

An application of co-word analysis and bibliometric maps for detecting the most highlighting themes in the consumer behaviour research from a longitudinal perspective

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Abstract This article presents an application of a bibliometric and visual study of the research carried out on a social science subfield, concretely the consumer behaviour research (CBR), from a longitudinal perspective (period 1966–2008). The study combines performance analysis and science mapping for detecting and visualizing conceptual subdomains. Quantitative and qualitative measures are used in order to identify the most prominent themes. Quantitative data are used to put together very related concepts (themes or clusters of topics), while qualitative indicators (as those based on citations) are used to measure the quality and/or impact of the detected themes. The study also uses bibliometric maps to show in a visual way the associations between the main concepts treated by the CBR community. The maps provide insight into the structure of the CBR, visualize the division of the field into several subfields, and indicate the relationships between these subfields. Co-word analysis is the bibliometric technique used to identify the main themes. All this allows us to quantify and visualize the thematic evolution of the CBR. It also helps to both experts and novices to understand the current state of the art of the CBR and to predict where future research could lead.

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1 Introduction

The consolidation of consumer behavioural studies as an autonomous and independent discipline is a phenomenon of sixties, so it is a relatively new field of study. Most of the consumer studies prior to the 1950s were carried out by private companies using motivation techniques in order to judge the efficacy of their decision making in the market. Later, in the fifties, consumer research began to focus on the individual, having a marked formative character. The models and results from the field of social-psychology emerged as the most significant (e.g. [Katona and Mueller 1954](#); [Lazarsfeld et al. 1948](#)). Nevertheless it was not until the sixties when a notable change took place and consumer behaviour began to be studied as such, marking the beginning of this discipline. It was at this time that the field began to intensely and incessantly expand largely thanks to the influence of many distinct perspectives.

Thenceforth, marketing research and management practices have been in a state of constant evolution, due to factors such as market globalization, environmental turbulence, demographic growth, consumer education, and Information and Communication Technologies ([Echchakoui and Mathieu 2008](#)). However, despite the rapid development of the field, there are still significant disagreements about what consumer research is, what its objectives are, and how it should differ from related disciplines ([Simonson et al. 2001](#)).

In Hoffman and Holbrook words', "research in consumer behaviour depends for its life-blood on the flow of information through the publications of people working in the field. The imprint of the process wherein this circulatory system nourishes the intellectual growth of the discipline appears in the evidence and documentation left by the network of references and citations that trace the underlying paths of ideas" ([Hoffman and Holbrook 1993](#)). Therefore, it is necessary to review and organize the entire body of knowledge and distinct disciplines that influence this field, an exercise which requires an open mind to look beyond one's own area of expertise and recognize the existence and validity of other specialities.

In the last 40 years, there have been numerous studies which have tried to forecast, order and classify consumer behaviour such as those by [Val'tukh \(1975\)](#), [Helgeson et al. \(1984\)](#), [Cohen and Chakravarti \(1990\)](#), [Tybout and Artz \(1994\)](#), [Jacoby et al. \(1998\)](#) and [Simonson et al. \(2001\)](#). Nevertheless, most of this research suffered from the same problem: it was all based upon specific publications in Marketing, with some reference to Psychology publications. Indeed, marketing journals have traditionally incorporated a high proportion of references from other disciplinary areas ([Bettencourt and Houston 2001](#); [Phillips et al. 1999](#); [Tellis et al. 1999](#)). Some studies have been concerned with the interdisciplinary relationships between consumer behaviour and other business disciplines, whereas other studies are more concerned with assessing connections to various non-business disciplines such as psychology, economics and sociology ([Sivadas and Johnson 2005](#)).

Specifically, the aim of this article is to present the first bibliometric study (including both content and citation analysis) of the consumer behaviour research (CBR). The study combines performance analysis and science mapping ([Cobo et al. 2011a](#); [Noyonsyons et al. 1999](#); [van Raan 2005](#)) for detecting and visualizing conceptual subdomains. Quantitative and qualitative measures are used in order to identify the most prominent themes. Quantitative data are used to put together very related concepts (themes or clusters of topics), while qualitative indicators (as those based on citations) are used to measure the quality and/or impact

of the detected themes. The study also incorporates bibliometric maps to show, in a visual way, the associations between the main concepts treated by the CBR community.

It uses bibliometric data based on co-word analysis to examine the intellectual structure of CBR on the basis of the main publications about this topic from 1966 to 2008.

Keyword analysis is a kind of content analysis that uses quantitative description to analyze the content of scientific or other types of articles (Berelson 1952; Kassarjian 1977). This method has also been used to ascertain trends (Yale and Gilly 1988; Roznowski 2003; Cho and Khang 2006; Williams and Plouffe 2007) and to identify topics and preferred statistical approaches (Helgeson et al. 1984) in different research fields. So, in our analysis, the bibliometric maps are created by co-word analysis, which is a content analysis technique that is effective in mapping the strength of association between information items in textual data (Callon et al. 1983, 1991; Coulter et al. 1998; Whittaker 1989). It is a powerful technique for discovering and describing the interactions between different fields in scientific research (Callon et al. 1991; Bailón-Moreno et al. 2006; Leydesdorff and Zhou 2008; López-Herrera et al. 2009, 2010; Viedma-del-Jesus et al. 2011; Zhang et al. 2008). Co-word analysis reduces a space of descriptors (or keywords) to a set of network graphs that effectively illustrate the strongest associations between descriptors (Coulter et al. 1998).

Since domain visualizations typically reference key works in a field, they are a good tool to enable the novice to become instantly familiar with a field through easy identification of key topics and their relationships (Garfield 1994, p. 1). In this sense, McCain (1990) suggests that “maps can provide a general historical view of the intellectual structure of a research area” and White (1990) asserts that there is “nothing better for reconnoitring macro-level intellectual structure as it evolves in fields of science and scholarship...the maps are essentially a new kind of graphics for revealing intertextual relationships”. We think the obtained maps will provide a new insight into the structure of the consumer behaviour field, showing the division of the field into several subfields and the relationships between these subfields. More concretely, in longitudinal mapping a series of chronologically sequential maps can be used to detect the advances of scientific knowledge and the evolution of the field over the years (Garfield 1994). While maps of current data alone cannot predict where research will go, longitudinal maps can be useful clues for informed analysts and domain experts with the intention of forecasting emerging trends for a subject domain (Mela et al. 1999).

The way in which the consumer behaviour field has evolved is also studied through a quantitative and qualitative analysis of the number of times researchers use and cite specific concepts in their papers along different periods (1966–1998, 1999–2003 and 2004–2008).

This article is organized as follows: Sect. 2 introduces the analysis methodology, Sect. 3 describes the data set used in this study, Sect. 4 describes the achieved results and, finally, some conclusions and contributions are drawn.

2 Methodology

In this article, we use the bibliometric approach proposed by Cobo et al. (2011a). This bibliometric approach combines both performance analysis tools and science mapping tools to analyze a research field, for detecting and visualizing its conceptual subdomains (particular topics/themes or general thematic areas) and its thematic evolution.

Co-word analysis is used in a longitudinal framework which allows us to analyze and track the evolution of a research field along consecutive time periods (Garfield 1994). Additionally, it develops a performance analysis of specific themes using different basic bibliometric indicators. Three of the four phases proposed in Cobo et al. (2011a) are used in this article:

- (1) To detect the research themes. To do so, firstly we have to compute the co-occurrence matrix by assuming that the co-occurrence frequency of two keywords is extracted from the corpus of documents by counting the number of documents in which the two keywords appear together. Secondly, we have to compute the equivalence index among keywords (Callon et al. 1991), called e_{ij} : $e_{ij} = \frac{c_{ij}^2}{c_i \cdot c_j}$, where c_{ij} is the number of documents in which two keywords i and j co-occur and c_i and c_j represent the number of documents in which each one appears. At the end of this phase, we cluster keywords to topics/themes by using the simple centers algorithm (Coulter et al. 1998; Cobo et al. 2011a), which automatically returns labelled clusters, so a post-process to label the clusters is not needed. With such process of clustering we locate keyword networks that are strongly linked to each other and which correspond to interest centers or to research problems that are the object of significant investment by researchers.
- (2) To build strategic diagrams. In the clustering process we obtain a set of interconnected networks or themes. Then, in this context each keyword network or theme can be characterized by two parameters (Callon et al. 1991):
 - Centrality: It measures the degree of interaction of a network with other networks and it can be defined as: $c = 10 \cdot \sum e_{kh}$, with k a keyword belonging to the theme and h a keyword belonging to other themes. Centrality measures the strength of external ties to other themes. We can understand this value as a measure of the importance of a theme in the development of the entire research field analyzed.
 - Density: It measures the internal strength of the network and it can be defined as: $d = 100 \cdot \frac{\sum e_{ij}}{w}$, with i and j keywords belonging to the theme and w the number of keywords in the theme. Density measures the strength of internal ties among all keywords describing the research theme. This value can be understood as a measure of the theme's *development*.

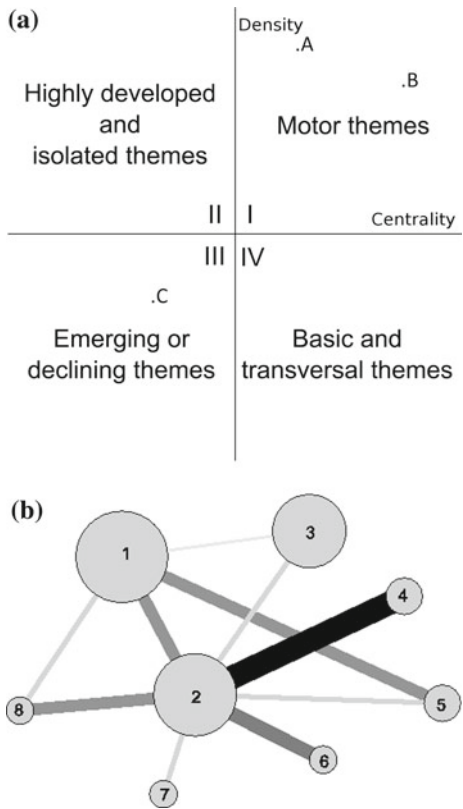
In this context, *Isolated Networks* are those that have low centrality values. *Principal Networks* are those that have high centrality and high density values (for more detail see Callon et al. 1991).

A Strategic Diagram is a two-dimensional space built by plotting themes according to their centrality rank (c_r) and density rank (d_r), calculated as: $c_r = \frac{rank_i^c}{N}$; $d_r = \frac{rank_i^d}{N}$, where $rank_i^c$ is the position of the theme i in the themes list in ascending sort of centrality, and is the position of the theme i in the themes list in ascending sort of density. N is the number of themes in the whole network, and is introduced to standardize the c_r and d_r values to the range $[0,1]$.

As an example, in Fig. 1b a strategic diagram is presented. Thus, with both parameters a research field can be understood to be a set of research themes, mapped in a two-dimensional space and classified into four groups (Callon et al. 1991):

- Themes in the upper-right quadrant are both well developed and important for the structuring of a research field. They are known as the motor-themes of the specialty given that they present strong centrality and high density.
- Themes in the upper-left quadrant have well developed internal ties but unimportant external ties and so are of only marginal importance for the field. These themes are very specialized and peripheral in character.
- Themes in the lower-left quadrant are both weakly developed and marginal. The themes of this quadrant have low density and low centrality, mainly representing either emerging or disappearing themes.

Fig. 1 **a** Quadrants in a strategic diagram and an example. **b** An example of a thematic network



- Themes in the lower-right quadrant are important for a research field but are not developed. So, this quadrant groups transversal and general, basic themes.

In a theme, the keywords and their interconnections draw a network graph, called a thematic network. Each thematic network is labelled using the name of the most significant keyword in the associated theme (usually identified by the most central keyword of the theme). An example of a thematic network is drawn in Fig. 1b. Here, several keywords are interconnected, where the volume of the spheres is proportional to the number of documents corresponding to each keyword, the thickness of the link between two spheres i and j is proportional to the equivalence index e_{ij} . Together with the whole network of interconnected themes and keywords a second network is built, based on the documents linked to each thematic network. A document is linked to a theme if it has at least two keywords presented in the thematic network.

Furthermore, the strategic diagrams can be enriched by adding a third dimension in order to show more information. So, for example, the themes can be represented as a sphere, its volume being proportional to different quantitative (or qualitative) data, as for example the number of documents associated with the theme or the number of citations received of the documents associated with the theme.

- 3) To carry out a performance analysis we can measure (quantitatively and qualitatively) the relative contribution of themes and thematic areas to the whole research field, detecting the most prominent, productive and highest-impact subfields. To do so, we use the

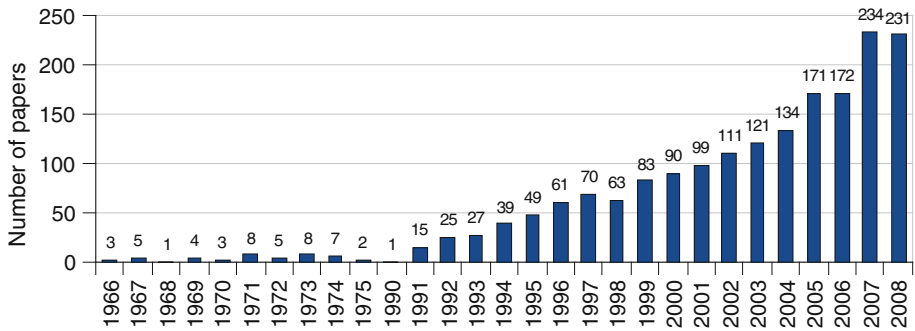


Fig. 2 Number of papers in ISIWoS from 1966 to 2008

following bibliometric indicators applied on the different detected themes: the number of published documents and the number of received citations.

We should point out that the co-word analysis is done with the software CoPalRed (Cobo et al. 2011b; EC³ 2006; López-Herrera et al. 2009). CoPalRed is based on the simple center algorithm to detect the themes through different subperiods of years. The plotting of the themes in the strategic diagram, the drawing of the thematic networks were made with specific ad-hoc software.

3 Data sets

In this article, the data set used consists of a corpus containing 1,842 papers about CBR extracted from ISI Web of Science (ISIWoS 2011) with the query #1 on 10th December 2008

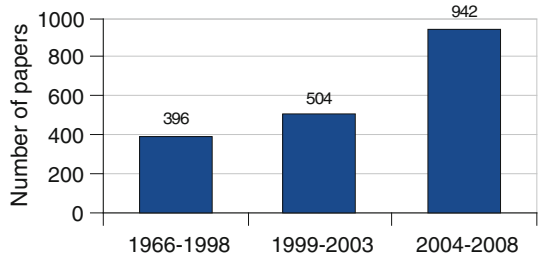
query #1: TS = (“consumer behaviour”) OR TS = (“consumer behavior”), where TS field is a search based on the “Topic”.

In Fig. 2, the number of papers in ISIWoS from 1966 to 2008 is shown.

Due to the data have been downloaded from the ISIWoS, the author-provided keywords and the Keywords Plus of the documents are jointly used. A normalization process is carried out prior to this over the keywords, where the plural and singular forms of the keywords are joined. The acronyms are also joined with the respective keywords.

Selecting specific periods of time is useful, because otherwise emerging topics and relationships might appear insignificant in the context of a broader time frame compared to topics that have been researched extensively in the past but are less prevalent today (Echchakoui and Mathieu 2008). Consequently, the last period should afford a more accurate indication of future trends than would a study covering a longer period but bringing out trends that are probably on the decline.

Thus, three sets of data were collected, with one set corresponding to each period: 1966–1998, 1999–2003 and 2004–2008. In addition, in co-word analysis, in a longitudinal study, the first period studied is usually the longest lasting one in order to get a representative number of published papers. For this reason, in this article, the first period studied includes 33 years and the other two periods just 5 years. In this way, separate bibliometric maps can be constructed for each one of these three periods. The number of papers per period is shown in Fig. 3.

Fig. 3 Number of papers per periods

In this study the citations of the documents are also used. We have considered for each paper the citations received until December, 22nd 2009. The citations that we take into account proceed from the ISIWoS.

4 Results of the application: evolution of the consumer behaviour based research

In order to analyze the conceptual evolution of the most recurring themes discussed by the CBR community, two kinds of strategic diagrams are presented for each period studied. In the first kind of strategic diagram, the volume of the spheres is proportional to the number of published documents associated with each theme. On the other hand, in the second kind of strategic diagram, the volume of spheres is proportional to the number of citations of the published documents corresponding to each theme.

This section is structured as follows:

- In Sects. 4.1, 4.2 and 4.3 the three periods included in this article are analysed deeply, showing their strategic diagrams and describing their principal themes.
- In Sect. 4.4 the most important themes from all the periods studied are analyzed, showing their associated thematic networks.

4.1 Analysis of the period 1966–1998

In this period, the longest one, a total of 396 documents were published by the CBR community. In order to analyse this period in a conceptual way, two strategic diagrams are shown in Fig. 4. In Fig. 4a, the volume of spheres is proportional to the number of documents published for the corresponding theme. Similarly, in Fig. 4b, the volume of the spheres is proportional to the number of citations in the published documents for each theme.

Because of their strategic situation (upper-right quadrant), with high centrality and density, the themes JUDGMENTS (with 15 papers), BACKGROUND-MUSIC (7 papers) and WOMEN (6 papers) were presumed to be conceptually developed, that is, they were considered *motor-themes* of the field in that period (see Fig. 4a). The theme PERCEPTIONS (8) was the most *general basic theme* (lower-right quadrant), but was not as internally developed as the previous themes. The themes MODELLING (19) and PSYCHOLOGY (5) were two *very specialized* themes and peripheral in character (upper-left quadrant).

Taking into account the number of citations, the *motor-theme* JUDGMENTS (533 citations) was the most cited theme, MODELLING (394) was the second one, and PSYCHOLOGY (316) was the third one (see Fig. 4b).

In Table 1, quantitative data for each theme of this period are shown. This data includes the number of associated documents, the number of citations for these documents, and the

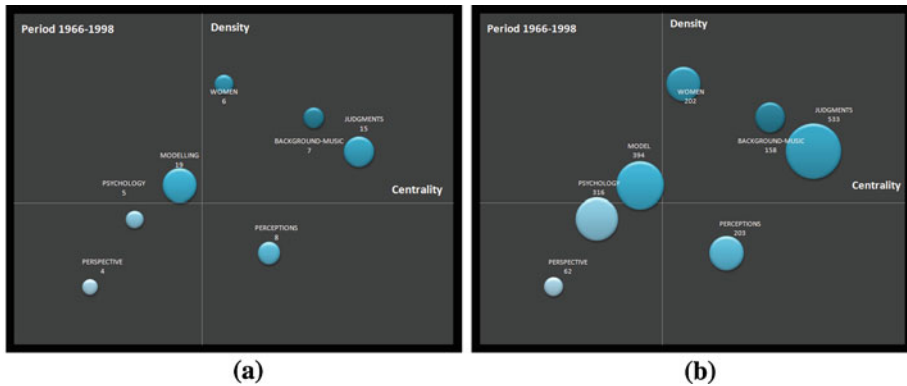


Fig. 4 Strategic diagrams for the period 1966–1998. **a** Strategic diagram based on published documents and **b** strategic diagram based on times cited

Table 1 Quantitative data for the themes of the period 1966–1998

Theme	Papers	Citations	Average of citations
PSYCHOLOGY	5	316	63.20
JUDGMENTS	15	533	35.53
WOMEN	6	202	33.67
PERCEPTIONS	8	203	25.38
BACKGROUND-MUSIC	7	158	22.57
MODELLING	19	394	20.74
PERSPECTIVE	4	62	15.50

average of citations received. In it, we can see PSYCHOLOGY (with 63.20 citations/paper) was the theme with the most impact in those years.

4.2 Analysis of the period 1999–2003

From 1999 to 2003, 504 papers were published by the CBR community. In those years, the number of topics was enlarged, and a bigger set of different themes was observed by CoPalRed.

In order to analyse this period in a conceptual way, two strategic diagrams are shown in Fig. 5, with respective Fig. 5a and b.

The most heavily studied themes or concepts, in relative weight in number of published papers, were MODELLING (45 papers), INTERNET-WEB (43 papers), PREFERENCES (33 papers) and PERCEPTIONS (29 papers). All of them were strategically located in the right quadrants (with high centrality indexes) of the strategic diagram, that is, they were also related externally to concepts applicable to other themes. Other important themes, in relative weight in number of papers, were EXPERIENCE (24 papers), ATTITUDES (22 papers) and PRODUCT (21 papers) (see Fig. 5a).

In this period, INTERNET-WEB, INFORMATION-TECHNOLOGY, BACKGROUND-MUSIC, CONSUMER-SATISFACTION and INTERNATIONAL-MARKETING were considered as *motor-themes*, whereas PERCEPTIONS, PREFERENCES, ATTITUDES and ADVERTISING were considered the most *general basic themes*.

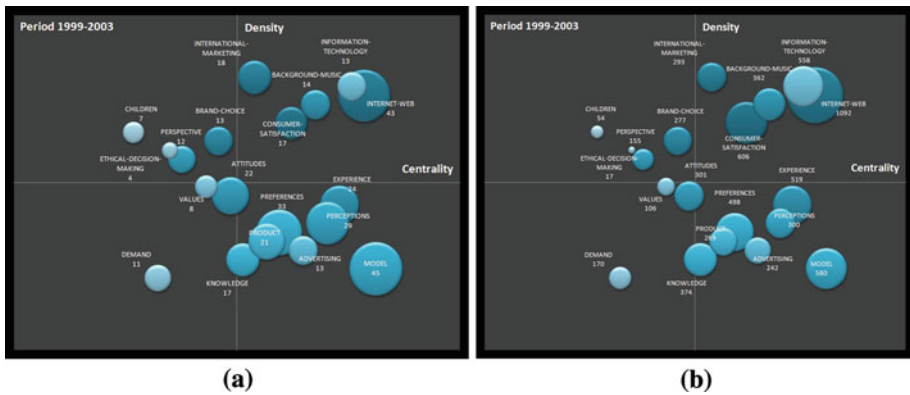


Fig. 5 Strategic diagrams for the period 1999–2003. **a** Strategic diagram based on number of published documents and **b** strategic diagram based on times cited

Table 2 Quantitative data for the themes of the period 1999–2003

Theme	Papers	Citations	Average of citations
INFORMATION-TECHNOLOGY	13	558	42.92
CONSUMER-SATISFACTION	17	606	35.65
BACKGROUND-MUSIC	14	362	25.86
INTERNET-WEB	43	1092	25.40
KNOWLEDGE	17	374	22.00
EXPERIENCE	24	519	21.63
BRAND-CHOICE	13	277	21.31
ADVERTISING	13	242	18.62
INTERNATIONAL-MARKETING	18	293	16.28
DEMAND	11	170	15.45
PREFERENCES	33	498	15.09
ATTITUDES	22	301	13.68
VALUES	8	106	13.25
PERSPECTIVE	12	155	12.92
MODELLING	45	580	12.89
PRODUCT	21	269	12.81
PERCEPTIONS	29	300	10.34
CHILDREN	7	54	7.71
ETHICAL-DECISION-MAKING	4	17	4.25

Taking into account the average number of citations received, INFORMATION-TECHNOLOGY (42.92 citations/paper), CONSUMER-SATISFACTION (35.65 citations/paper), BACKGROUND-MUSIC (25.86 citations/paper) and INTERNET-WEB (25.40 citations/paper) were the four themes with the most impact discussed by the CBR community in those years.

In Table 2, more quantitative data for each theme in this period is shown.

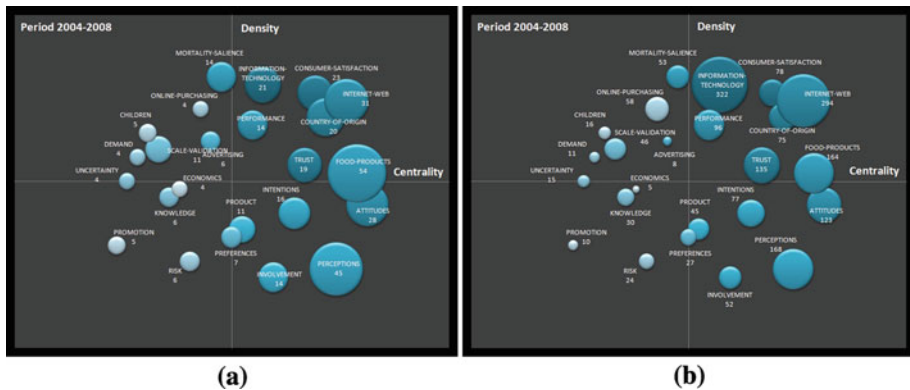


Fig. 6 Strategic diagrams for the period 2004–2008. **a** Strategic diagram based on number of published documents and **b** strategic diagram based on times cited

4.3 Analysis of the period 2004–2008

In the last five years studied (2004–2008), there was a significant increase in the number of papers published (942 papers). In order to analyse this subperiod in a conceptual way, two strategic diagrams are shown in Fig. 6, with respective Fig. 6a and b.

The main detected themes by CoPalRed, in number of published papers, were FOOD-PRODUCTS (54 papers), PERCEPTIONS (45 papers), INTERNET-WEB (31 papers), ATTITUDES (24 papers) and CONSUMER-SATISFACTION (23 papers). Other important themes, in relative weight in number of papers, were INFORMATION-TECHNOLOGY (21 papers), COUNTRY-OF-ORIGIN (20 papers) and TRUST (19 papers) (see Fig. 6a). All of them were located in the right quadrants (with high centrality) of the strategic diagram, that is, they were related externally to concepts applicable to other themes.

With respect to the average number of citations received, INFORMATION-TECHNOLOGY (15.33 citations/paper), ONLINE-PURCHASING (14.50 citations/paper) and INTERNET-WEB (9.48 citations/paper) were the three themes with the most impact discussed by the CBR community in this last lustrum.

In Table 3, more quantitative data for each theme of this last period are shown.

4.4 Analysis of the most frequent themes

Only the thematic networks of the most frequent themes are shown in Table 4. With these thematic networks, the relations among keywords and themes for each relevant period are shown. So, one can appreciate several conclusions in the evolution of the most prevalent themes identified by the CBR community.

In these thematic networks, the volume of the spheres is proportional to the number of papers corresponding to each keyword and the thickness of the link between two spheres i and j is proportional to the equivalence index e_{ij} .

- Because of its strategic position (lower-right quadrant), the theme ATTITUDES was considered a *basic theme* (with high centrality and low density) in the second period analyzed (1999–2003), and it remains in the same quadrant for the last period (2004–2008), although increasing its centrality index and its number of associated papers. This theme was originally associated with keywords as *intentions*, *human-values* and *product-quality*

Table 3 Quantitative data for the themes of the period 2004–2008

Theme	Papers	Citations	Average of citations
INFORMATION-TECHNOLOGY	21	322	15.33
ONLINE-PURCHASING	4	58	14.50
INTERNET-WEB	31	294	9.48
TRUST	19	135	7.11
PERFORMANCE	14	96	6.86
KNOWLEDGE	6	30	5.00
INTENTIONS	16	77	4.81
ATTITUDES	28	123	4.39
SCALE-VALIDATION	11	46	4.18
PRODUCT	11	45	4.09
RISK	6	24	4.00
PREFERENCES	7	27	3.86
MORTALITY-SALIENCE	14	53	3.79
COUNTRY-OF-ORIGIN	20	75	3.75
UNCERTAINTY	4	15	3.75
PERCEPTIONS	45	168	3.73
INVOLVEMENT	14	52	3.71
CONSUMER-SATISFACTION	23	78	3.39
CHILDREN	5	16	3.20
FOOD-PRODUCTS	54	164	3.04
DEMAND	4	11	2.75
PROMOTION	5	10	2.00
ADVERTISING	6	8	1.33
ECONOMICS	4	5	1.25

Table 4 Selected themes for a deeper analysis

Theme	1966–1998	1999–2003	2004–2008
ATTITUDES		Basic-theme	Basic-theme
BACKGROUND-MUSIC	Motor-theme	Motor-theme	
CONSUMER-SATISFACTION		Motor-theme	Motor-theme
INFORMATION-TECHNOLOGY		Motor-theme	Motor-theme
INTERNET-WEB		Motor-theme	Motor-theme
MODELLING	Peripheral-theme	Basic-theme	
PERCEPTIONS		Basic-theme	Basic-theme
PREFERENCES		Basic-theme	Basic-theme

in the period 1999–2003; and, it was related with keywords as *beliefs, planned-behaviour* and *foreign-products* in the last period (2004–2008) (see thematic networks in Fig. 7a, b).

- Due to the strategic position of the theme BACKGROUND-MUSIC in the first two periods (1966–1998 and 1999–2003), it was a *motor-theme* (with high centrality and density). This theme was also a highly cited theme (see data in Tables 2 and 3). In the first period (1966–1998), as seen in Fig. 8a, it was related to the topics: *mood,*

- emotions* and *preferences*, among others. From 1999 to 2003, BACKGROUND-MUSIC was mainly associated with *emotions*, *physical-surrounding* and *marketing* (see Fig. 8b).
- In virtue of its strategic position, the theme CONSUMER-SATISFACTION was considered a *motor-theme* in the last two periods analyzed in this article (1999–2003 and 2004–2008). In the period from 1999–2003, this theme was related to other keywords such as: *consequences*, *expectation* and *consumption-emotion* (Fig. 9a). And in the last five years, it was related to the keywords *quality*, *consequences*, *loyalty* and *attribution*, among others (see Fig. 9b).
 - INFORMATION-TECHNOLOGY appeared during the periods 1999–2003 and 2004–2008 as a *motor theme*, and its number of associated papers greatly increased in the last five years. From 1999–2003, this theme was related to keywords such as *Technology-Acceptance-Model* and *user-acceptance*, among others. In the last five years (2004–2008), it was related to these same keywords and others such as *perceived-usefulness* and *self-efficacy* (see Fig. 10a, b).
 - The theme INTERNET-WEB appeared during the period 1999–2003 as a *motor-theme* (with high centrality and density). It has become one of the most studied themes by the CBR community, with 43 published papers from 1999–2003, and with 31 published papers from 2004–2008. This theme was originally associated with keywords such as *online*, *e-commerce* and *shopping*, in the period from 1999–2003 (see Fig. 11a), and related to *technology*, *information-technology-usage* and *user-interface and usability*, from 2004 to 2008 (see Fig. 11b).
 - Owing to its strategic position, the theme MODELLING was considered a *peripheral-theme* (low centrality and high density) in the period 1966–1998. However, this theme changed its strategic position and became a *basic theme* during the next five years (from 1999–2003). This theme was originally associated with keywords such as *demand*, *choice*, *product* and *price* (see Fig. 12a). However, from 1999–2003 it was associated with the keywords *behaviour*, *decision*, *recall* and *reasoned-action*, among others (Fig. 12b).
 - The themes PERCEPTIONS and PREFERENCES were considered *general basic themes*, being located in the lower right quadrant both from 1999–2003 and from 2004–2008. However, while the theme PREFERENCES has reduced the number of associated papers in the latter period, the theme PERCEPTIONS (45 papers) considerably increased its number of associated documents, becoming one of the most studied themes from 2004. This theme was originally related to keywords such as *brands*, *information*, *quality* and *choice-behaviour* in the second period (1999–2003), and in the last period, to *behaviour*, *consumer*, *decision-making* and *internet-shopping* (see Fig. 13a, b).
 - In Fig. 14a and b the PREFERENCES' thematic-networks are shown for the periods from 1999–2003 and 2004–2008, respectively.

To summarize the main findings are showed in the Table 5.

From a longitudinal perspective, some themes initially considered high density (upper-left or upper-right quadrant) have disappeared recently. This is the case of theme WOMEN which disappeared during the last eight years (subperiod 1999–2008) or BACKGROUND-MUSIC AND MODELLING which disappeared in the last five years (subperiod 2004–2008). The theme WOMEN had a significant reduction in the number of associated papers due to the incorporation of women in working world, the growth of the single-parent home and, also to the emergence of other people who are responsible for customary purchases. BACKGROUND-MUSIC has lost relevance as a research theme in the last years and MODELLING, even though it continues to be a very common methodology or analytical practice in the CBR community, has not been considered as a keyword in recent papers.

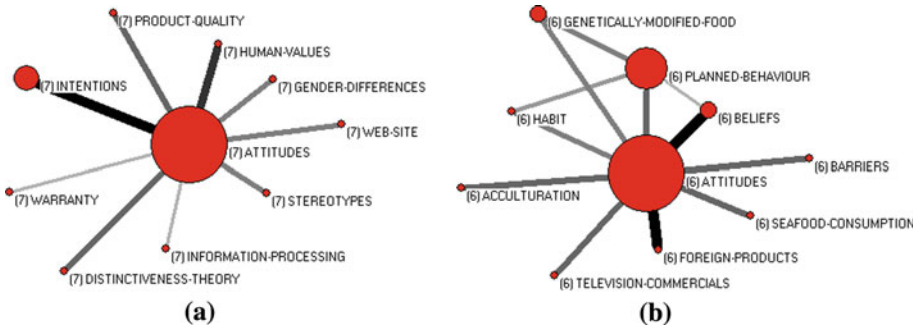


Fig. 7 Evolution of the theme ATTITUDES. **a** Subperiod 1999–2003 and **b** subperiod 2004–2008

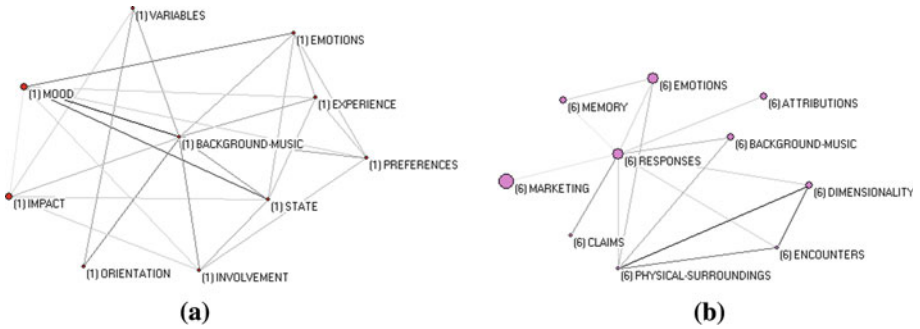


Fig. 8 Evolution of the theme BACKGROUND-MUSIC. **a** Subperiod 1966–1998 and **b** subperiod 1999–2003



Fig. 9 Evolution of the theme CONSUMER-SATISFACTION. **a** Subperiod 1999–2003 and **b** subperiod 2004–2008

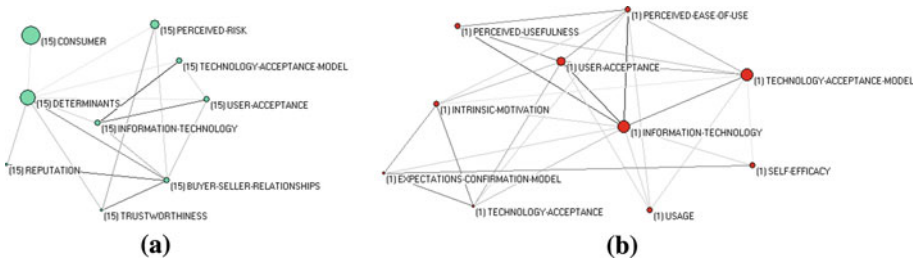


Fig. 10 Evolution of the theme INFORMATION TECHNOLOGY. **a** Subperiod 1999–2003 and **b** subperiod 2004–2008

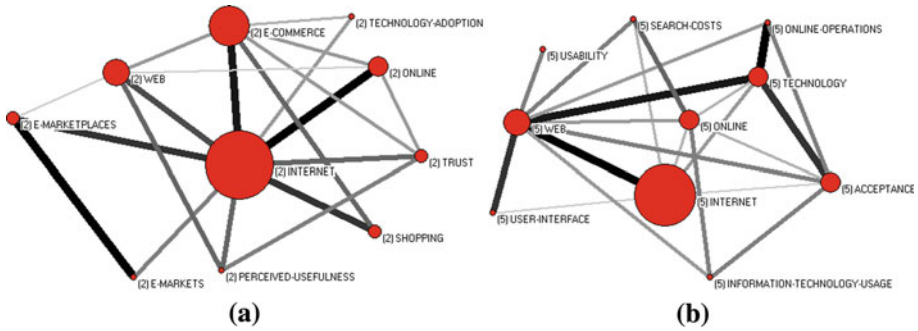


Fig. 11 Evolution of the theme INTERNET-WEB. **a** Subperiod 1999–2003 and **b** subperiod 2004–2008

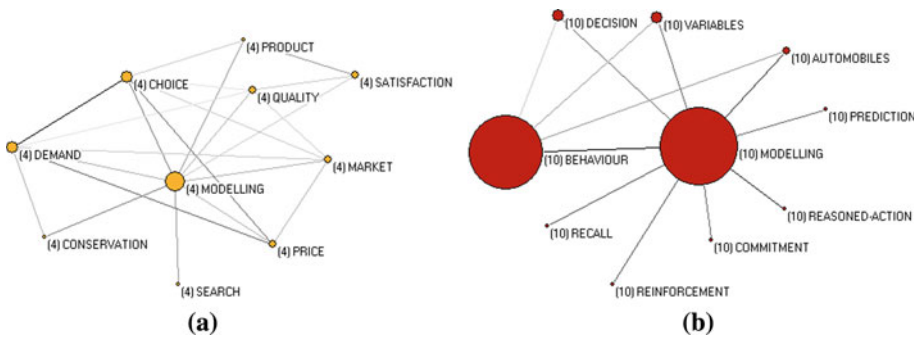


Fig. 12 Evolution of the theme MODELLING. **a** Subperiod 1966–1998 and **b** subperiod 1999–2003

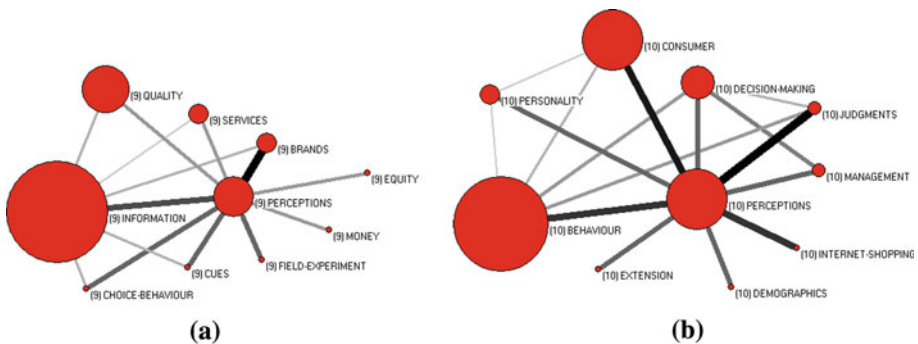


Fig. 13 Evolution of the theme PERCEPTIONS. **a** Subperiod 1999–2003 and **b** subperiod 2004–2008

5 Conclusions and contributions

5.1 Key findings and practical implications

The rapid growth of information and availability of data from an increasing number of new sources have enhanced the possibilities of data and information exploration, and, consequently, of the identification of research trends and patterns in any given area of knowledge (Juvan et al. 2005).

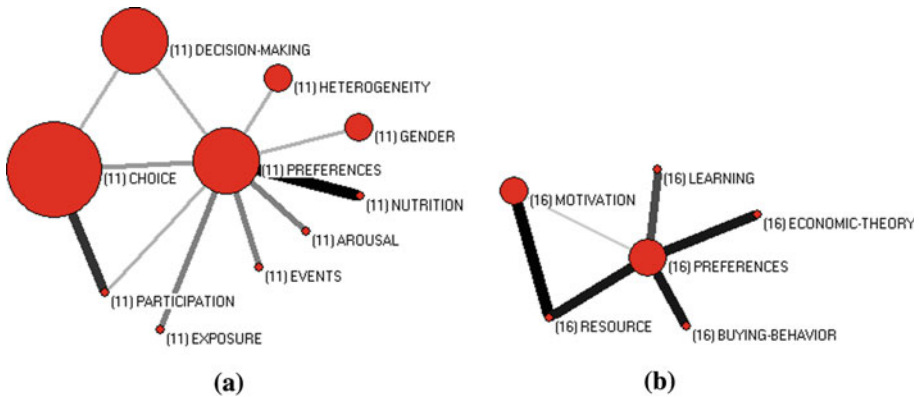


Fig. 14 Evolution of the theme PREFERENCES. **a** Subperiod 1999–2003 and **b** subperiod 2004–2008

In this article, a bibliometric study on CBR has been presented. More than 1,800 original research papers were processed. Based on a co-word analysis, the visual structure of this area has been drawn.

Over the period studied (1966–2008), the number of themes detected has grown owing to an increase in the number of papers published by the CBR community. But this fact is not a lineal relation, since in the last subperiod (2004–2008) published papers have been grouped into bigger themes.

The bibliometric maps help detect future trends. The results show how Information and Communication Technologies (ICT) has become increasingly important over time, becoming an essential nexus in consumer behaviour studies in recent times.

In this sense, INFORMATION-TECHNOLOGY, CONSUMER-SATISFACTION and BACKGROUND-MUSIC were the three themes with the highest frequency written about by the CBR community from 1999–2003 (taking into account the average number of citations).

Observing the corresponding bibliometric map from 2004–2008, it is expected that in the coming years a large number of publications will deal with consumer behaviour as it relates to ITC in general, and Internet-Web and e-commerce (online-purchasing), in particular. These themes were the most studied and cited themes researched by the CBR community in this last lustrum. FOOD-PRODUCTS, general PERCEPTIONS, ATTITUDES and CONSUMER-SATISFACTION, COUNTRY-OF-ORIGIN and TRUST were other very frequent themes based on the number of papers published. These were related externally to concepts applicable to other themes such as those previously mentioned.

With these data and results, it is possible to predict that there will be a positive movement regarding the topics of CONSUMER-SATISFACTION, FOOD-PRODUCTS and PERCEPTIONS, since they have increased their centrality in the last five years as demonstrated by consistency in the number of studies published. We expect this trend to continue.

These findings appear to indicate the potential usefulness of bibliometric studies in uncovering the different research fields’ intellectual structure and evolution. This evolution provides an opportunity to anticipate interesting developments in these fields with respect to key topics as well as predicting which topics are less likely to assume a central role in the literature in the near future (Cho and Khang 2006; Echchakoui and Mathieu 2008).

Identifying the main subject group and sub-group categories of keywords in the form of frequency distributions could uncover potential issues for future research. Though keywords can succinctly summarise the content of all aspects of the reviewed articles and their

Table 5 The most highlighting themes and relations among keywords and themes

	1966–1998	1999–2003	2004–2008
ATTITUDES	–	B-T: intentions, human-values, product-quality,...	B-T: beliefs, planned-behaviour, foreign-products,...
BACKGROUND-MUSIC	M-T: mood, emotions, preferences,...	M-T: emotions, physical-surrounding, marketing,...	–
CONSUMER-SATISFACTION	–	M-T: consequences, expectation, consumption-emotion,...	M-T: quality, consequences, loyalty, attribution,...
INFORMATION-TECHNOLOGY	–	M-T: Technology-Acceptance-Model, user-acceptance,...	M-T: perceived-usefulness, self-efficacy,...
INTERNET-WEB	–	M-T: online, e-commerce, shopping,...	M-T: technology, information-technology-usage, user-interface, usability,...
MODELLING	P-T: demand, choice, product, price,...	B-T: behaviour, decision, recall, reasoned-action,...	–
PERCEPTIONS	B-T: information, memory, strategies	B-T: brands, information, quality, choice-behaviour,...	B-T: behaviour, consumer, decision-making, internet-shopping,...
PREFERENCES	–	B-T: choice, decision-making, gender,...	B-T: motivation,...

M-T motor theme, *B-T* basic-theme, *P-T* peripheral theme

usefulness for empirical research in consumer behaviour, keywords have been neglected as a research tool (Kevork and Vrechopoulos 2009).

The major goal of keyword or co-word analysis has been accomplished in the present article, since until now researchers have generally not used keyword (co-words) analysis at all, even though it leads to unbiased and exhaustive results without fixing the social science subject research areas “a priori”. Keywords genuinely reflect the authors’ beliefs about the subject content fields of their articles, and are important enough to reveal a self-supported unbiased and exhaustive consumer behaviour framework, especially useful to researchers and social science practitioners.

This article has required a complex process of depuration in keywords, trying to avoid differences in meaning among two keywords, which though they referred to the same topic were considered different in the analysis. This lack of homogenization is a major problem of

keywords: it would be interesting to propose an international thesaurus about different topics that facilitates researcher and practitioner search work. In fact, in most bibliographic or full-text databases, users can search either within free text, or with controlled terms (keywords or descriptors), since controlled terms allow improved retrieval precision of documents on a selected topic (Juvan et al. 2005; Kevoork and Vrechopoulos 2009), providing that document authors selected their keywords over this hypothetical thesaurus.

5.2 Limitations and future research

The purpose of this research has been to offer an expeditious perspective of the study of CBR during the period 1966–2008, identifying previous and current themes and forecasting the emerging trends and relationships between other fields. However, this task is not without problems due the bias that this analysis implies. The first one is that the analysis will concentrate on priority themes and will inevitably exclude those that have an anecdotal appearance. On the contrary, the analysis will legitimize discussion about general tendencies accepted by the majority of the scientific community. The second problem is methodological; the diversity of papers included in the analysis makes it difficult to justify their integration, although the very nature of consumer behaviour as a discipline as mentioned in the previous paragraphs makes this global analysis more interesting.

ISIWoS specializes in only a small proportion of important journals. Future research will be focused on proceedings, more professional journals and other bibliographic database, enabling a wider analysis. In addition, news studies will also include other more advanced citations based indicators, as those proposed in Franceschini and Maisano (2010) and Cobo et al. (2011a) (e.g. h-index and variants) in order to discover the influence of the journals on the development of scientific knowledge of determined disciplines.

Since the analysis performed has been constrained by factors such as sample size, period examined, etc. its “applicability-generalizability” must be further reviewed and tested in the future, preferably at regular intervals.

Finally, experts and novices could use these data, results and maps to understand the current “state of the art” into the CBR and to predict where future research will lead.

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