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Corresponding Author: Dr. Francisco Muñoz-Leiva, Ph.D.

Corresponding Author's Institution: University of Granada

First Author: Francisco Muñoz-Leiva, Ph.D.

Order of Authors: Francisco Muñoz-Leiva, Ph.D.; María Isabel Viedma-del-Jesús, Ph.D.; Antonio Gabriel López-Herrera, Ph.D.; Juan Sánchez-Fernández, Ph.D.

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Suggested Reviewers:

An Application of Co-Word Analysis and Bibliometric Maps for Detecting the Most Highlighting Themes in the Consumer Behaviour Based Research: A Longitudinal Perspective

Francisco Muñoz-Leiva¹, María Isabel Viedma-del-Jesús¹, Antonio Gabriel López-Herrera², Juan Sánchez-Fernández¹

¹*Department of Marketing and Market Research, University of Granada*

Address: Facultad de Ciencias Económicas y Empresariales. Campus Universitario La Cartuja 18071. Granada (Spain)

Telephone number: (+34) 958 241 000 + Ext. 20262, 958 249 579, 958 240 936

Fax Number: (+34) 958 240 695

e-mail: franml@ugr.es, iviedma@ugr.es, sanchezf@ugr.es

²*Department of Computer Science and Artificial Intelligence, University of Granada*

Address: CITIC-UGR (Research Center on Information and Communications Technology)

C./ Daniel Saucedo Aranda, s/n 18071 Granada (Spain).

Telephone number: (+34) 958 240 466

Fax Number: (+34) 958 243 317

e-mail: lopez-herrera@decsai.ugr.es

Abstract

In this paper is presented a bibliometric and visual study of research on a Social Science field, concretely, on consumer behaviour. Bibliometric maps showing the associations between the main concepts in the field are provided from 1966 to 2008. The maps provide insight into the structure of the consumer behaviour based research, visualize the division of the field into several subfields, and indicate the relationships between these subfields. The results show how Information and Communication Technology (ICT) has become increasingly important over time, becoming an essential nexus in consumer behaviour studies in recent times. The maps are created by co-word analysis and they can be used for forecast emerging trends in the consumer behaviour field and they also enable the novice to become familiar with the field.

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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 1950's 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 lifeblood 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). Consequently, it is important to recognize the study of consumer behaviour as an interdisciplinary field (Solomon 2008), since it could not have advanced without the contributions of academic theories and disciplines like the Cost-Reducing Theory, Psychology, Sociology, even Anthropology and Medicine, and without the support of instrumental techniques like Statistics or the Information Technology.

Consumer behaviour has been discussed in depth from the perspective of these different fields and research areas using numerous ideas and concepts, constructions, theories and models (Zinkhan *et al.* 1992). 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 order and classify consumer behaviour such as those by Helgeson *et al.* (1984) Cohen and Chakravarti (1990), Tybout and Artz (1994), Jacoby, Johar, and Morrin (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). An apparent assumption underlying consumer behaviour research is that related disciplines would primarily adapt, apply, and possibly extend theories developed in the basic disciplines, such as psychology, sociology, economics, and communication, to specific consumption categories (Simonson *et al.* 2001).

Therefore, because of the interdisciplinary nature of the study of consumer behaviour, studies which review many publications which directly or indirectly influence the aforementioned behaviour are necessary. In this line, Phillips *et al.* (1999: 203) suggest marketers and consumer researchers' 'fascination with analyzing flows of information within and among disciplines stems from their desire to understand the structure of scientific knowledge.'

Specifically, the aim of this paper is to present a bibliometric study (including both content and citation analysis) of the CBBR. The study has been done by means of bibliometric maps which show the main associations between the main concepts explored by the CBBR community. These bibliometric maps provide insight into the structure of the CBBR and visualize the division of the field into several subfields, highlighting the relations between these subfields.

Hoffman and Holbrook (1993) and Börner *et al.* (2003) state that usually bibliometric analyses are based on: counts of publication frequency by author, enumerations of citation frequencies by author, frequencies of citations to journals, and numbers of citations from journals. In addition, Valero and Monk (1998) assert bibliographic data has mainly two uses: i) to rank journals according to their impact on the research community, usually by counting the number of citations that papers receive, and (2) to identify fields of knowledge.

Under their point of view all these approaches have provided insights into the patterns of influence that prevail within consumer research and between these consumer-related fields and other academic disciplines. Nevertheless, the method of co-citation analysis has received little use in studies of consumer behaviour, and much less co-word analysis. Citation analysis in marketing and consumer research has been more concerned with knowledge transmission both within the marketing discipline and across academic disciplines (Sivadas and Jonhson 2005).

The present work uses bibliometric data based on co-word analysis to examine the intellectual structure of CBBR on the basis of the main publications about this topic from 1966a 2008, and is inspired by the recognition that the production of consumer behaviour knowledge is often a social process and the recognition that we have little formal understanding of the social structure underlying discipline's research

production (Eaton *et al.* 1999). Previous studies in this field have emphasized a single aspect of networks or have examined various aspects independently (the influence of specific journals or the relationships among journals), or have stressed networks at one particular point in time, or have employed essentially descriptive methodologies to examine networks (Pieters *et al.* 1999). Keyword analysis has usually been focused on determining the importance of keywords, identifying which keywords are similar to each other, and tracing the evolution in keyword importance over time (Pieters *et al.* 1999). We, following Iacobucci's (1996) recommendations, try to use inferential instead of descriptive methodologies investigating network structure and changes in structure over time. As Pailey (1984) noted with respect to journal citations, we think that keywords are strong indicators of the flow of information to, within, and from a scientific discipline.

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, Kassarian 1977). In marketing, this method has been used to ascertain trends in the field of salesforce (Williams and Plouffe 2007), to identify topics and preferred statistical approaches in the field of consumer behaviour (Helgeson *et al.* 1984), to highlight advertising trends (Roznowski 2003) and discover Internet advertising trends (Cho and Khang 2006). The advantage of this method is to determine the current state of research and identify future trends in a research field (Yale and Gilly 1988).

Therefore, in this study, the sole classification criterion are the keywords reported in the manuscripts (in fact keywords expressions) together with their frequencies, similar to Kevork and Vrechopoulos (2009). Our approach finds support in a suggestion by Romano and Fjermestad (2002, p. 66): "What the research

community says about itself should be taken into account when evaluating a field's maturity." Therefore, keywords are suitable for doing that in a comprehensive manner.

Our analysis is completed by means of bibliometric maps created by co-word analysis (Callon *et al.* 1983; Coulter *et al.* 1998; Whittaker 1989) that show the associations among the main concepts studied in the field. 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 1994:1). 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 maps provide insight into the structure of the consumer behaviour field, show the division of the field into several subfields and indicate the relationships between these subfields. More concretely, in longitudinal mapping, concept introduced by Garfield (1994), 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. 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 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 paper is organized as follows: section 2 introduces the co-word analysis methodology, section 3 describes the achieved results and finally, some conclusions are drawn.

2. CO-WORD ANALYSIS: METHODOLOGY

Co-word analysis is a content analysis technique that is effective in mapping the strength of association between information items in textual data (Callon *et al.* 1983, Callon *et al.* 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, 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).

According to Krsul “this technique illustrates associations between keywords by constructing multiple networks that highlight associations between keywords, and where associations between networks are possible” (Krsul 1998: 80).

The basic assumption in bibliometric mapping (Börner *et al.* 2003) is that each research field can be characterized by a list of the important keywords. Each publication in the field can in turn be characterized by a sub-list of these global keywords. Such sub-lists are like DNA fingerprints of these published articles.

Börner *et al.* (2003: 185) suggest that these ‘fingerprints’ can be used as a similarity measure: "The more keywords two documents have in common, the more similar the two publications are, and the more likely they come from the same research area or research specialty at a higher level".

Garfield (1994: 1) suggests that longitudinal mapping can be used to plot the evolution of a field, and can be used by ‘analysts and domain’ experts to forecast trends in the field, discovering the key research areas and their interconnection.

According to Börner *et al.* (2003: 188), the process of constructing a bibliometric map can be divided into the following six steps:

- (1) Collection of raw data.
- (2) Selection of the type of item to analyse.
- (3) Extraction of relevant information from the raw data.
- (4) Calculation of similarities between items based on the extracted information.
- (5) Positioning of items in a low-dimensional space based on the similarities.
- (6) Visualization of the low-dimensional space.

We now discuss how we implement each of these steps in this paper.

The first step in the process of bibliometric mapping is the collection of raw data. In this paper, the raw data consists of a corpus containing 1,842 papers about CBBR extracted from ISI Web of Science (ISIWoS) 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 figure 1, the number of papers in ISIWoS from 1966 to 2008 is shown.

Insert figure 1 about here

The use of ISIWoS guarantees that selected journals have high "impact factors" that allow researchers to evaluate the most frequently cited journals, highest

impact journals, and leading journals in a field (Kim and McMillan 2008). Moreover the selection is based on the bibliometric principle that the knowledge of a discipline is concentrated in only a small proportion of important journals (Garfield 1979).

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 paper, 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 figure 2.

Insert figure 2 about here

The second step in the process of bibliometric mapping is the selection of the type of item to analyze. According to Börner *et al.* (2003), journals, papers, authors, and descriptive terms or words are most commonly selected as the type of item to analyze. Each type of item provides a different visualization of a field of science and results in a different analysis. In this paper, we choose to analyze descriptive words, and more precisely, keywords. A bibliometric map showing the associations between keywords in a scientific field is referred to as a keywords based map in this paper.

The third step in the process of bibliometric mapping is the extraction of relevant information from the raw data collected in the first step (Börner *et al.* 2003). In this paper, the relevant information consists of the co-occurrence frequencies of keywords. The co-occurrence frequency of two keywords is extracted from the body of papers by counting the number of documents in which the two keywords both occur in the keywords section.

The fourth step in the process of bibliometric mapping is the calculation of similarities between items based on the information extracted in the third step (Börner *et al.* 2003). In this paper, similarities between items are calculated based on frequencies of keywords co-occurrences. When two keywords frequently occur together, they are said to be linked, and the intensity of the link is indicated by the equivalency index (Michelet 1988, Callon *et al.* 1991), e_{ij} defined as:

$$e_{ij} = \frac{c_{ij}^2}{c_i \cdot c_j},$$

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. When the keywords always appear together, the equivalency index equals unity; when they are never associated, it equals zero. Once the links are quantified, by an algorithm called *simple centers*, groupings or themes, consisting of the most strongly linked networks that represent the centers of interest of the researchers, are produced.

As described by Coulter *et al.* (1998), the simple centres algorithm uses two passes through the data to produce the desired networks. The first pass (Pass-1) constructs the networks depicting the strongest associations and links added in this pass are called internal links. The second pass (Pass-2) adds to these networks links of

weaker strengths that form associations between networks. The links added during the second pass are called external links.

Coulter *et al.* (1998) note that two keywords which appear infrequently in the corpus, but always appear together, will have higher strength values than keywords that appear many times, but almost never together. Hence, possibly irrelevant or weak associations may dominate the network. A solution to this problem incorporated into the algorithm described in this section is to require that only the keyword pairs that exceed a minimum co-occurrence are considered potential links while building networks during the first pass of the algorithm. As each sub-period and block has different numbers of papers, different minimum co-occurrence values are used: 3, 4, and 6 for the sub-periods 1966-1998, 1999-2003, 2004-2008, respectively.

During the Pass-1, the link with the highest strength is selected first, its nodes becoming the starting nodes of the first Pass-1 network. Other links and their corresponding nodes are added to the graph using a breadth-first search on the strength of the links (that is, the strongest link connecting an ungraphed node to the graph being constructed is added first), until there are no more links that exceed the co-occurrence threshold, or a maximum Pass-1 link limit is exceeded. The next network is generated in a similar manner starting with the link with the highest strength that is not in any existing graph.

Networks are interconnected by Pass-2 links. The centrality of a network measures the degree of interaction to other networks (Callon *et al.* 1991) 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.

The *density* of a network measures the internal strength of the network (Callon *et al.* 1991) 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.

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).

The fifth step in the process of bibliometric mapping is the positioning of items in a low-dimensional space based on the similarities calculated in the fourth step (Börner *et al.* 2003). In this paper, the low-dimensional space is referred to as a keywords based map and only two-dimensional keywords based maps are considered. The two dimensions are 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 $rank_i^d$ 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. N is introduced to standardize in [0,1] the c_r and d_r values.

The sixth step in the process of bibliometric mapping is the visualization of the low-dimensional space that results from the fifth step (Börner *et al.* 2003). In our study, we use CoPalRed computer program (EC³ 2006), which visualizes the networks in a *strategic diagram*. A strategic diagram is a two-dimensional space in which themes are localized in strategic positions using the two measures, density rank (values in the ordinate axis) and centrality rank (values in the abscissa axis) (for more

detail see Callon *et al.* 1991). The abscissa axis is associated to centrality, or the external cohesion index and it represents the most or least central position of a theme within the overall network. The ordinate axis is associated to density, or the index of internal cohesion and it represents the conceptual development of a theme.

Four areas of interest (or quadrants) can be defined in a strategic diagram (see figure 3). Each quadrant has an associated theoretical meaning:

- Quadrant I (upper-right): groups the *motor-themes* of the specialty, given that it presents strong centrality and high density.
- Quadrant II (upper-left): in this quadrant we find very specialised but *peripheral themes*.
- Quadrant III (lower-left): collects themes with low density and centrality and so mainly represents either *emerging or disappearing themes*.
- Quadrant IV (lower-right): the transversal and the most *general basic themes* are localized in this quadrant, although with internal development not as high as those of quadrant I.

Insert figure 3 about here

CoPalRed visualizes a keywords-based map by displaying a sphere for each theme. This sphere indicates the location of the theme in the strategic diagram. The spheres can group and show representative information of the themes. In this paper, that information includes the theme name, identified by the most central keyword of the theme.

For example, in the strategic diagram in figure 3, the themes A, B and C are presented. The placement of theme B implies that this theme is quite related externally to concepts applicable to other themes that are conceptually closely related.

In addition, the internal cohesion is also rather strong, and therefore we can consider B to be a *motor-theme* of the studied scientific field.

In a theme, the keywords and their interconnections draw a network graph, usually called *thematic network*. Each thematic network is labelled using the name of the most significant keyword in the associated theme (identified by the most central keyword of the theme).

The whole network of interconnected themes and keywords, builds a second network composed of papers linked to thematic networks. In this second network, papers with keywords associated to any detected thematic network are linked to it. To do that, CoPalRed assumes a paper belongs to a theme when it presents at least two keywords of the theme.

The strategic diagrams can be enriched adding a third dimension in order to provide more information. So, for example, the themes can be represented as spheres, with volume being proportional to different quantitative data. For example:

1. The number of documents associated to the theme.
2. The number of received citations of the documents associated to the theme.
3. The number of author researching in the theme. An author is associated to the theme if he/she published some document related to the theme.

In this paper, the number of documents and the number of citations from these papers are used as the third dimension.

So, to sum up, the CBBR field is studied in this paper as:

1. A list of themes, split into four classes (isolated or peripheral themes, basic or transversal themes, motor-themes and emerging/disappearing themes) and identified by the most central keyword of the theme.
2. A list of papers associated to each detected theme.

3. Each theme is characterized by a centrality index and a density index.
4. A strategic diagram is drawn, which enables classification of the clusters into four major families, corresponding to the different relative values of their two indices: centrality and density.
5. Spheres are used in order to give more information (number of documents and number of citations) with respect to each detected theme.

So, this process provides the basis for a comparative analysis of the different themes being studied.

3. EVOLUTION OF THE CONSUMER BEHAVIOUR BASED RESEARCH

In order to analyze the conceptual evolution of the most recurring themes discussed by the CBBR 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. Citations received until December 22th 2009 were downloaded from ISIWoS and included.

This section is structured as follows:

- In sections 3.1, 3.2 and 3.3 the three periods included in this paper are analysed deeply, showing their strategic diagrams and describing their principal themes.
- In section 3.4 the most important themes from all the periods studied are analyzed, showing their associated thematic networks.

3.1. Analysis of the period 1966-1998

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

Insert figure 4 about here

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 figure 4.a). 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 figure 4.b).

Insert table 1 about here

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 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.

3.2. Analysis of the period 1999-2003

From 1999 to 2003, 504 papers were published by the CBBR 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 figure 5, with respective figures 5.a and 5.b.

Insert figure 5a and 5b
about here

The most heavily studied themes, 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 figure 5.a).

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*.

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 CBBR community in those years.

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

Insert table 2 about here

3.3. *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 figure 6, with respective figures 6.a and 6.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 figure 6.a). 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 CBBR community in this last lustrum.

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

Insert table 3 about here

3.4. Analysis of the most frequent themes

The most frequent themes (shown in table 4) from the three studied periods re analyzed below, including their associated thematic networks. 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 CBBR 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} .

Insert table 4 about here

- 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* 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 figures 7.a and 7.b).

Insert figure 7a. y 7.b.
about here

- 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 figure 8.a, 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 figure 8.b).

Insert figure 8.a y 8.b.
about here

- In virtue of its strategic position, the theme CONSUMER-SATISFACTION was considered a *motor-theme* in the last two periods analyzed in this paper (1999-2003 and 2004-2008). In the period from 1999-2003, this theme was related to keywords such as: *consequences, expectation* and *consumption-emotion* (figure 9.a). And in the last five years, it was related to the keywords *quality, consequences, loyalty* and *attribution*, among others (see figure 9.b).

Insert figure 9.a y 9.b
about here

- 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 figures 10.a and 10.b).

Insert figure 10.a y 10.b
about here

- 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 CBBR 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 figure 11.a), and related to *technology*, *information-technology-usage* and *user-interface* and *usability*, from 2004 to 2008 (see figure 11.b).

Insert figure 11.a y 11.b
about here

- 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 figure 12.a). However, from 1999-2003 it was associated with the keywords *behaviour*, *decision*, *recall* and *reasoned-action*, among others (figure 12.b).

Insert figure 12.a y 12.b
about here

- 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 figures 13.a and 13.b).

Insert figures 13.a and
13.b about here

- In figures 14.a and 14.b the PREFERENCES' thematic-networks are shown for the periods from 1999-2003 and 2004-2008, respectively.

Insert figure 14.a y 14.b
about here

4. DISCUSSION OF FINDINGS

Over the specific time periods included in this paper, the number of prominent themes has grown due to an increase in the number of papers published by the CBBR community. Based on the co-word and citation analyses, the visual structure of this research area has been drawn, and the main findings are summarized (in Table 5) as follows:

In the first period (1966-1998), the themes MODELLING and PSYCHOLOGY were two very specialized themes and peripheral in character. PSYCHOLOGY was the theme with the greatest impact during those years and MODELLING was originally associated with keywords such as *demand*, *choice*, *product* and *price*.

Insert table 5 about here

In the second period (1999 to 2003), in relative weight in number of papers, MODELLING, INTERNET-WEB, PREFERENCES and PERCEPTIONS were the most commonly studied themes and quite related externally to concepts applicable to other themes. Other topics were EXPERIENCE, ATTITUDES and PRODUCT. With respect to the average number of citations, INFORMATION-TECHNOLOGY, CONSUMER-SATISFACTION and BACKGROUND-MUSIC were the three themes with the greatest impact written about by the CBBR community in those years.

INTERNET-WEB, INFORMATION-TECHNOLOGY, BACKGROUND-MUSIC, CONSUMER-SATISFACTION and INTERNATIONAL-MARKETING

were considered *motor-themes*, whereas PERCEPTIONS, PREFERENCES, ATTITUDES and ADVERTISING were considered the most general *basic-themes*.

ATTITUDES was originally associated, among others, with keywords such as *intentions*, *human-values* and *product-quality*; BACKGROUND-MUSIC was associated with *emotions*, *physical-surrounding* and *marketing*; CONSUMER-SATISFACTION was associated with *consequences*, *expectation* and *consumption-emotion*; INFORMATION-TECHNOLOGY with *technology-acceptance-model (TAM)* and *user-acceptance*; INTERNET-WEB with *online*, *e-commerce* and *shopping*, MODELLING with *behaviour*, *decision*, *recall* and *reasoned-action*, PERCEPTIONS with *brands*, *information*, *quality* and *choice-behaviour* and PREFERENCES with *choice*, *decision-making*, *gender*.

In the last period (2004 to 2008), the main themes identified in number of published papers were: FOOD-PRODUCTS, PERCEPTIONS, INTERNET-WEB, ATTITUDES and CONSUMER-SATISFACTION. Other important themes, in relative weight in number of papers, were INFORMATION-TECHNOLOGY, COUNTRY-OF-ORIGIN and TRUST. All of them had high centrality values, that is, they were related externally to concepts applicable to other themes.

Taking into account the average number of citations, ONLINE-PURCHASING, INFORMATION-TECHNOLOGY and INTERNET-WEB were the three most frequent themes researched by the CBBR community in this last lustrum. On the other hand, the theme ATTITUDES was related to keywords such as *beliefs*, *planned-behaviour* and *foreign-products*; CONSUMER-SATISFACTION was related to *quality*, *consequences*, *loyalty* and *attribution*; INFORMATION-TECHNOLOGY was related to *perceived-usefulness* and *self-efficacy*; INTERNET-WEB to *technology*, *information-technology-usage* and *user-interface*, *usability*;

PERCEPTIONS to *behaviour, consumer, decision-making and internet-shopping*; and PREFERENCES, was mainly related to *motivation*.

Other 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 CBBR community, has not been considered as a keyword in recent papers.

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 (Juva *et al.* 2005).

In this paper, a bibliometric study on CBBR 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 CBBR

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 CBBR 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 CBBR 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 CBBR' intellectual structure and evolution. This evolution provides an opportunity to anticipate interesting developments in CBBR 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 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 paper, 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 consumer behaviour 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 marketing practitioners.

This paper 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 CBBR 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 (Juva *et al.* 2005; Kevork 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 CBBR 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 make 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 more bibliographic databases, enabling a wider analysis.

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 CBBR and to predict where future research will lead.

With regard to future research, after five years from the completion this study, we will repeat this study to determine if our forecast has been correct, or new trends are detected.

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Figure 1: Number of papers in ISIWoS from 1966 to 2008

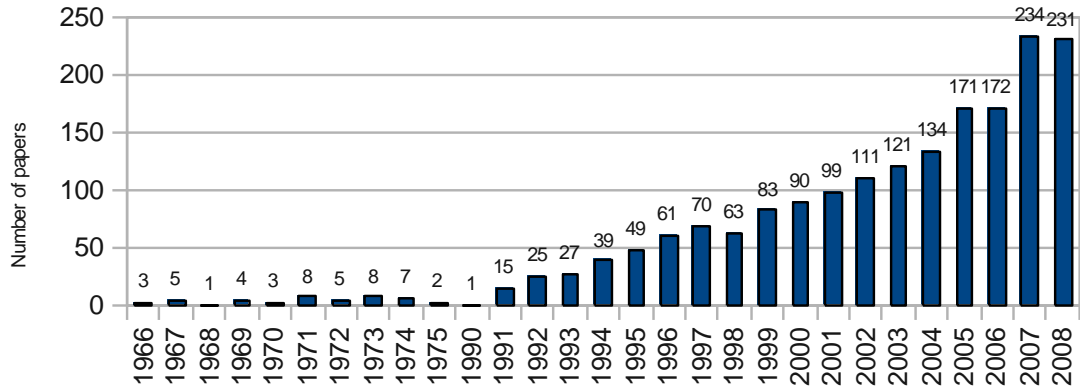


Figure 2: Number of papers per periods

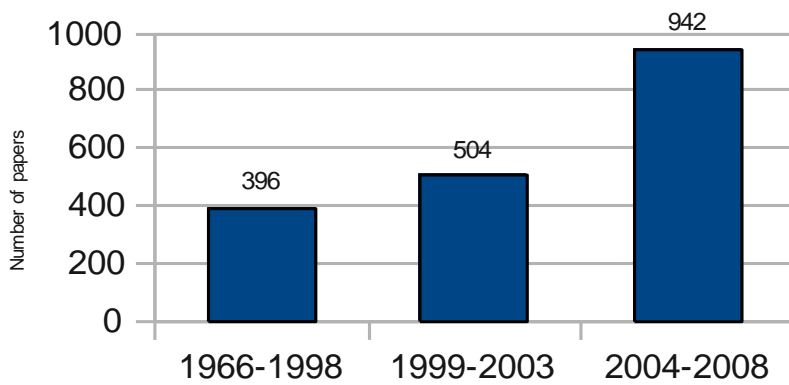


Figure 3: Quadrants in a strategic diagram and an example

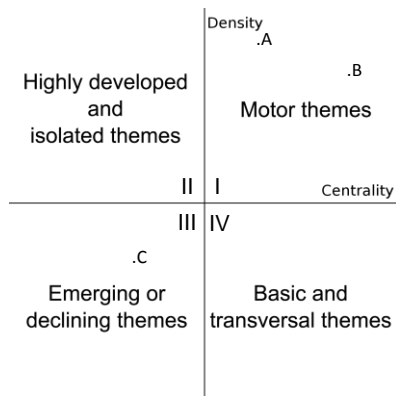
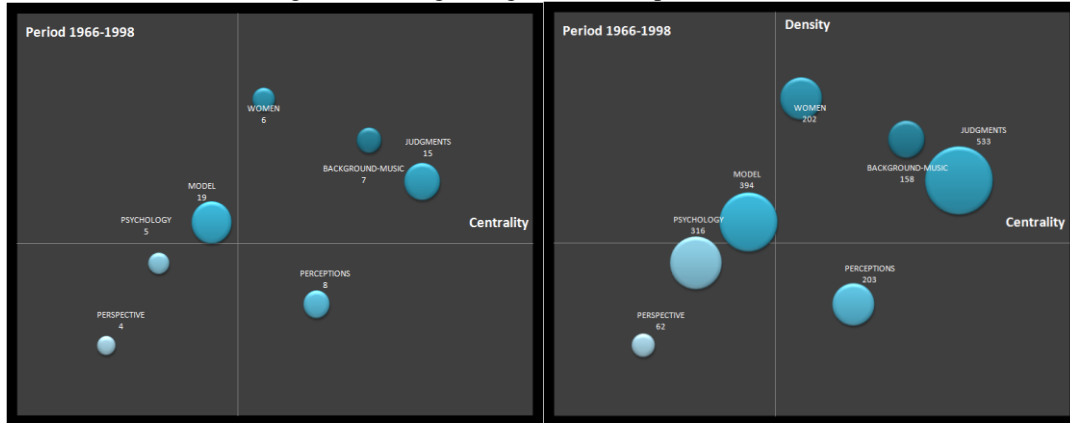


Figure 4: Strategic diagrams for the period 1966-1998.

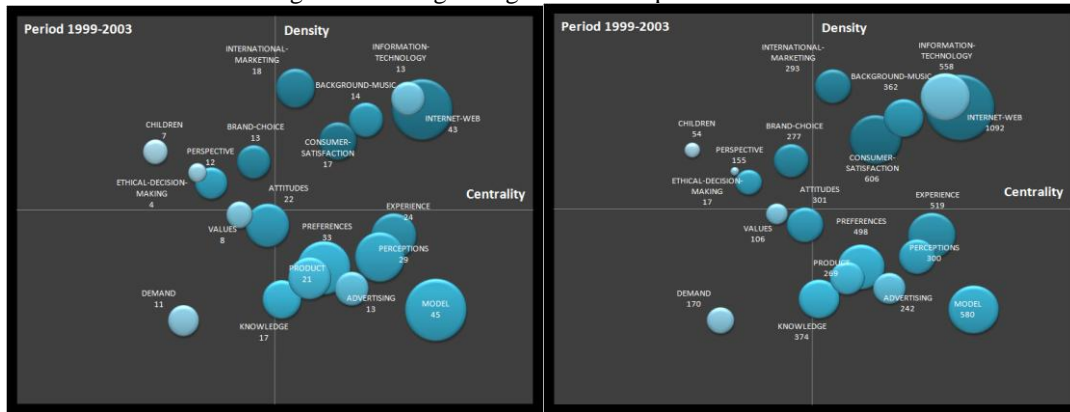


(a) Strategic diagram based on number of published documents. (b) Strategic diagram based on times cited.

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

Figure 5: Strategic diagrams for the period 1999-2003.



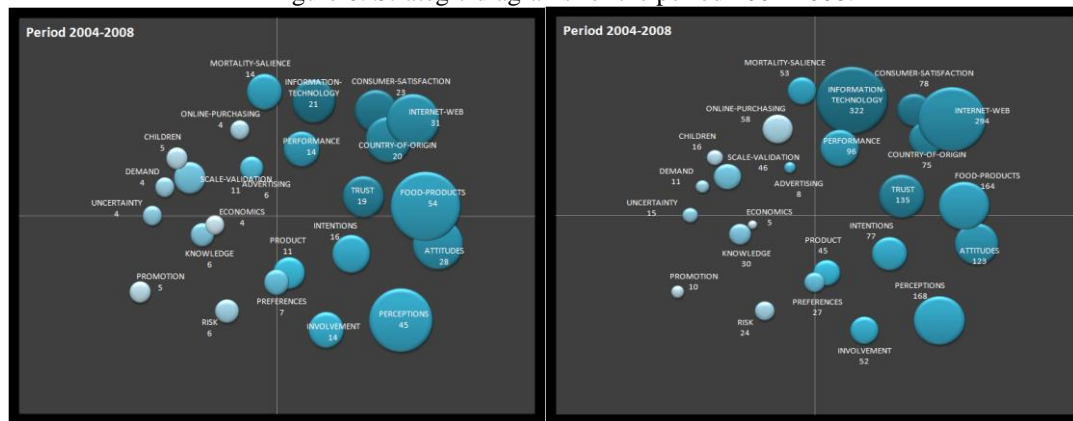
(a) Strategic diagram based on number of published documents. (b) Strategic diagram based on times cited.

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

THEME	PAPERS	CITATIONS	AVERAGE OF CITATIONS
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

Figure 6: Strategic diagrams for the period 2004-2008.



(a) Strategic diagram based on number of published documents. (b) Strategic diagram based on times cited.

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

THEME	PAPERS	CITATIONS	AVERAGE OF CITATIONS
PROMOTION	5	10	2.00
ADVERTISING	6	8	1.33
ECONOMICS	4	5	1.25

Table 4: Selected themes for a deeper analysis.

	1966-1998	1999-2003	2004-2008
ATTITUDES		<i>basic-theme</i>	<i>basic-theme</i>
BACKGROUND-MUSIC	<i>motor-theme</i>	<i>motor-theme</i>	
CONSUMER-SATISFACTION		<i>motor-theme</i>	<i>motor-theme</i>
INFORMATION-TECHNOLOGY		<i>motor-theme</i>	<i>motor-theme</i>
INTERNET-WEB		<i>motor-theme</i>	<i>motor-theme</i>
MODELLING	<i>peripheral-theme</i>	<i>basic-theme</i>	
PERCEPTIONS	<i>basic-theme</i>	<i>basic-theme</i>	<i>basic-theme</i>
PREFERENCES		<i>basic-theme</i>	<i>basic-theme</i>

Figure 7: Evolution of the theme ATTITUDES

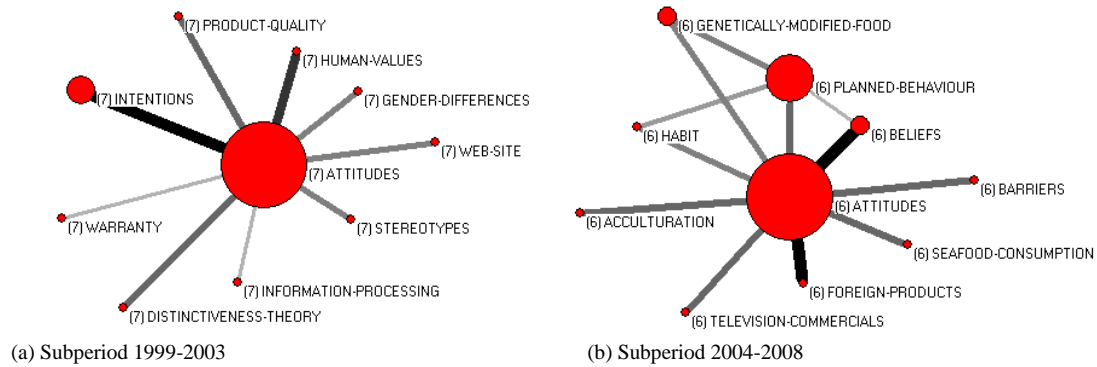


Figure 8: Evolution of the theme BACKGROUND-MUSIC

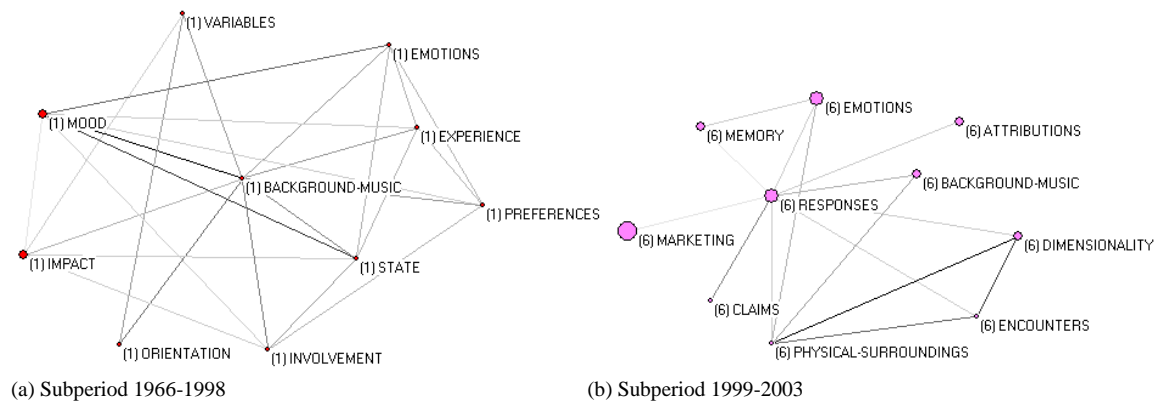


Figure 9: Evolution of the theme CONSUMER-SATISFACTION

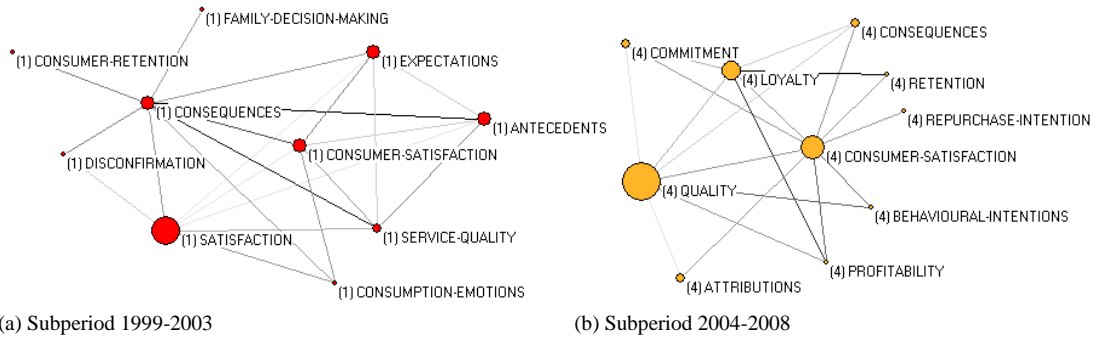


Figure 10: Evolution of the theme INFORMATION TECHNOLOGY

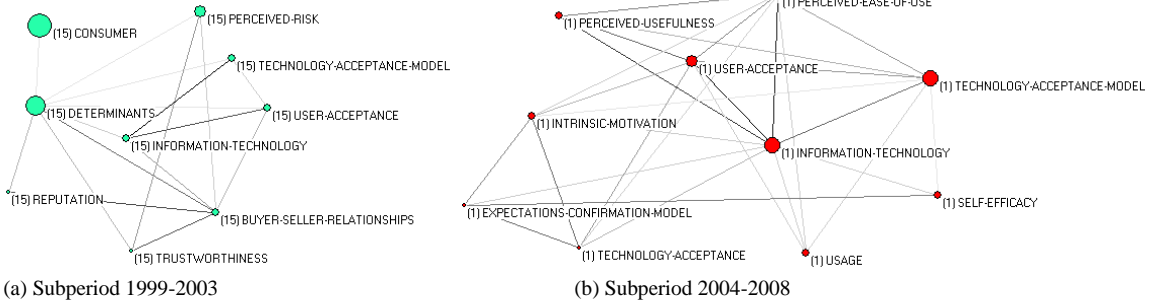


Figure 11: Evolution of the theme INTERNET-WEB

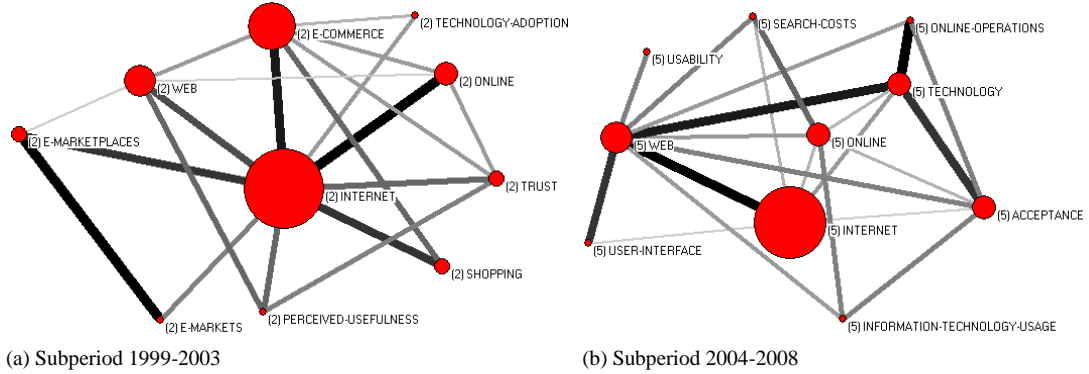


Figure 12: Evolution of the theme MODELLING

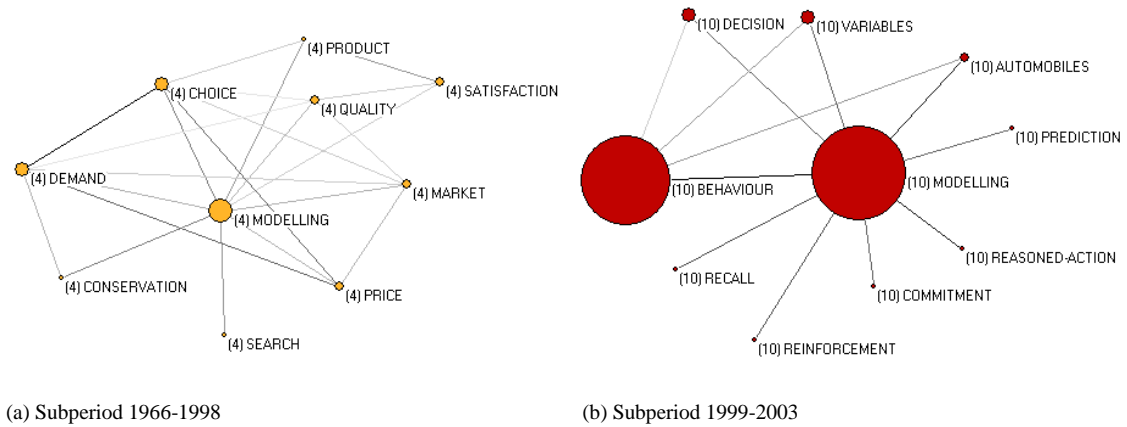


Figure 13: Evolution of the theme PERCEPTIONS

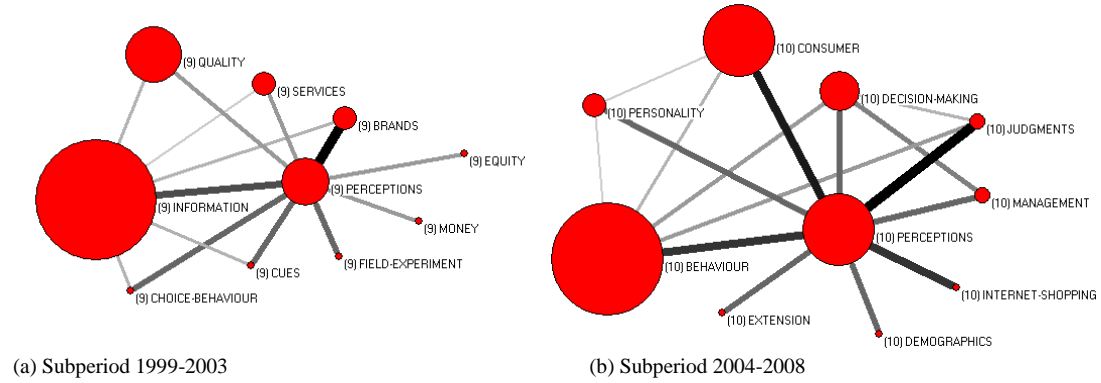


Figure 14: Evolution of the theme PREFERENCES

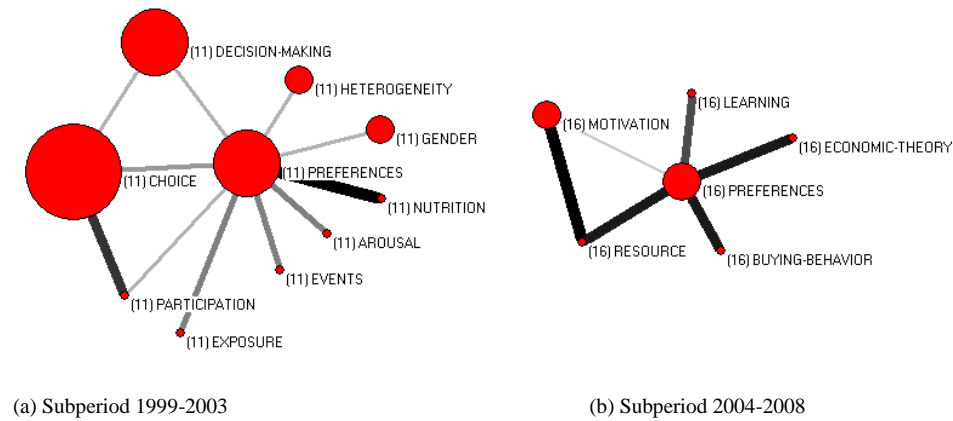


Table 5: The most highlighting themes and relations among keywords and themes.

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

(a) M-T: Motor Theme; B-T: Basic-Theme; P-T: Peripheral Theme

Figure1 (.tif)

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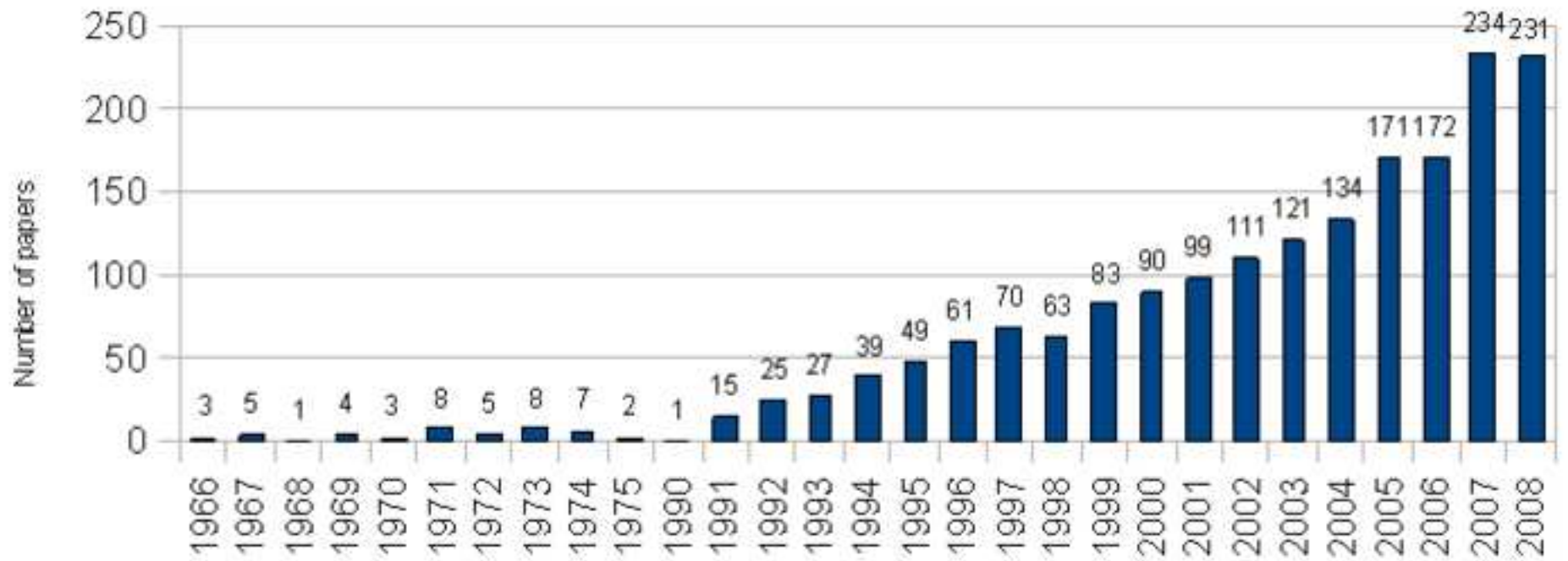
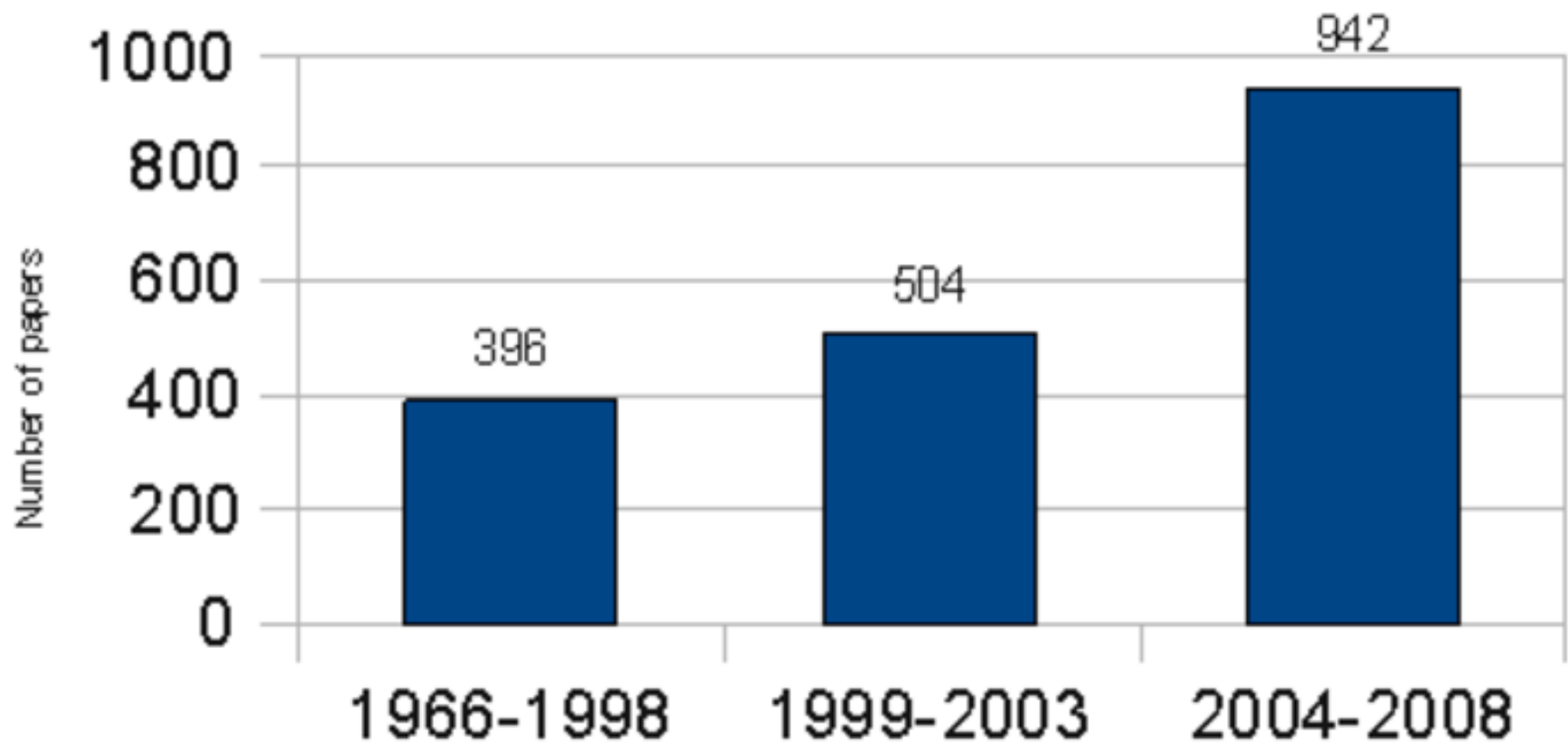


Figure2 (.tif)
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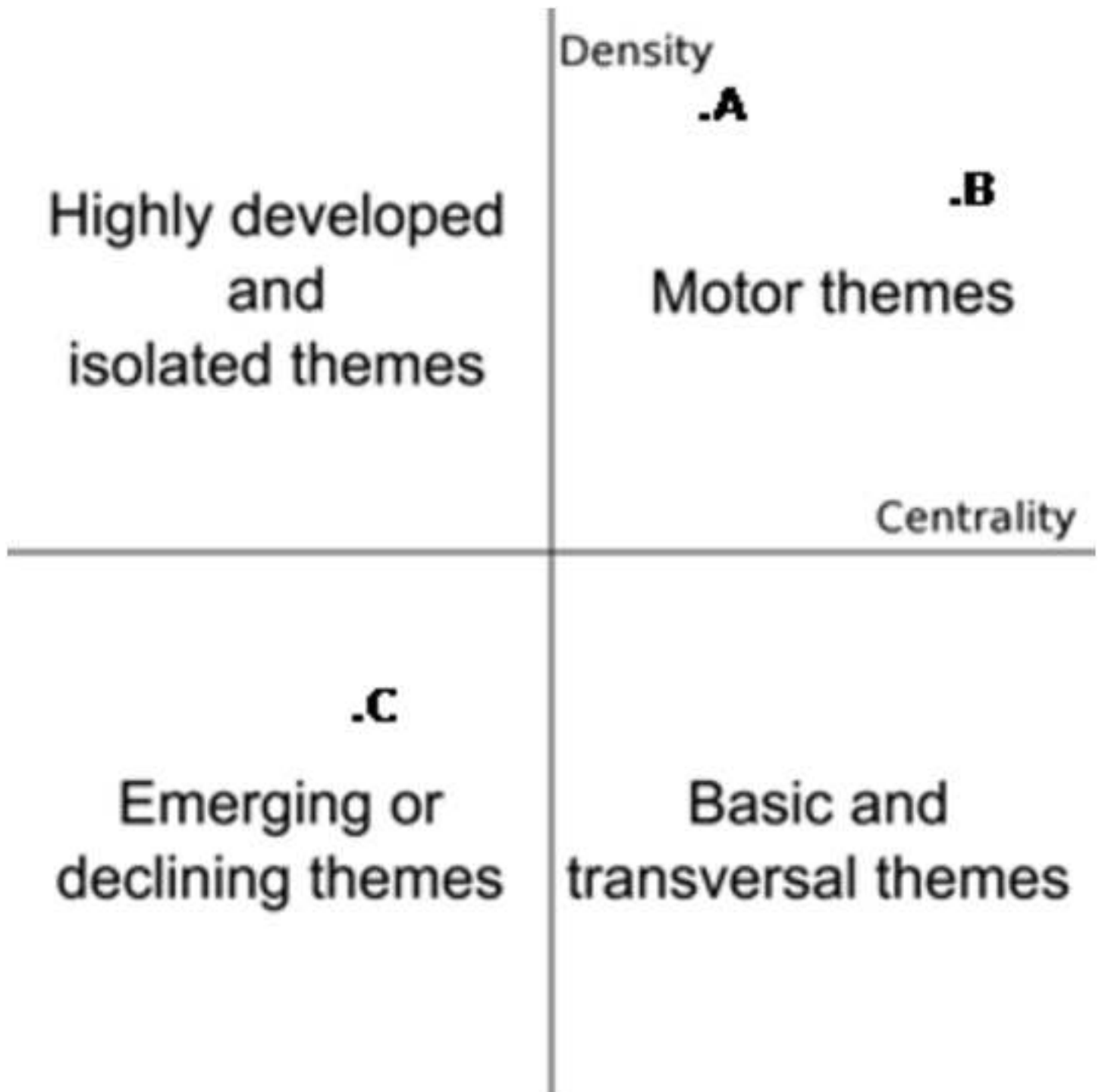


Figure4a (.tif)
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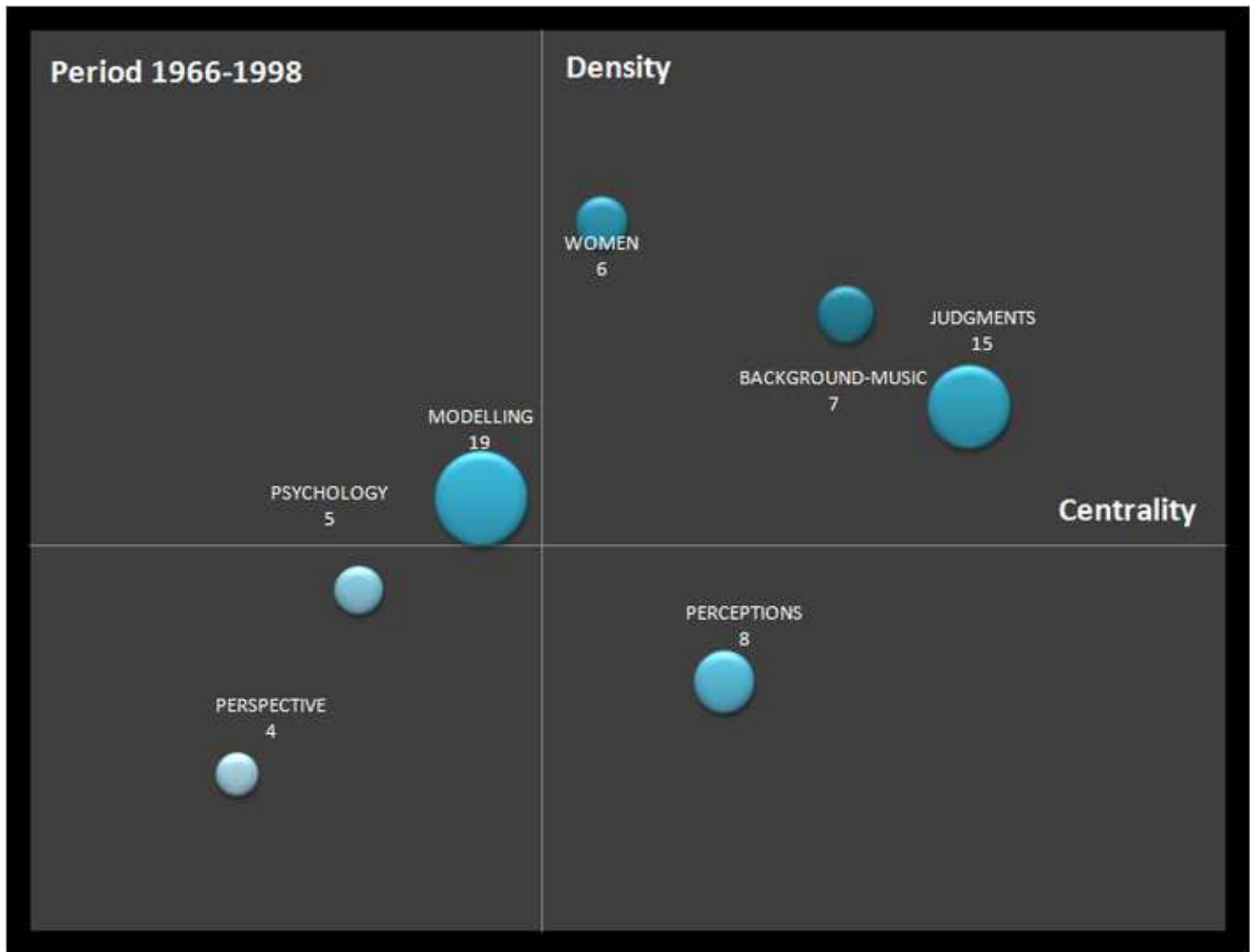


Figure4b (.tif)
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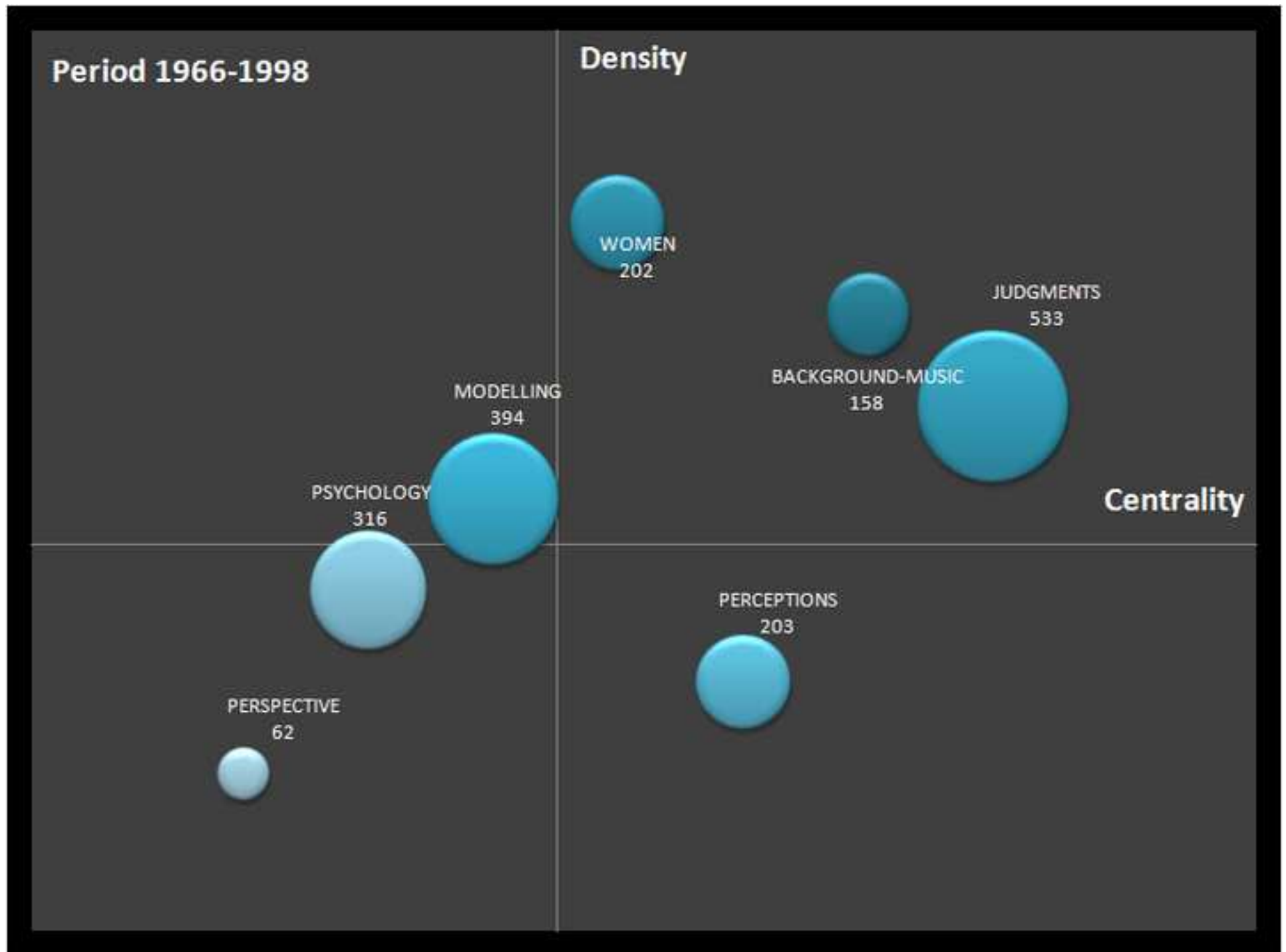


Figure5a (.tif)

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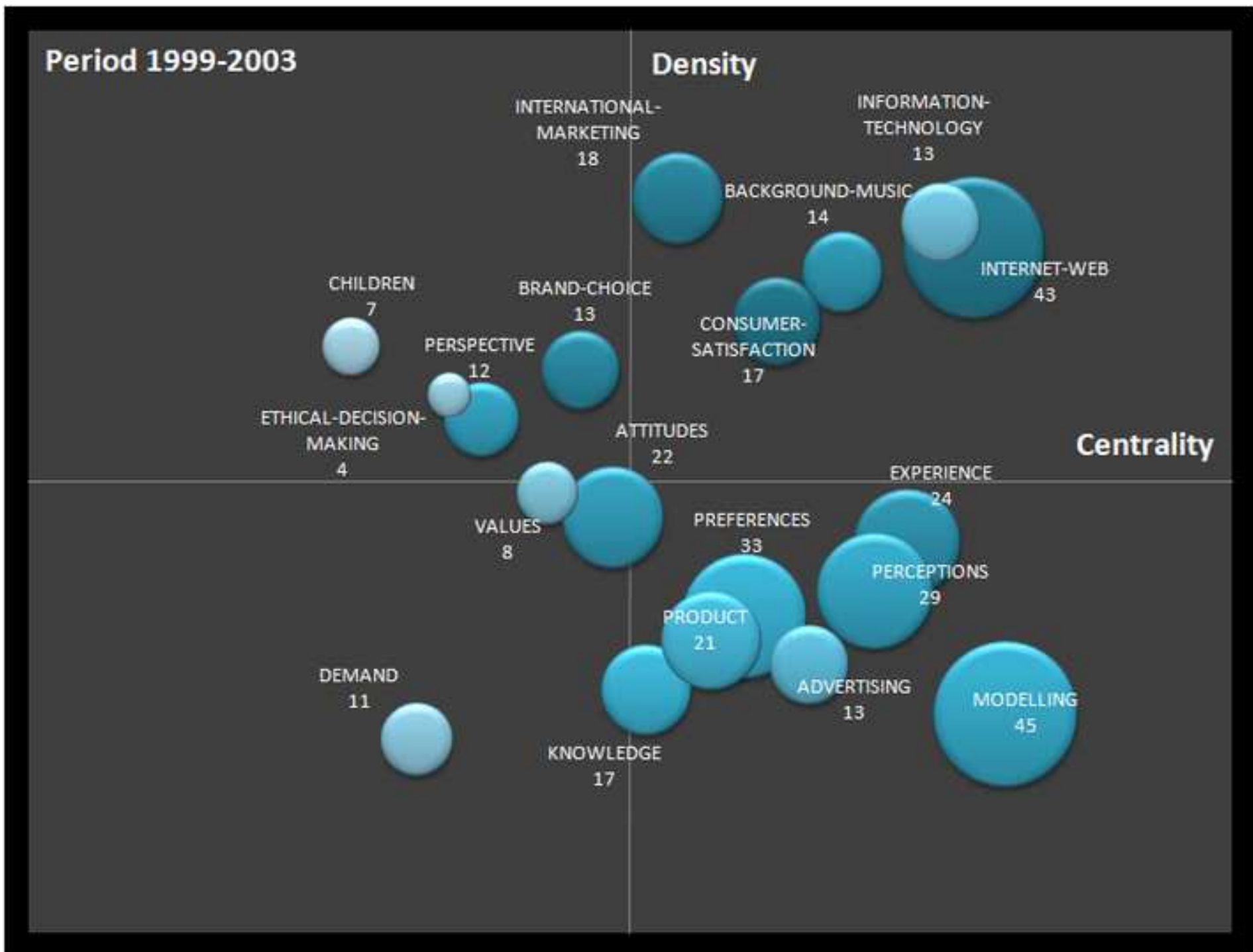


Figure5b (.tif)

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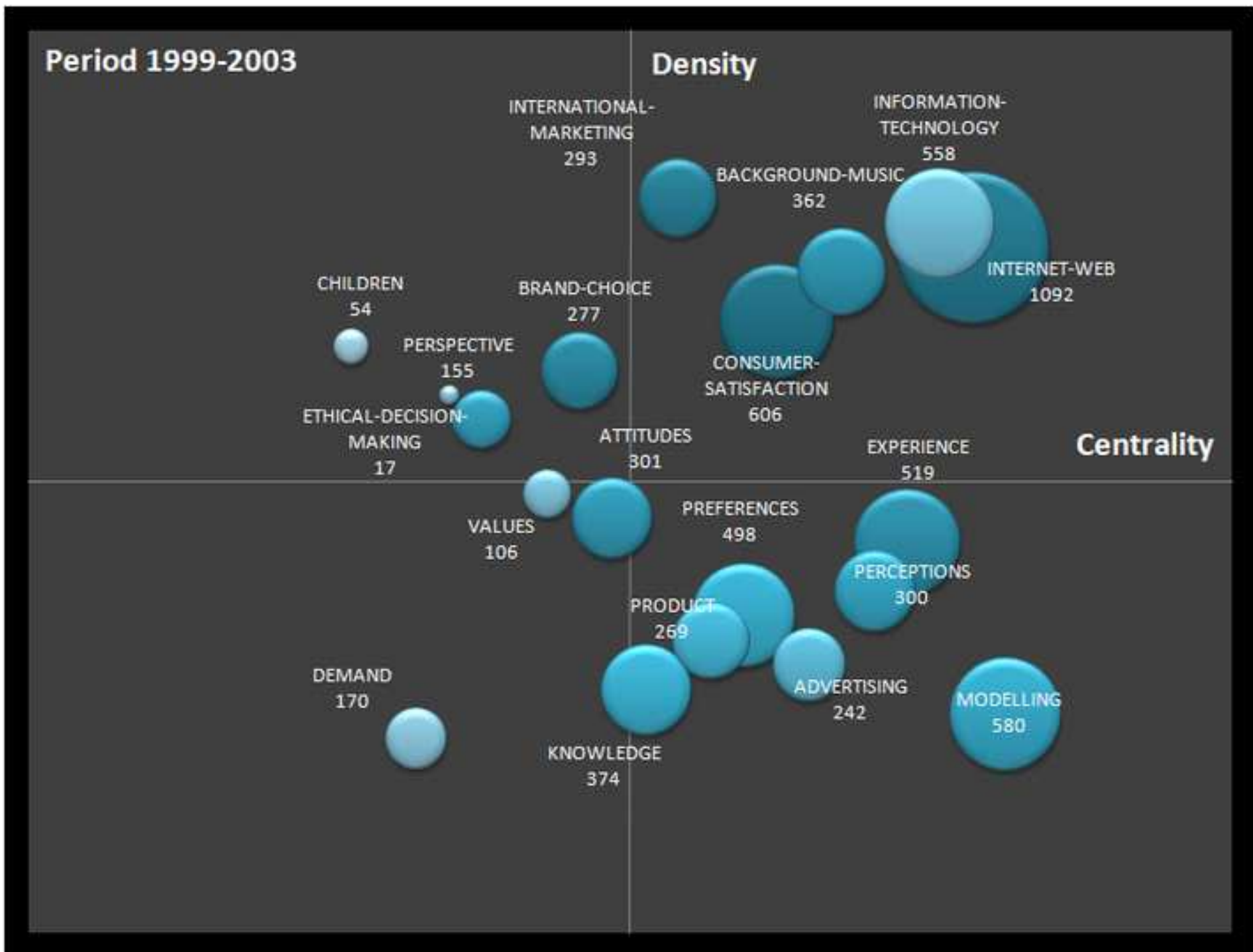


Figure6a (.tif)
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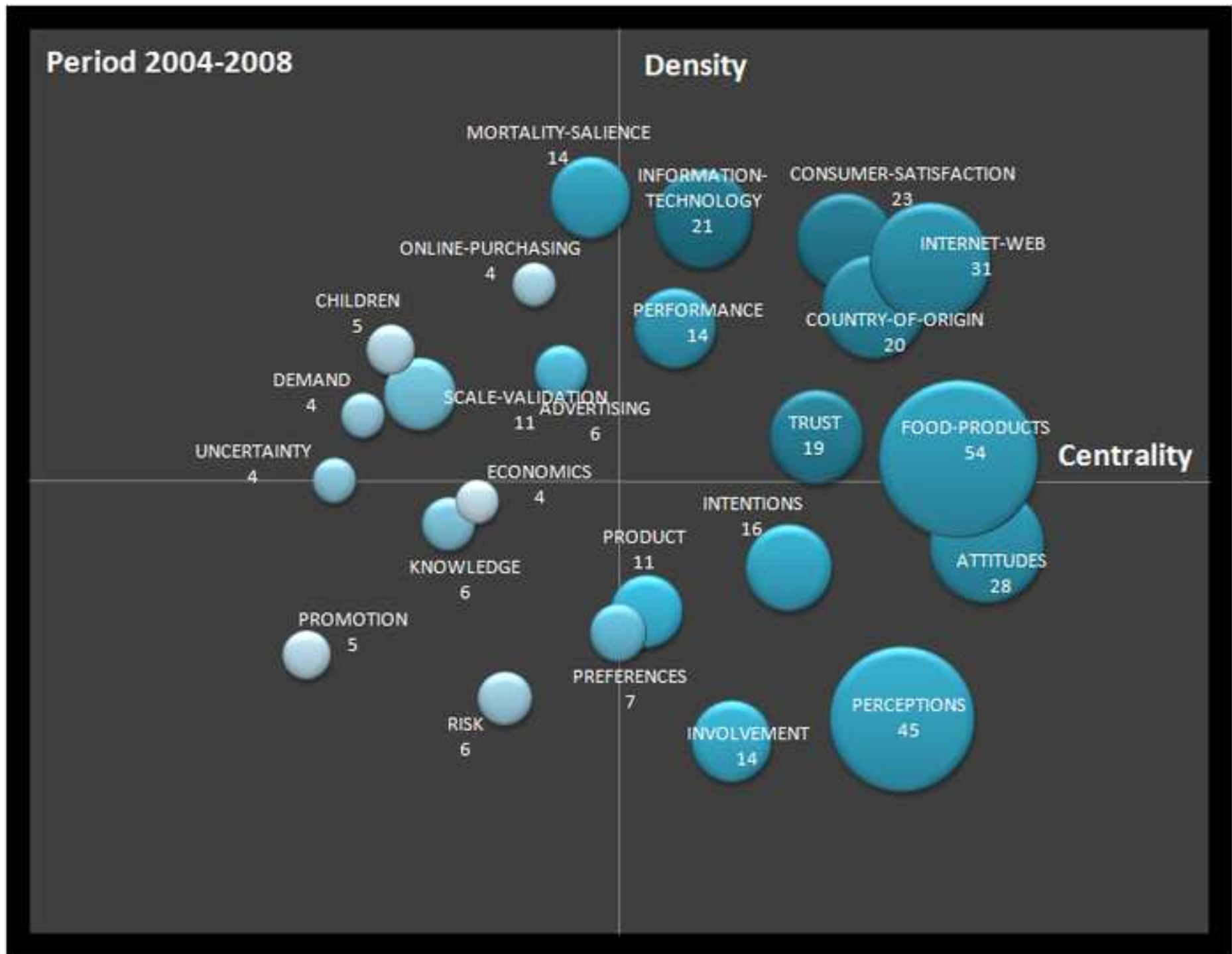


Figure6b (.tif)

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