Through out the research, different numbers of publications and reference data are found: there are 10,586 citations from 1999 to 2008 and 5,950 citations from 1989 and 1998. Thus, the most consumer behavior citations have been done in the recent 10 years. Over the 20 years, there is a total of 319 published journals from 1999 to 2008 and 287 published journals are from 1989 to 1998. They are used as the source to identify the most influential scholars and documents in consumer behavior studies. Thus, there is a slight increase in attention in spite of the larger number of studies that have been done on consumer behavior in the recent 10 years.

Author co-citation matrix

A co-citation matrix is inherently very similar to the social networks, as it is essentially a network of linked authors (Pilkington and Teichert, 2006; Pilkington and Chai, 2008). The core division of the co-citation matrix that represents the key authors from a particular academic field is diagrammed as a network the locations of which are determined using Geodesic distances (Pilkington and Teichert, 2006; Pilkington and Chai, 2008). SNA is increasing used to analyze the nature and pattern relationships among individual scholars or articles in one discipline (Casey and McMillan, 2008; Ma et al., 2008; Pilkington and Fitzgerald, 2006; Pilkington and Teichert, 2006; Pilkington and Chai, 2008).

Table 1. The highly cited documents in consumer behavior publication: 1989 to 1998.

ID #	Frequency	Full cited documents (frequency ≥ 4)
1	24	BELK RW, 1989, J CONSUM RES, V16, P1
2	14	HIRSCHMAN EC, 1992, J CONSUM RES, V19, P155
3	10	CHURCHILL GA, 1982, J MARKETING RES, V19, P491
4	10	HOWARD JA, 1969, THEORY BUYER BEHAVIOR
5	9	BUCKLIN RE, 1992, J MARKETING RES, V29, P201
6	8	RICHINS ML, 1991, J CONSUM RES, V18, P71
7	8	SNYDER M, 1985, J PERS SOC PSYCHOL, V49, P586
8	6	ANDERSON PF, 1986, J CONSUM RES, V13, P155
9	6	FORNELL C, 1981, J MARKETING RES, V18, P39
10	6	GARDNER MP, 1985, J CONSUM RES, V12, P281
11	6	GUADAGNI PM, 1983, MARKET SCI, V2, P203
12	5	ANDERSON JC, 1988, PSYCHOL BULL, V103, P411
13	5	BENTLER PM, 1990, PSYCHOL BULL, V107, P238
14	5	GRANZIN KL, 1991, J PUBLIC POLICY MARK, V10, P1
15	5	KAMAKURA WA, 1989, J MARKETING RES, V26, P379
16	5	MOSCHIS GP, 1987, CONSUMER SOCIALIZATION
17	5	OLIVER RL, 1980, J MARKETING RES, V17, P460
18	5	SCHOUTEN JW, 1991, J CONSUM RES, V17, P412
19	5	SINGH J, 1988, J MARKETING, V52, P93
20	5	SIRGY MJ, 1982, J CONSUM RES, V9, P287
21	5	THOMPSON CJ, 1989, J CONSUM RES, V16, P133
22	5	WALLENDORF M, 1988, J CONSUM RES, V14, P531
23	5	ZEITHAML VA, 1988, J MARKETING, V52, P2
24	4	ANDREASEN AR, 1985, J CONSUM RES, V12, P135
25	4	BALDERJAHN I, 1988, J BUS RES, V17, P51
26	4	BARON RM, 1986, J PERS SOC PSYCHOL, V51, P1173
27	4	BECKER MH, 1977, J HEALTH SOC BEHAV, V18, P348
28	4	CALDER BJ, 1987, J CONSUM RES, V14, P136
29	4	DICKSON PR, 1990, J MARKETING, V54, P42
30	4	FENIGSTEIN A, 1975, J CONSULT CLIN PSYCH, V43, P522
31	4	FOLKS, V.S., 1984, J CONSUM RES, V10, P398

The 30 most frequently cited authors in each 10-year time period were identified as the core authors in the field, and these were further examined with co-citation analysis. By searching the SSCI and SCI databases over the period 1989 to 2008, a file was created for each author that contained all of the articles citing their works (each identified by a unique number). In order to compile an author co-citation matrix, the author co-citation matrix was developed based on these frequencies of author co-citation, and the diagonal data were calculated. The matrix represents each author's profile of co-citation with every other author on the list (White and Griffith, 1981). The data is then converted into an Excel spreadsheet to develop a 30 x 30 matrix for each 10-year period. The most frequently cited papers of each of these authors are listed in Table 1.

DATA ANALYSIS

Social network analysis, factor analysis and cluster analysis were performed by importing the data matrix into Ucinet 6.0 (Borgatti et al., 2002) in order to perform

(Pilkington and Tecichert, 2006; Hair et al., 1998; Pilkington and Liston-Heyes, 1999). The tools of social network analysis can be used to graph the relationships in the co-citation matrix, thereby identifying the strongest links and the core areas of interest in the consumer behavior field (Pilkington and Tecichert, 2006). In order to describe the knowledge distribution process in the consumer behavior area, the knowledge network of consumer behavior is mapped by identifying the key nodes and developing the structure. The co-citation correlation matrix was factor analyzed using varimax rotation; a commonly used procedure which attempts to fit or loads the maximum number of authors on a minimum number of factors (McCain, 1990). These scholars can be said to collectively define this field because they have the most influence in the development of the consumer behavior area. The graphing programmer NETDRAW (Version 2.0 which comes with the social network software suite UCINET) is used to

Table 2. The highly cited documents in consumer behavior publication: 1999 to 2008.

ID #	Frequency	Full cited documents (frequency ≥ 5)
32	13	HOFFMAN DL, 1996, J MARKETING, V60, P50
33	12	BARGH JA, 2002, J CONSUM RES, V29, P280
34	12	DONOVAN RJ, 1994, J RETAILING, V70, P283
35	11	ALBA J, 1997, J MARKETING, V61, P38
36	11	BARON RM, 1986, J PERS SOC PSYCHOL, V51, P1173
37	11	KAHNEMAN D, 1979, ECONOMETRICA, V47, P263
38	11	SIMONSON I, 1992, J MARKETING RES, V29, P281
39	10	AJZEN I, 1991, ORGAN BEHAV HUM DEC, V50, P179
40	10	DAVIS FD, 1989, MANAGE SCI, V35, P982
41	9	FORNELL C, 1981, J MARKETING RES, V18, P39
42	8	BAGOZZI RP, 1988, J ACADEMY MARKETING, V16, P74
43	8	OGUINN TC, 1989, J CONSUM RES, V16, P147
44	8	ROOK DW, 1987, J CONSUM RES, V14, P189
45	8	SHIMP TA, 1987, J MARKETING RES, V24, P280
46	7	DIJKSTERHUIS A, 2005, J CONSUM PSYCHOL, V15, P193
47	7	HOLBROOK MB, 1982, J CONSUM RES, V9, P132
48	6	BAKOS JY, 1997, MANAGE SCI, V43, P1676
49	6	BELK RW, 1988, J CONSUM RES, V15, P139
50	6	FOURNIER S, 1998, J CONSUM RES, V24, P343
51	6	HOCH SJ, 1991, J CONSUM RES, V17, P492
52	6	PETTY RE, 1983, J CONSUM RES, V10, P135
53	6	RAJU PS, 1980, J CONSUM RES, V7, P272
54	6	RICHINS ML, 1992, J CONSUM RES, V19, P303
55	6	ZAICHKOWSKY JL, 1985, J CONSUM RES, V12, P341
56	5	CACIOPPO JT, 1982, J PERS SOC PSYCHOL, V42, P116
57	5	CONNER M, 1998, J APPL SOC PSYCHOL, V28, P1429
58	5	FESTINGER L, 1954, HUM RELAT, V7, P117
59	5	GARBARINO E, 1999, J MARKETING, V63, P70
60	5	HUBER J, 1982, J CONSUM RES, V9, P90
61	5	NOVAK TP, 2000, MARKET SCI, V19, P22

generate the intellectual structure map of author proximities (Borgatti et al., 2002). The consumer behavior research graphs are shown in Figures 1 and 2, which show the links among the top 30 most cited publications. Only the links with greater than or equal to 20 or 50 co-citations respectively for each decade are shown in these graphs in order to reduce clutter and make the diagram easier to interpret.

RESULTS

Citation analysis

The highest frequency of citation and the most influential scholars were then identified from the citation samples, by counting their total citations count within the journal articles. As shown in Table 1, among all the cited journal articles, the most-cited consumer behavior article titles between 1989 and 1998 (1st ten year) were Belk's paper

(1989): The Scared and the Profane in Consumer Behavior: Theodicy on the Odyssey in Journal of Consumer Research, followed by Hirschman's paper (1992): The Consciousness of Addiction: Toward a General Theory of compulsive Consumption in Journal of Consumer Research, Churchill's paper (1982): An Investigation Into the Determinants of Customer Satisfaction in Journal of Marketing Research, J.A. Howard's book (1969): The Theory of buyer Behavior and Bucklin's paper (1992): Brand Choice, Purchase Incidence, and Segmentation: An Integrated Modeling Approach in Journal of Marketing Research. Based on Table 2, among all the cited documents, the most-cited consumer behavior documents between 1999 and 2008 are Hoffman's paper (1996): Marketing in Hypermedia computer-Mediated Environments: Conceptual Foundations in Journal of Marketing, followed by Bargh's paper (2002): Losing Consciousness: Automatic Influences and consumer Judgment, Behavior, and Motivation in Journal of Consumer Research, Donovan's
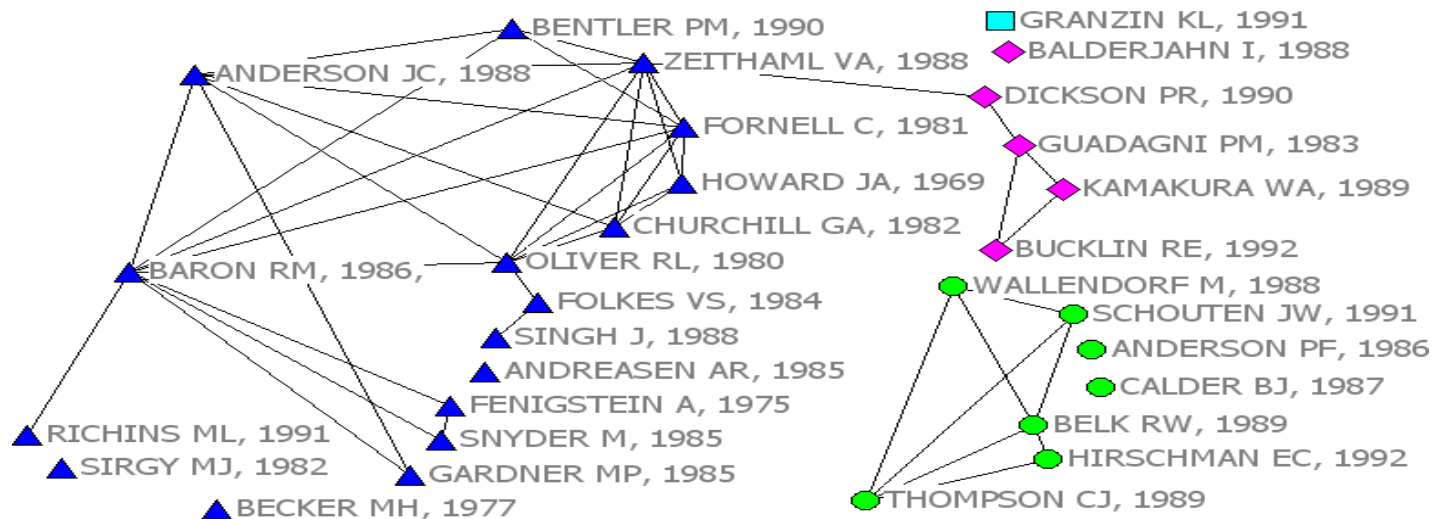
Figure 1. Core themes in consumer behavior research: 1989 to 1998 (frequency ≥ 20).

paper (1994): Store Atmosphere and Purchasing Beha-vior in Journal of Retailing, Alba's paper (1997): Interactive Home Shopping: Consumer, Retailer, and Manufacturer Incentives to Participate in Electronic Marketplaces in Journal of Marketing, and Baron and Kenny's paper (1986): The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations in Journal of Personality and Social Psychology.

For the period from 1989 to 1998, the most frequently cited in the consumer behavior literature as follows: Advances in Consumer Research, Journal of Consumer Research, Journal of Marketing Research, Journal of Business Research and Journal of Consumer Affairs. For the second ten-year period, the most frequently cited journal was Advances in Consumer Research, Journal of Business Research, Journal of Consumer Psychology, Journal of Consumer Research and Psychology and Marketing. These journals and books were found by searching for the title "consumer behavior" under SSCI database.

Co-citation analysis

Co-citation analysis is a bibliometrics technique used by information scientists to map the intellectual structure of a research field, which can be defined as the topical relatedness of clusters of authors, journals or articles within a particular field. It involves counting documents from a chosen field such as a paired or co-cited document, which appear frequently in the bibliographic reference lists of citing documents. Co-citation counts are compiled in a matrix form and statistically scaled to create a representation of a particular point in time of what is actually an evolving structure of knowledge

(Small, 1993; Zuccala, 2006). Author co-citation analysis is a bibliometric technique that uses a matrix of co-citation frequencies between authors as its input (McCain, 1990).

Due to the limitation of the SSCI online database, only the first authors' names were shown in the most frequently cited top 60 authors for the periods 1989 to 1998 and 1999 to 2008. The most frequently cited authors between 1989 and 1998 (first ten years) were Belk, followed by Hirschman, Churchill, Howard and Bucklin. Also, the database identified the most frequently cited scholars between 1999 and 2008 (second ten years) as Hoffman, followed by Bargh, Donovan, Alba and Baron. These scholars had the most influence in the development in the consumer behavior area and thus collectively define this field.

Social network analysis

Social network analysis tools can be used to graph the relationships in the co-citation matrix and identify the strongest links and the core areas of interest in consumer behavior (Pilkington and Teichert, 2006). Co-citation analysis of these key nodes as shown in Figures 1 and 2 was done using the UCINET software (Borgatti et al., 2002) and shows graphically, the core areas of interest. This method groups elements in a network based on the sharing of common links to each other. The few authors centered in Figures 1 and 2 were the leading figures in consumer behavior research. Their numerous citations and extensive interlinks with each other undoubtedly indicated their prestigious status in consumer behavior research. Their contributions and explorations in consumer behavior collectively defined the future research directions of consumer behavior studies.
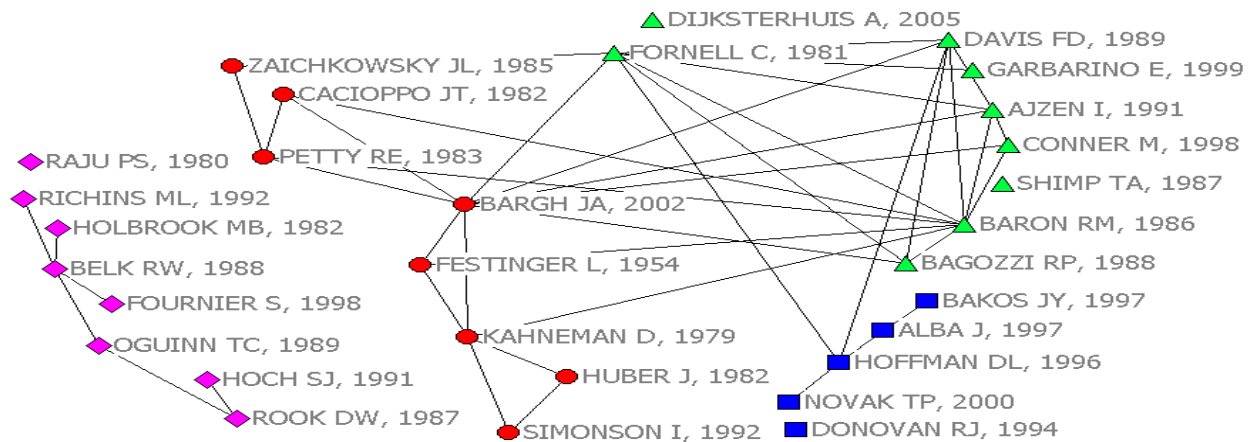
Figure 2. Core themes in consumer behavior research: 1999 to 2008 (frequency ≥ 50).

Factor analysis

In this study, factor analysis was used to examine the interrelationships among the original variables through the creation of some derived variables or factors (Ding et al., 1999). In addition, factor analysis was performed using the same program for the purpose of mapping the intellectual structure of consumer behavior studies and determining the common links between authors. As stated previously, the top 30 key-authors were then selected. Tables 1 and 2 illustrated their respective contribution in the central columns with subtotal frequency cited by source sample. In order to observe the changes in citation patterns (field dynamics) of consumer behavior studies, this study divided a raw 30 × 30 co-citation matrix into two time periods (from 1989 to 1998 and from 1999 to 2008). In Figures 1 and 2, each key-node (frequency ≥ 20 and frequency ≥ 50 respectively) represented a key-author and his/her representative work. Moreover, the corresponding colors and shapes of the nodes in both Figures 1 and 2 represented authors that are in the same clusters (Tables 3 and 4), which means that their previous studies focused on the same areas in the field of consumer behavior. The line was drawn between any two key-nodes in accordance with the co-citation frequency of any two authors depending on the publications.

Factor analysis of authors from 1989 to 1998

A principal component analysis with a varimax rotation was used to factor factor analyze the matrix of raw co-citation counts. Table 3 showed the results of factor analysis for consumer behavior studies from 1989 to 1998. Festinger, Howard, Fenigstein, Becker and Kahneman seem to represent the old interests of the consumer behavior discipline. Several newer key-nodes

including Dijksterhuis, Bargh, Novak, Garbarino, Fournier and Conner were becoming highly co-cited. For the first decade, J.C. Anderson, Fornell and Bentler were the most prominent, and for the second decade Fornell and Bagozzi were heavily co-cited with each other. Novak and Hoffman, Huber and Simonson were heavily co-cited but little linked with other key nodes, which indicated that they tend to work alone. Comparing the knowledge network of consumer behavior maps (Figures 1 and 2), it was clear that there were four key-nodes; J.C. Anderson and Fornell emerged with a frequency of co-citation larger than 859, whereas Fornell and Bagozzi emerged with a frequency of co-citation larger than 403 in the past two decades. The links between the key-nodes represented the frequency of the two authors' co-citations. As Figures 1 and 2 showed, the linkages of the key-nodes of the authors Zeithaml, Fornell, Baron, Oliver and J.C. Anderson were interwoven densely. In the second ten-year period, the linkages of Bargh, Fornell, Baron and F.D. Davis were interwoven more densely.

After performing the factor analysis, there were four clusters of consumer behavior studies dominating this field in the first decade (Table 3). Regarding the first and the most dominant research factor in consumer behavior studies, Howard and Sheth (1969) presents the idea of a consumer's choice is limited to a small number of brands. It implies that the composition of the evoked set is decided over time as consumers become aware of and then classify brands into different sets. In fact, people are more aware of consumers' product dissatisfaction and how consumers will respond to product failure. Folkes (1984) discusses the attribution theory, which views people as rational information processors whose actions are influenced by their causal inferences. Frequently, the reaction of customer response to the failed product is that they will do one of the following: ask for a refund or exchange for the product; get angry and ask for an apology from the manufacturer; spread the bad

Table 3. The top 30 lead authors factor loadings: 1989 to 1998 (varimax rotation at 0.4 or higher).

Factor	Variance (%)
Factor 1: Consumer decision model, satisfaction, performance evaluations and dissatisfaction	24.40
Howard, J.A., 1969	0.923
Folkes, V.S., 1984	0.889
Churchill, G.A., 1982	0.885
Andresen, A.R., 1985	0.845
Singh, J., 1988	0.788
Gardner, M.P., 1985	0.647
Zeithaml, V.A., 1988	0.641
Oliver, R.L., 1980	0.543
Factor 2: Material objects, self-consciousness and compulsive consumer behavior	15.80
Wallendorf, M., 1988	0.971
Schouten, J.W., 1991	0.806
Hirschman, E.C., 1992	0.790
Thompson, C.J., 1989	0.585
Anderson, P.F., 1986	0.515
Factor 4: Socially conscious consumer, helping-behavior, and altruistic personality	3.30
Granzin, K.L., 1991	0.883
Factor 3: Price knowledge and search, point-of-purchase and brand choice	8.00
Dickson, P.R., 1990	0.881
Bucklin, R.E., 1992	0.872
Kamakura, W.A., 1989	0.733
Guadagni, P.M., 1983	0.607
Grazin, K.L., 1991	0.883

Table 4. The top 30 lead authors' factor loadings: 1999 to 2008 (Varimax rotation at 0.4 or higher).

Factor	Variance (%)
Factor 1: Interactive home shopping, electronic marketplace and hypermedia computer-mediated environments	19.40
Novak, T.P., 2000	0.870
Alba, J., 1997	0.814
Bakos, J. Y., 1997	0.711
Hoffman, D.J., 1996	0.505
Donovan, R.J., 1994	0.470
Factor 2: Consumption, brand personality and compulsive buying	13.20
Richins, M.L., 1986	0.863
Holbrook, M.B., 1982	0.806
Fournier, S., 1998	0.743
O'Guinn, T.C., 1989	0.576
Hoch, S.J., 1991	0.458
Raju, P.S., 1980	0.402
Factor 3: Prospect theory, social judgment and behavior, choice, brand and subliminal-influences	12.30
Huber J., 1982	0.771
Kahneman, D., 1979	0.718
Simonson, I., 1992	0.607
Festinger, L., 1954	0.589

Table 4. Cont.

Bargh, J.A., 2002	0.505
Factor 4: Structural equation model, technology acceptance model, service quality, consumer ethnocentrism, satisfaction and market-research	3.70
Bagozzi, R.P., 1988	0.855
Garbarino, E., 1999	0.836
Davis, F.D., 1989	0.595
Donovan, R.J., 1994	0.573
Shimp, T.A., 1987	0.557
Baron, R.M., 1986	0.450

experiences about this product in order to hurt the firm's business; or do nothing. According to attribution theory, the consumer will search for a reason why the product failed and try to come up with several explanations.

By taking the co-citation matrix and grouping the authors using factor analysis of the correlations between the entries, this study can determine which authors were grouped together as well as ascertaining their commonly shared elements. Performing a faction study of these authors' results in different shapes of the nodes, these methods seek to group elements in a network based on the sharing of common links to each other. These factions from the diagrams showed that research in consumer behavior concentrates on the interaction between the consumer decision model (CDM), health belief model (HBM), structural equation models (SEM), cognitive model and satisfaction, compulsive consumer behavior, price knowledge and search, altruistic personality, brand choices, self-consciousness and point-of-purchase stimuli, social comparison process theory, prospect theory, causal model, optimum stimulation level (OSL), the need for cognition scale (NCS), hedonic consumption, pursuit of fantasies, technology acceptance model (TAM), interactive home shopping and hypermedia computer-mediated environments, consumption, brand personality and compulsive buying, social judgment and behavior, subliminal - influences, consumer ethnocentrism and compulsive buying behavior.

In Factor 2, Belk (1988) discussed material possessions. Material possession attachment was considered "a multi-faceted property of the relationship between an individual or group of individuals and a specific material object that had been psychologically appropriated and singularized through person-object interaction" (Kleine and Baker, 2004). In Factor 3, Dickson and Sawyer (1990) found that only 47% of shoppers knew the price of the goods that they had just placed in their shopping cart. This type of research was based upon recall of price, and recall may not be an appropriate measure of consumers' price awareness. It implied that consumers were significantly better at stating whether the price they were shown was a high price, average price, or low price, than they were in accurately recalling the price for the item.

Kamakura and Russell (1989) developed an approach based on preference segmentation in which segment sizes and response parameters are obtained in a single estimation procedure. A consumer's brand choice probability was estimated as a mixture of segment-level probabilities weighted by segment shares; the segment probabilities then depend on segment-specific parameters. However, only the dimension of consumer brand choice was considered in the studies. Guadagni and Little's (1983) study integrated scanner panel data and conditional multinomial logit analysis, not only developing a highly accurate predictive and parsimonious model of future consumer choice behavior from the brand loyalty, size loyalty, presence/absence of store promotion, regular shelf price, and promotional price cuts, but also demonstrating the importance of detailed and complete household panel data for making predictions. In Factor 4, environmentally-concerned citizens were more knowledgeable about possible solutions to environmental problems (Granzin and Olsen, 1991), and "people who were more knowledgeable about environmental issues are more willing to pay a premium for green products" (Laroche et al., 2001).

In contrast, Figures 2 and 4 represented a different framework, and the findings take different directions from the previous ones. There were four major research factors in the second ten years, as well as certain shared similarities. Generally speaking, the core of research themes in the period 1999 to 2008 was related to interactive home shopping, brand marketing, compulsive consumer behavior, prospect theory, structural equation model and technology acceptance model.

Factor analysis of authors from 1999 to 2008

There were also four factors in the second decade. As shown in Table 4 and Factor 1, Novak et al. (2000) identified factors that make using the Web a compelling experience. The article finds, for example, that the degree to which the online experience was compelling can be defined, measured, and related well to particular

marketing variables. The article provided a model that conceptualizes flow on the Web as a cognitive state experienced during navigation. Alba et al. (1997) identified consumer characteristics in an online environment. Internet-based customization offers the consumer the benefits of product information and the convenience of shopping at home.

In Factor 2, Fournier (1998) posited that customers have relationships with their brands and that brands can be "relationship partners" for customers. She develops a "typology of consumer-brand relationship forms," in which she correlates certain types of human relationships with similar brand relationships (Fournier, 1998). O'Guinn and Faber (1989) indicated that people who buy compulsively are more likely to demonstrate compulsivity as a personality trait, have lower self-esteem, and are more prone to fantasy than more normal consumers. Their primary motivation appeared to be the psychological benefits derived from the buying process itself rather than from the possession of purchased objects. Consequences of compulsive buying included extreme levels of debt, anxiety and frustration, the subjective sense of loss of control, and domestic dissension. An interesting indication from O'Guinn and Faber (1989) study had shown that females are more likely than males to exhibit compulsive buying behavior. Hoch and Loewenstein (1991) presented a detailed discussion of compulsive and impulsive forms of consumer behavior. Their conceptualization focused on the interplay of willpower, desire for gratification, and self-control in regulating consumption. In Factor 3, Kahneman and Tversky (1979) described how people make choices in situations where they have to decide between alternatives that involve risk. This was known as the prospect theory. In Factor 4, Garbarino and Johnson (1999) used structural equation analysis to analyze the relationships of satisfaction, trust, and commitment to component satisfaction attitudes and future intentions for the customers of a New York off-Broadway repertory theater company. In the study, for the low relational customers such as the individual ticket buyers and occasional subscribers, the overall satisfaction is the primary mediating construct between the component attitudes and future intentions. For the high relational customers such as consistent subscribers, trust and commitment, rather than satisfaction, were the mediators between component attitudes and future intentions. Technology acceptance model (Davis et al., 1989) was one of the most widely examined models used to test the consumers' acceptance of new information technology, which was based on the theory of reasoned action (TRA, Ajzen and Feishbein, 1980). TAM developed a simplified model with explanations for the relationships between perceived ease of use (PEOU) and perceived usefulness and intentions in accepting new technologies.

The most influential scholars in the consumer behavior studies between 1989 and 2008 were grouped together.

Four factors were extracted from the data and together they explain over 51.50% of the variance in the correction matrix for the first ten years. As for the second ten years, four factors were extracted from the data and together they explain over 48.60% of the variance in the correlation matrix. Following the example of previous studies (White and Griffith, 1981; Culnan, 1986; Acedo, 2005), this study considered that a work should be included in a particular research trend when its loading is equal to or greater than 0.4 as shown in Tables 3 and 4. They tentatively assigned names to the factors on the basis of this study's interpretation of the authors with high associated loadings. There were no attempts to interpret the remaining factors on account of their relative small eigenvalue (< 1.004 and < 1.116). We tentatively assigned names to the factors on the basis of our own interpretation of the authors with high associated loading. The interpretation of the results of analysis in this study was that consumer behavior research is composed of several different sub-fields: CDM, satisfaction, performance evaluation, material objects, self-consciousness, compulsive buying behavior, price knowledge and search, socially conscious consumer, interactive home shopping, TAM, brand personality, social judgment and behavior, choice and brand subliminal-influence, structural equation model and consumer ethnocentrism.

Cluster analysis

A cluster analysis of co-citation data provided a clear visual representation of the proximity of an author to others and enables us to easily ascertain the closeness of one cluster to others (Subramani et al., 2006). As shown in Figures 3 and 4, the closeness of author points on the maps was algorithmically related to their similarity as perceived by citers. In this study, by taking the co-citation matrix and grouping the authors using a hierarchical tree cluster analysis of the frequency of co-citation between two authors, we could illustrate the goal of the tree clustering algorithm. The purpose of this algorithm was to join together objects (for example, the frequency of authors' co-citations) into successively larger clusters, using the measure of similarity. In Figure 3 and 4, on the left of the tree plot, it began with each object in a class by itself. The result was that the tree plot links more and more objects together and aggregates larger and larger clusters of increasingly dissimilar elements. At the end of this tree plot, all objects were joined together. In these plots, the horizontal axis denotes the linkage distance. Thus, for each node in the graph, a new cluster was formed and can read off the criterion distance at which the respective elements were linked together into a new single cluster.

In this study, the rule for grouping the highly-co-cited key-nodes was whether they co-cited the same document
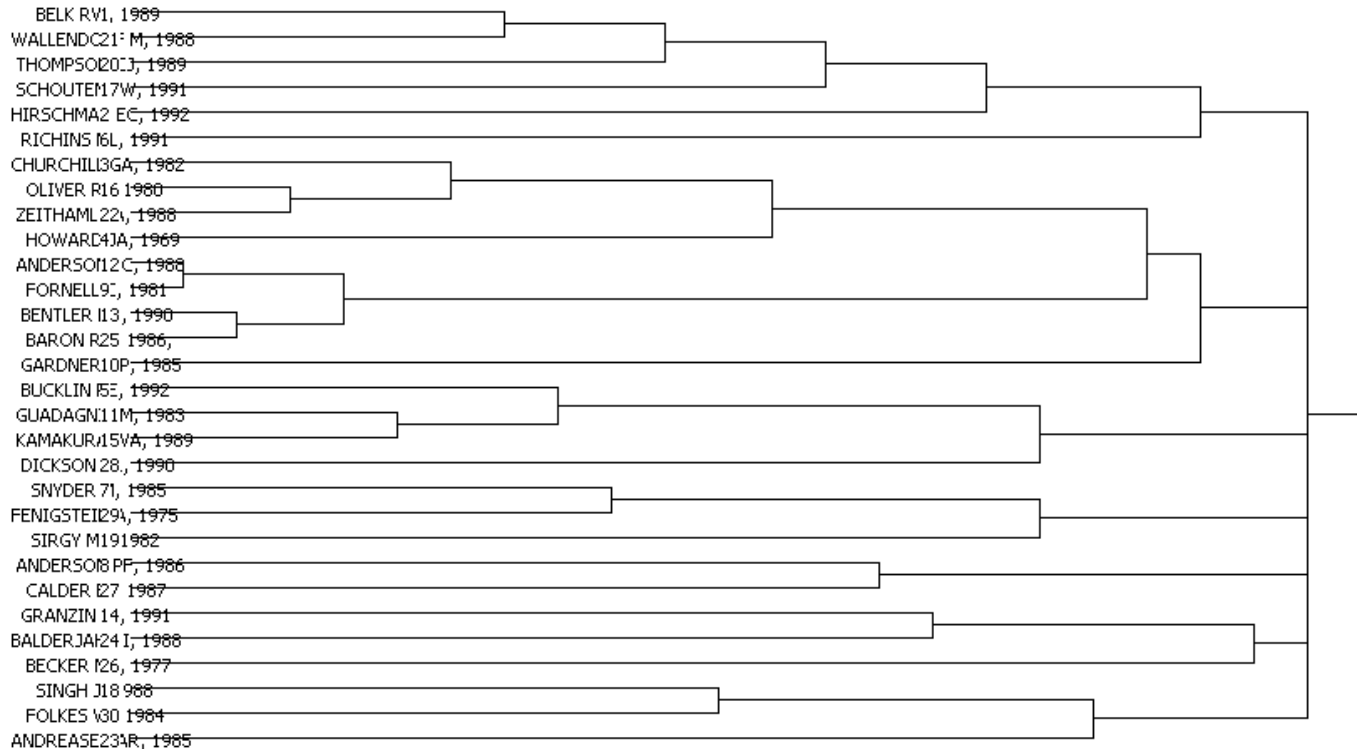
Figure 3. Core disciplines co-citation network of cited authors from cluster analysis in consumer behavior research: 1989 to 1998.
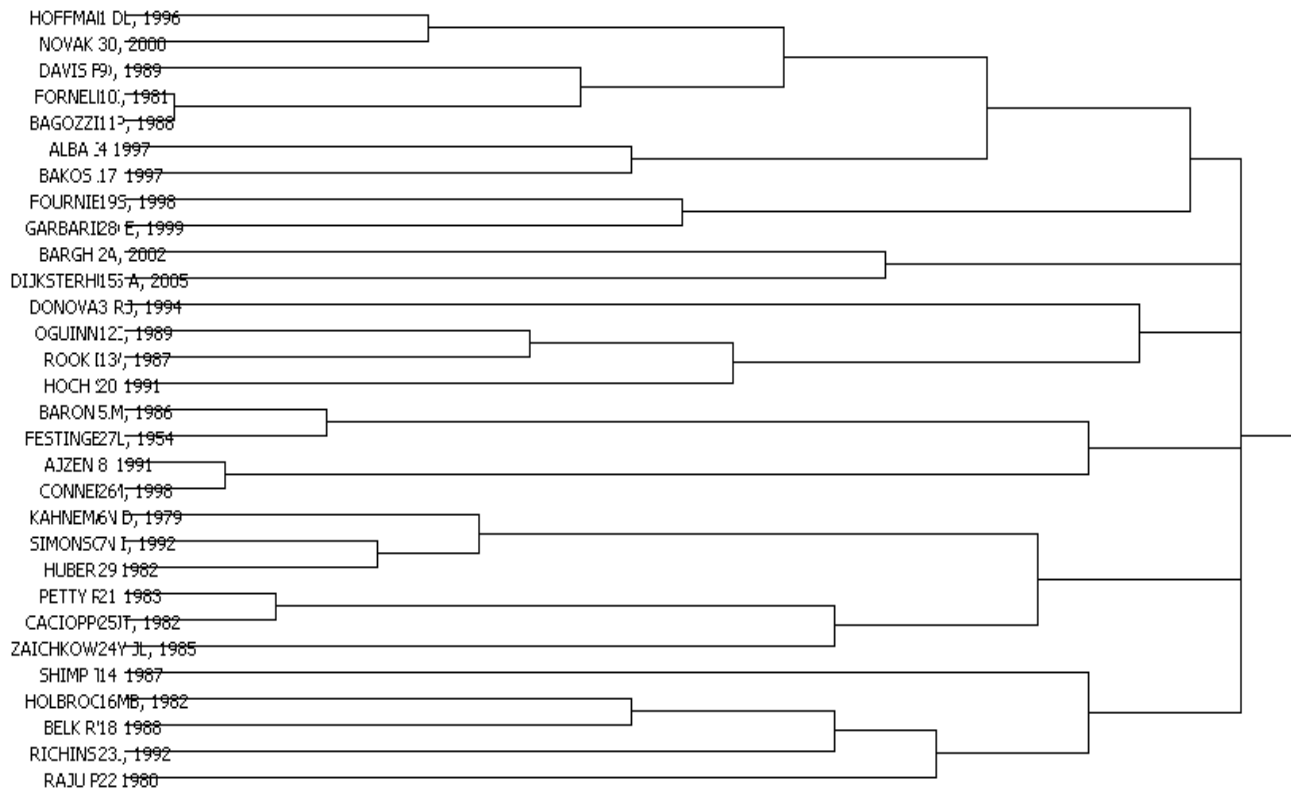

Figure 4. Core disciplines co-citation network of cited authors from cluster analysis in consumer behavior research: 1999 to 2008.
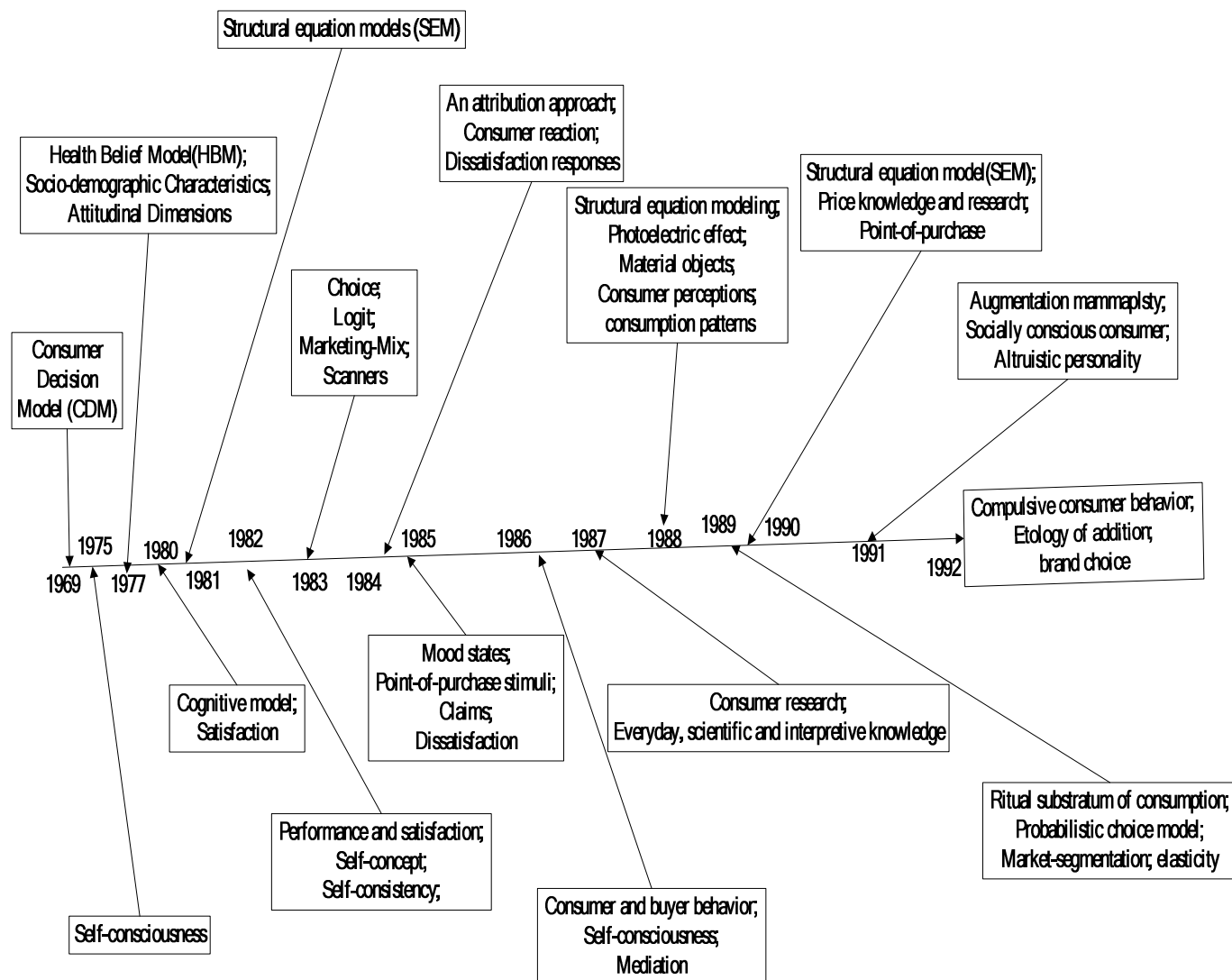
Figure 5. Research topics and keywords historical timeline of consumer behavior (1989 to 1998).

or not. These distances (similarities) could be based on a single dimension or multiple dimensions, with each dimension representing a rule or condition for grouping objects. In this study, to cluster highly-co-cited key-nodes, this was done by taking into account the number of frequency of two authors' co-citations they contain and by applying the complete linkage method. In this method, the distances between clusters were determined by the greatest distance between any two objects in the different clusters (that is, by the furthest neighbors). Since the co-citation frequency of the two authors Anderson (1988) and Fornell (1981) is 859 times, this was the highest number of frequency among all other authors. As Figures 3 and 4 also indicated, the shortest distance means that these two key nodes had the fastest links together in the tree plot, which means they were the most highly- cited key nodes and they shared the same similarities.

DISCUSSION

The historical timeline of research concepts, themes and methods provides a clear overview of the consumer behavior research path in the period from 1989 to 2008 (Figures 5 and 6). Comparing the past two decades' historical timeline of research, there are some significant changes from the first to the second ten years in consumer behavior studies. As shown in Figure 5, the majority of the research is focused on the consumer decision model (CDM), health belief model (HBM), cognitive model; structural equation model (SEM), performance and satisfaction, self-consciousness and compulsive consumer behavior, consumer and buyer behavior, point-of-purchase stimuli and mood states during the period 1989 to 1998. On the other hand, in Figure 6, the main knowledge network has changed;
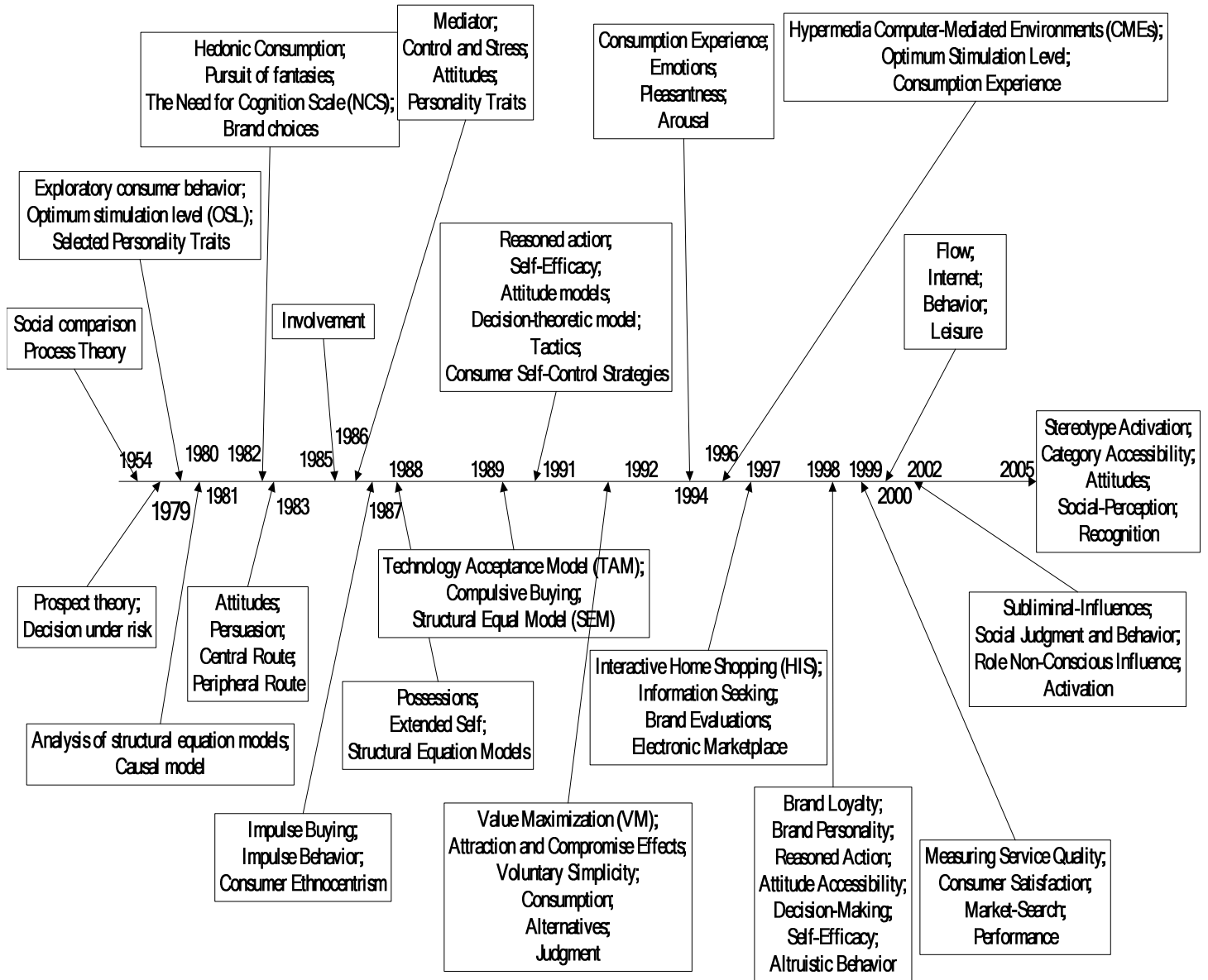
Figure 6. Research topics historical timeline of consumer behavior (1999 to 2008).

there is a predominance of social comparison process theory, prospect theory, exploratory consumer behavior, optimum stimulation level (OSL), causal model, pursuit of fantasies, hedonic consumption, the need for cognition scale (NCS), brand choices, technology acceptance model (TAM), value maximization (VM), hypermedia computer-mediated environments (CEMs), interactive home shopping (HIS), subliminal-influences, stereotype activation and consumer ethnocentrism during the period 1999 to 2008. The results of the research findings indicate that consumer behavior studies undergo a change over time.

Also, the map of most lead authors' geographic locations in the universal map will help researchers to know where the first author of the most influential 60 authors in this field was for the past two decades (Figure 7). It is easy to see that most of the leading authors live in the United States. The numbers on the map (Figure 7) listed below each state or country corresponds to the ID number column of Tables 1 and 2, which are ranking by the frequency of citations.

The ability to effectively identify the most influential and representative collection of research articles has become significantly important. This manuscript employs bibliometric tools and social network analysis methodology to fill a gap in the consumer behavior
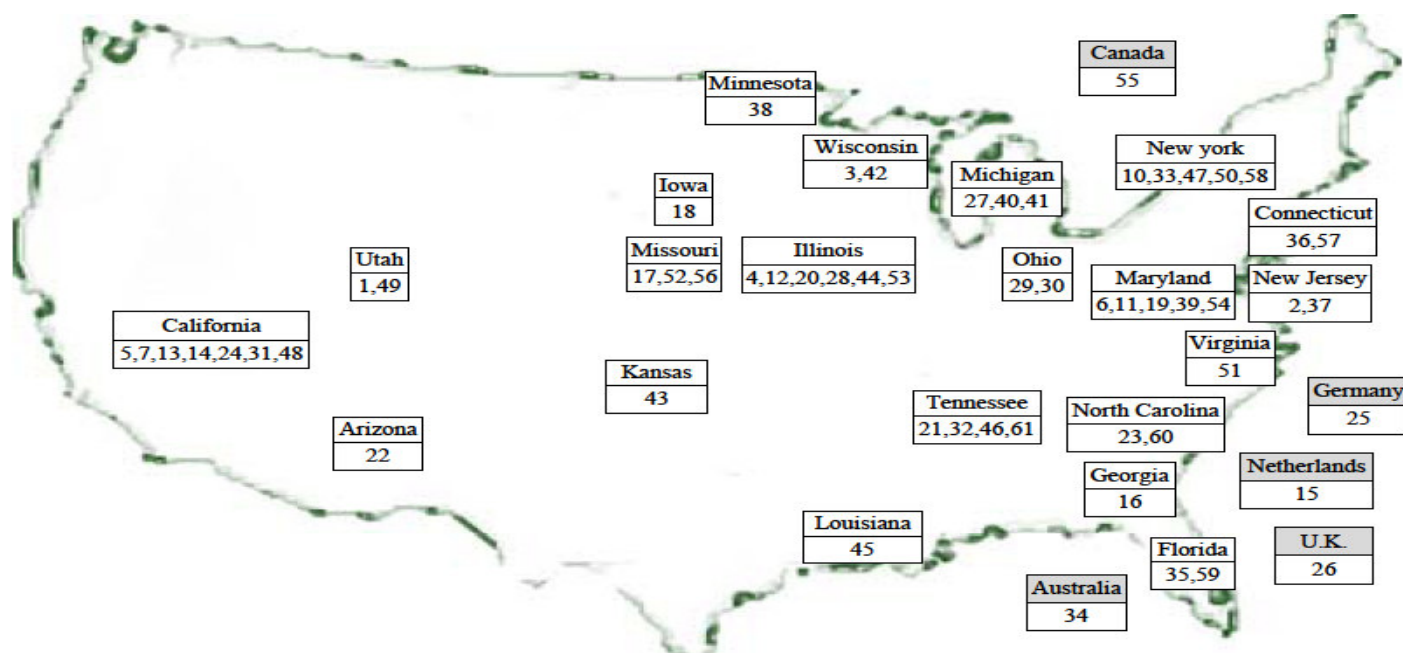
Figure 7. Geographic map of most cited authors' location in consumer behavior studies: 1989 to 2008.

development literatures by applying citation and co-citation analysis to the most influential and representative collection of research articles.

The author and journal listings can show new researchers where the core of the consumer behavior field resides, thus providing them with useful direction and reference. In this study, a comprehensive metho-dology was proposed for identifying and tracking changes in research interests. The proposed methodology can be applied to most academic discipline to help facilitate the investigation of literatures.

The significant distinction of the present study is the use of the author as the unit of analysis of the study instead of specific books or papers, because the contributions of an author are often spread over several papers and books rather than a single work. The foregoing discussion of the intellectual structure of consumer behavior and its trends and development will enable researchers and professionals to recognize the influential publications and researchers in this field. Moreover, this method provides researchers with a wide spectrum of inter-connected (web-like) nodes laden with concepts, and theories from which scholars and thinkers can begin their own exploration. Scholars and practitioners may contribute to furthering this frontier to advance the state of consumer behavior research, theory and practice. Ultimately, this research can serve to facilitate and expedite the process of identifying the influential works, authors and journals in a particular field. The results of this study complement and build upon the findings of other studies that have approached the subject from the qualitative perspective.

LIMITATIONS AND FUTURE RESEARCH DIRECTION

Although this research offers valuable insights into the intellectual structure of consumer behavior studies, it has some limitations. First, it is important to be as objective as possible in such a study, yet it is difficult to avoid some degree of subjectivity in choosing the number of authors to be included in this study. It is necessary for this research to make certain judgment calls to balance these contrasting considerations (McCain, 1990) and there thus, exists the possibility that the search criteria may be incomplete, and certain worthwhile papers may not have been included. Second, the generalization of this study may be affected because the selection of sample articles is limited to the period 1989 to 2008 and the phenomenon of self citation could not be excluded with the research method employed by this paper. Third, only the first authors are included in this study due to the way in which co-citation data is retrieved. The 60 authors included in this study were chosen because they were the most-cited lead authors; as a result, certain co-authors who have made significant contributions to the field may not have been included in this list (White, 1990). These limitations notwithstanding, author co-citation analysis is a useful methodology for studying the evolution of thought in a field, and it has found widespread applicability for this reason.

Future research combining citation analysis with content analysis is encouraged. Content analysis is a research tool used to determine the presence of particular words or concepts within texts or sets of texts and the combination of this tool with certain analysis

would enable researchers and practitioners arrive at a better understanding of consumer behavior studies.

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