



# Bibliometric analysis of corporate governance research in German-speaking countries: applying bibliometrics to business research using a custom-made database

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## Abstract

The objective of the present study on corporate governance research in German-speaking countries is to portray the networks in this field, identify the central sources and actors, and establish the relations between individual subdisciplines. The present paper therefore uses bibliometric and network analysis to investigate business research literature in the leading journals in German-speaking countries. As none of the major citation databases could be used for the bibliometric analysis given the subject area under investigation, the first step was to create a bibliometric database for the planned evaluation. Using this as a basis, bibliometric evaluations were then carried out with a focus on co-citation analysis. This analysis was based on an evaluation of over 10,000 references in 267 source documents. This identified the key publications on business research in German-speaking countries that have a particularly strong influence on the subject of corporate governance. The various key areas were clustered according to similarity and visualized in a network.

**Keywords** Bibliometrics · Co-citation analysis · Corporate governance research · Economics · Business research · Social network analysis · Clustering · Mapping · VOSviewer

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## Introduction

Despite its current relevance, German corporate governance<sup>1</sup> research has not yet been the subject of bibliometric analysis. Combined with the methods of social network analysis, bibliometric analyses can quantitatively describe formal scholarly communication and thus illustrate a research area's structure, central themes, and existing correlations, for instance in the form of clusters and networks. Against this background, a detailed analysis of the development of research will help to selectively appraise the different facets of the corporate governance discussion in German-speaking countries and thus to create a better basic understanding of the topic and depict the current research scene.

So far, corporate governance has been perceived as a largely unsystematic part within business research that has been fragmented into many individual topics. Irrespective of this, corporate governance has continuously gained in importance as a business research topic in German-speaking countries over the last two decades. Corporate governance is a heterogeneous field of research within business administration. Business management corporate governance research analyses the functioning of a company as well as the economic efficiency of the company's organisation and activities. The theoretical analysis of corporate governance is primarily focused on hierarchical relationships such as those between shareholders and the Management Board or between the Management Board and the auditors. Business management corporate governance research also analyses the structure and characteristics of individual governance actors against the background of diversity or the structure of compensation systems. The heterogeneity of economic corporate governance research is additionally increased by the influence of national regulatory requirements, ethical standards and cultural conditions on the design of corporate governance. Country-specific differences between the individual corporate governance systems cause in different research focuses between individual countries (Warncke 2005, p. 43). The corporate governance system and understanding in the German-speaking world differs in many ways from the corporate governance practised in other countries. For example, the German and Austrian corporate governance systems are characterised by a dualistic top management consisting of the Management Board and the Supervisory Board and are considered stakeholder-oriented primarily due to the concept of participation (Welge and Eulerich 2012, p. 85).

The thematic heterogeneity as well as the high country specificity of the business management corporate governance research mean that corporate governance has not yet been perceived as a systematic and uniform research strand within business research. This

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<sup>1</sup> At the heart of the corporate governance discussion lies the separation of ownership and (corporate) control/power of disposition, which arose as a result of the spread of large publicly owned corporations from 1850 onwards and in the 20th century in particular. As a consequence of this separation, conflicts of interest and differences in discretionary powers developed between owners and managers, fostering opportunistic conduct on the part of the managers. As a result, corporate governance research focuses primarily on finding solutions to these problems. This is partly achieved on a theoretical basis, for instance through explanations provided by principal–agent theory or stewardship theory. Otherwise, attempts are made to address the lack of monitoring by introducing appropriate regulatory provisions and legislation, such as the Sarbanes–Oxley Act in the USA, or, in Germany, the Corporate Sector Supervision and Transparency Act (KonTraG), Company Transparency and Disclosure Act (TransPuG), and Accounting Law Modernization Act (BilMoG). Furthermore, codes of conduct known as “soft laws”, such as the German Corporate Governance Code (DCGK), also address this issue. Thus, overall, corporate governance can be regarded as a legal and de facto regulatory framework for managing, controlling, and monitoring a company. This regulatory framework comprises regulatory provisions, recommendations for conduct, as well as conduct at an individual, personal level.

article is dedicated to business-related corporate governance research, taking into account the specifics in German-speaking countries, with the aim of systematizing corporate governance research as well as its content-related structure and historical development. For the authors of this paper, it is important to combine methodological competence in quantitative analyses with well-founded specialist knowledge from economics. This paper is intended as an example of how a subject area can be examined with the help of bibliometric methods and the results of this investigation can be interpreted with the help of the content background. The aim is to make statements on actors, bodies, outstanding publications, thematic clusters and the development of the subject area. The paper is to be seen as a case study for the combination of quantitative analyses and qualitative background, based on a database created especially for this topic. The target groups are therefore both bibliometricians and economists.

### **Definition of “corporate governance”—Introduction to research project**

Most bibliometric analyses are created with existing publication and citation databases, such as Scopus or Web of Science. The reason for this is the great effort required to create a database containing the original publications and their footnotes. In exceptional cases, there are reasons why it makes sense to create your own database. One reason—and this is also the reason for the analysis on which this paper is based—is the thematic coverage of the existing databases for a subject area: Both Scopus and Web of Science and other citation databases of economics available for the German-speaking area do not sufficiently cover the subject area from a business management perspective, since not enough German-language journals are represented in the corresponding databases.

For the purposes of the present evaluation and in order to undertake a bibliometric analysis, a database was developed at the University of Duisburg-Essen that recorded the relevant bibliographic data of 276 original publications and of the publications cited in the lists of references and footnotes of these original publications. The database created is very similar to the structure of the Web of Science: it contains a bibliographic section containing the information of the authors, the journal title as well as publication year, volume, issue number and page number. This information is linked to an index number, i.e. a unique ID. This is relevant for the second part of the database: the citation index. The ID is the connection between the two parts of the database. The citation index contains the ID, the author names of the citing article, the title of the publication and the year of publication. With these data, the aim of the present study, to carry out a co-citation analysis, is in any case feasible. “Any source citation may subsequently become a reference citation” (Garfield 1984, p. 528). In this way, a specific citation index was created for the field of corporate governance in German-speaking countries. This index depicts the relationships between the original publications listed in the index as well as the publications cited by the original publications.

With the overall objective in mind, citation, co-citation, and cluster analyses will be used here to illustrate the structure and development of business-related corporate governance research in German-speaking countries as a whole and to address the following questions:

- Which publications and authors were cited most frequently in the period under review? (Citation analysis)
- Which publication pairs were cited together most frequently? (Co-citation analysis)

- What significance do the most-cited publications have within German-language corporate governance research? What thematic clusters can be identified for corporate governance research? What is their main thematic focus and which publications led to the creation of these clusters? Which clusters establish connections to other research fields? (Cluster and network analysis)

In order to look at the specific procedures involved in citation, co-citation, and cluster analyses, the next section details the general methodology of bibliometric analysis and outlines the methodology used in this particular work.

## Methodology

In order to quantitatively determine the purpose of and developments in the communication system of business-related corporate governance research in German-speaking countries, bibliometric analyses on citation and co-citation behaviour will be performed in the course of this study. By conducting relevant evaluations and analyses of publications, citations, and co-citations, research areas will be identified within an individual field and between multiple research fields (Winterhager 1994).

### (1) The database used

Standard citation databases such as Web of Science or Scopus cover much of the scholarly output in the fields of medicine and science, with publications primarily appearing in international, English-language journals. However, these databases are unsuitable for business research publications in German-speaking countries, as they contain few German-language business research journals. In order to overcome the lack of bibliometric information about business research publications from German-speaking countries in these databases, citation and co-citation data were collected manually on the basis of the studies conducted by Schäffer et al. (2006, 2011), Gmür (2007), and Roth and Gmür (2004).

Journals relevant to the analysis were selected on the basis of the “Jourqual” journal ranking by the German Academic Association for Business Research (VHB) for business research journals (Schrader and Hennig-Thurau 2009). The Jourqual ranking considers and rates 1633 national and international journals relevant to business research and is based on the assessments of over 1000 experts from Germany, Austria, and Switzerland (Schrader and Hennig-Thurau 2009). As there is no journal with a leading quality index in German-speaking countries that specializes in the field of corporate governance, the available subdisciplines were examined and the categories of “ABWL” (general management), “Organisation und Personal” (organization and human resources), “Rechnungswesen und Controlling” (accounting and controllership) and “Wirtschaftsethik” (business ethics) were identified as having sufficient relevance for corporate governance and were included in the selection. This selection was based on these subdisciplines’ close connections with the topic of corporate governance as well as on the personal evaluation the authors of this paper. The journals addressing corporate governance topics of practical relevance, such as *Zeitschrift für Corporate Governance* or *Der Aufsichtsrat*, did not receive a high quality index in the Jourqual ranking, and for this reason were not included in the study. Overall, the following were identified as leading journals based on the quality index value of the Jourqual ranking (the abbreviation, if any, and the quality index are given in brackets)<sup>2</sup>:

<sup>2</sup> Only German-language journals covering the entire spectrum of business administration are included in the database in order to obtain a holistic view of corporate governance research.

- *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung* (zfbf) (7.21) including *Schmalenbach Business Review* (sbr) (7.2)
- *Zeitschrift für Betriebswirtschaft* (ZfB) (7.01)
- *Zeitschrift für Personalforschung* (6.74)
- *Die Betriebswirtschaft* (DBW) (6.70)
- *Journal für Betriebswirtschaft* (JfB) (6.09)
- *Industrielle Beziehungen* (6.09)
- *Zeitschrift für Planung und Unternehmenssteuerung* (5.90)
- *Zeitschrift für Wirtschafts- und Unternehmensethik* (ZFWU) (5.89)
- *Die Unternehmung* (5.78)
- *Betriebswirtschaftliche Forschung und Praxis* (BFuP) (5.57)

The year chosen as the starting point for the bibliometric study was 1995. In order to evaluate the relevance of individual documents to the present study, the indicators chosen were “title”, “keywords”, and “abstracts”. If terms such as “corporate governance” or “supervisory board” featured in one of these three categories in a particular document, the document was included in the database after being checked by two experts. In order to ensure that corporate governance research in German-speaking countries was represented as fully as possible, both empirical and non-empirical documents were taken into consideration. Moreover, any publications dealing with similar business research topics were also included in the study if they were deemed to be connected or of relevance. This ensured that the analysis of the business research discussion would be as comprehensive as possible. In addition to “corporate governance”, the search terms used were “good business management”, “remuneration”, “board”, “executive board”, and “supervisory board”. The results were examined to determine whether their subject matter had a clear link to corporate governance research. In order to prevent a subjective distortion of the results, Prof. Dr. Marc Eulerich and a second expert in this subject field each conducted an independent selection of relevant documents and then crosschecked each other’s selection, ensuring relevance at all times.

The database created at the University of Duisburg-Essen has two levels, the first of which contains the following information on the original publications:

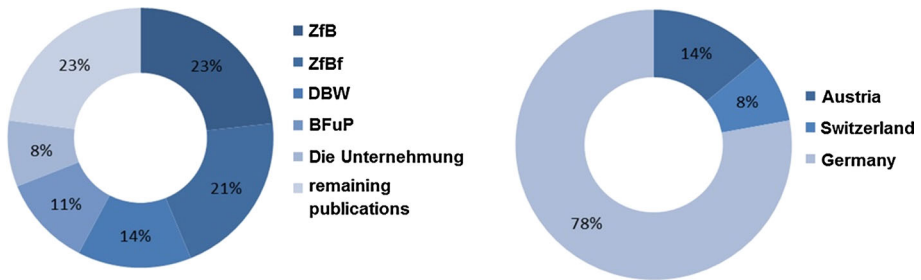
- First, second, and third author
- Source name
- Year of publication
- For journals: year and issue number
- Number of pages
- Index number (unique ID)

The permanent index number is a unique identifier that makes each specific data set retrievable. Thus, at the second level of the database, only this index number is required in addition to

- Author name (first author) and
- Year of publication

in order to combine original and cited documents, so that the database can be used to perform bibliometric analysis.

For the period 1995–2010, the authors identified 276 documents from the selected journals that were relevant to corporate governance research according to the aforementioned criteria. As shown in Fig. 1, the source documents are mainly distributed over five



**Fig. 1** Distribution of the 267 source documents according to journals and region

journals: almost 75% of all selected publications were published in these five core journals. In terms of the language, the German-speaking journals predominate. 78% of the scientific articles on the topic of corporate governance were published in Germany.

## (2) Citation analysis

A citation is the reference in a scientific paper to a previous publication (Stock 2001, p. 34). It marks a flow of information and thus signals proximity to the content. Eugene Garfield's idea for a citation index for improving the information retrieval of scientific publications is based on this approach. A citation index "is an ordered list of cited articles each of which is accompanied by a list of citing articles" (Garfield 1984, p. 528).

First, the documents identified were investigated using citation analysis. In this type of analysis, a citation in a particular document is used as a basis for determining the relevance of a source or an author to that document (Gmür 2003). For this purpose, all publications cited in a given source document were recorded and transferred to a matrix. These references incorporate all of the source types cited, including journal articles, monographs, contributions to anthologies, published studies, etc. By including all references in their entirety, the citation structures were reproduced fully and no important documents were systematically excluded due to their publication type. This matrix in turn helped to determine which publications were cited most frequently in the period under investigation and are therefore of proven relevance to the research area in question. This statement is based on the observation that distributions are generally not linear, but skewed (see Results-Section): it can therefore be asserted that a work that is cited above average is given more attention or resonance (van Raan 2004, p. 28). This is the basis for the formation of citation-based indicators, which in the simplest form are an absolute number (e.g. number of citations), in the next more complex level are represented as relative indicators (e.g. citation rate) and in the final stage as normalized indicators (e.g. RCR, JCSm or J-factor).

The observation of the skewed distribution of citations to publications allows conclusions to be drawn as to which original publications have a higher weight and which a lower weight. For the database on "Corporate Governance" on which this publication is based, a corresponding evaluation of the citations (citation analysis) has been prepared in the Results section in order to be able to draw conclusions on the weight of the underlying documents by distributing the citations to the publications. The result will be compared with the core results of this publication: the co-citation analysis.

### (3) Co-citation analysis

This form of bibliometric analysis follows the opposite path of co-author analysis: it is followed which authors or institutions are often cited together or cite each other (Diodato 1994, pp. 37–44). This can provide information about which way certain knowledge takes and in which direction knowledge diffuses. A co-citation occurs when two sources or authors are both referenced in a single publication. Co-citation analysis (Marshakova-Shaikovich 1973; Small 1973) is thus based on the assumption that two documents appearing together in the reference list of a third document are related in terms of content (Small 1973). Thus, co-citation can be understood as a measure that portrays the contextual similarity of multiple publications related to a theory, topic, methodology, or empirical field (de Price 1965; Crane 1972; Leivrouw 1989; Small and Greenlee 1980; Gmür 2003).

“From a mathematical point of view, a co-citation network is a one-mode projection of a bipartite network consisting of two types of vertices, citing documents and cited documents, analogous to co-author networks consisting of author and document vertices. In forming a co-citation network we usually begin by selecting a sample of cited documents and then compute all the co-citations between the document pairs” (Small 2009; see also Newman et al. 2001).

Thus, other publications that are conceived as bibliometric evaluations of scientific fields also use co-citation analyses as a component with the aim of obtaining information on the structure of the subject area through co-citation analysis, e.g. Li et al. (2017): “The clustering and critical analysis of reference co-citations can disclose the knowledge structure of a field as well as the evolution of research fronts and its key documents”.

The information to be provided by the co-citation analysis relates primarily to the structure of corporate governance research and the question of which publications are cited frequently and which are cited frequently together. These publications can subsequently be regarded as basic literature of the subject area. What is interesting here is from which periods this basic literature originates and whether it can be thematically clustered. If this is the case, the structure of corporate governance research can be analysed and the influence of different thematic trends can be presented (Hou 2017; Hauke et al. 2017).

For the co-citation analysis, the directed matrix that was used for the citation analysis, containing the direct references cited by the source documents, was converted into a co-citation matrix. A co-citation matrix is a symmetrical, square matrix containing the number of co-citations of each of the  $n \times n$  document pairs, i.e. the number of source documents whose lists of references contain both documents.

On a document level, co-citation analysis combined with social network analysis methods enabled us to investigate and visualize the structure of the research scene in the field of corporate governance. The co-citation matrix contained 10,015 documents, each of which had been co-cited with another document at least once. Eleven of the documents were excluded from the co-citation analysis as each of them is cited only once. These are contributions that can be regarded as rather unimportant for the scientific discussion of corporate governance, otherwise they would have been cited by other authors. They are opinions or short publications.

In order to exclude random connections, a threshold was set so that the co-citation matrix would only include connections between relevant co-citations and that two documents named together in a reference list by chance would be excluded. A threshold value of three was selected for representing the network and computing the clusters. In a network analysis, the threshold is responsible for reducing complexity, which makes the analysis useful in the first place, and for ensuring that the content of the analysis is not distorted.

Random connections should be removed from the analysis without loss of meaningful information (Small 2009; Shaw 1985). For the present analysis, the threshold at a minimum occurrence of three was considered the best possible value. As the majority of the documents in the data set were only co-cited once or twice, the network was reduced to 462 documents.

As the number of co-citations of two documents depends on how often they are cited generally, a relative value rather than the absolute number of co-citations is used to assess their respective similarities (van Eck and Waltman 2009). It is essential to relativize the data, in particular for clustering, i.e. grouping documents together on the basis of their similarities. Absolute values prevent the selective differentiating of individual clusters. This means that sources with a low absolute number of co-citations will not be assigned to a cluster even though they may be closely related to the source in terms of content. For this reason, the absolute number of co-citations is relativized by relating both sources to their respective citation frequency. Similarities can be relativized using a similarity measure known as association strength. Association strength is defined as

$$\text{Association Strength} = \frac{c_{ij}}{s_i s_j}$$

where  $c_{ij}$  represents the number of times the documents  $i$  and  $j$  were co-cited and  $s_i$  and  $s_j$  represent the total number of times  $i$  and  $j$ , respectively, were co-cited (van Eck and Waltman Eck et al. 2010a, b). Association strength is a probabilistic similarity measure that has proven to be a particularly suitable means of normalization for co-citation analysis (van Eck and Waltman 2009).

Cluster analysis, an exploratory method of multivariate data analysis, enables particular items to be arranged into homogeneous groups on the basis of their similarities (Backhaus et al. 2011, p. 397). These clustering and mapping methods can be combined and visualized, for example in the software program VOSviewer.<sup>3</sup> On the basis of the association strength measure and a set minimum threshold of co-citations, each source document can be assigned to the appropriate cluster and integrated directly into the network representation.

## Results and discussion

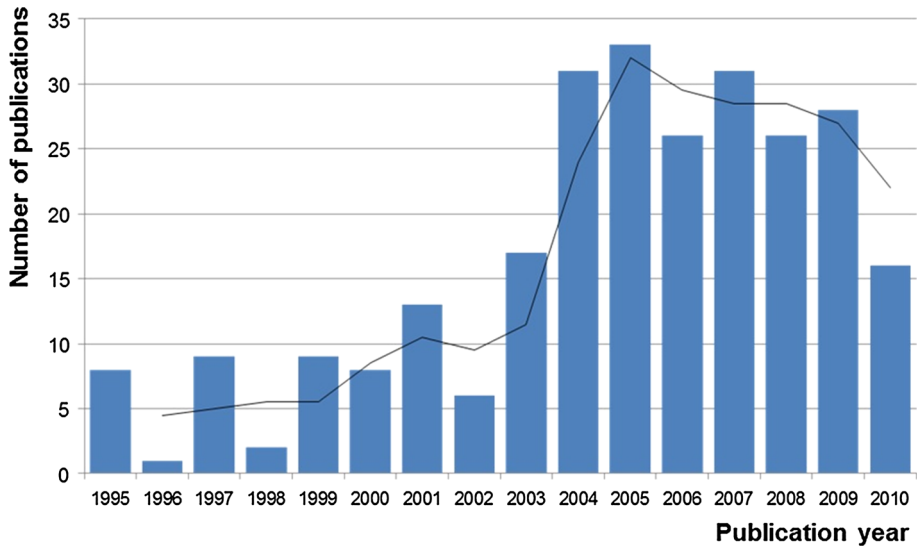
### (a) Bibliometric results

The present study is based on 267 documents on corporate governance published in business research journals in German-speaking countries between 1995 and 2010. Figure 2 shows the chronological distribution of the documents published in this period. The graph shows that publication activity in the area of corporate governance increased substantially from 2003 onwards. One possible explanation for this fact might be, that after the large corporate scandals of Enron and Worldcom Corporate Governance has become one major aspect of today's corporate environment and therewith also for today's research activities. Based on the rapid increase in the number of publications, it is fair to describe this as a trend (Tunger 2009).

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<sup>3</sup> VOSviewer is a software program for visualizing clusters and network structures that was developed specifically for bibliometric purposes.





**Fig. 2** Chronological distribution of the 267 corporate governance documents in German-speaking countries

### Results of the database analysis

Closer examination reveals that the distribution of the documents over the journals and other sources leads to a typical Bradford distribution: “Articles on a scientific topic can be divided into three groups of journals, with each group containing a similar number of publications. The number of journals in each of the three groups is at a ratio of 1:n:n<sup>2</sup>, where *n* is defined as the Bradford multiplier. The first (and smallest) group contains the core journals in the subject area; the second contains those that publish articles on this subject regularly; and the third group is composed of journals that only publish articles on this subject infrequently” (Bradford 1934; Haustein and Tunger 2013).

When applied to the present corporate governance database, this means that there is a small number of journals containing the majority of the relevant publications and a large number of journals containing few relevant documents. In accordance with Bradford’s law, three groups are formed, each containing a similar number of publications. In the present case, this means that each group contains around 90 publications.

Group 1 (the core journals) consists of *Zeitschrift für Betriebswirtschaft* (ZfB) and *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung/Schmalenbach Business Review* (zfbf/sbr). Together, these two journals contain 117 of the documents. Group 2, comprising 89 documents, is formed by combining the next three sources—*Die Betriebswirtschaft* (DBW), *Betriebswirtschaftliche Forschung und Praxis* (BFuP), and *Die Unternehmung*—into a single group. The third group is composed of all remaining sources, amounting to a total of 60 documents.

This shows that Bradford’s law is valid here and can be applied to the present corporate governance database. This is an important statement, as it means that a citation index can be constructed according to economic criteria and, from the outset, is not required to cover 100% of the journals in a subject area. “Nevertheless, justifiably sound bibliometric

evaluations may safely be made on the basis of this data in the knowledge that the core journals of a discipline are included” (Haustein and Tunger 2013).

This demonstrates the quality of the database, in that the journals in German-speaking countries that are important to the topic of corporate governance were identified and incorporated in the database. Bradford’s law helps to clearly identify the journals that can be considered the core journals of a discipline, those that address a topic on a regular basis, and those in which the topic is of marginal significance.

When considering authors’ publication output, Lotka’s law can be applied. This law states that “the number of authors publishing  $n$  contributions corresponds to about  $1/n^2$  of the number of authors publishing only one contribution” (Haustein and Tunger 2013; Lotka 1926).

Therefore, if the number of contributions is distributed among authors, this distribution will be skewed. If Lotka’s law is applied to the present corporate governance database, the following result is obtained (in this evaluation, only the first author of each document was considered):

Only 12 authors published more than two contributions each in total. 31 authors published exactly two contributions, and 161 authors had only one contribution. The evaluation of publications at author level is introduced here in order to be able to check the Lotka distribution and thus make a statement about the data source. Lotka’s law is also valid here and can be applied to the present database (Table 1).

On the whole, it can be concluded that the quality of the database is such that it is subject to the expected laws (Bradford and Lotka) and is therefore of high validity for the present study.

## Results of the citation analysis

The 267 original documents cite 10,015 different sources 13,527 times. This corresponds to an average of around 50 citations per original document. The directed connections (from the 267 source documents to the 10,015 references) can be recorded in full in a  $267 \times 10,015$  matrix. The citations were distributed among the documents according to the Pareto principle, which is typical of bibliometric data: a small number of documents were cited particularly frequently and a large number of documents were cited very infrequently. Thus, of the 10,015 publications, 80.8% were cited only once. In comparison, the most frequently cited publications were Jensen and Meckling (1976), Shleifer and Vishny (1997), Murphy (1999), Jensen (1986), Hart (1995), Witt (2003), Berle and Means (1932), and Jensen and Murphy (1990) (see Table 2). Together, these eight documents reflect a broad thematic spectrum within the corporate governance discussion.

With the exception of Witt (2003), all of these publications originate from the USA and are regarded as fundamental works of corporate governance research that define the topics in this field more closely, irrespective of country-specific regulatory provisions.

By aggregating the direct citations on the level of first authors,<sup>4</sup> the 267 source documents cite a total of 4683 authors. The most frequently cited first authors—and thus the key actors in corporate governance research in German-speaking countries—are *Jensen*, *Albach*, *von Werder*, and *Theisen*. Here, in contrast to the document-level consideration, the German-speaking authors predominate in this analysis despite the prominent position held by Jensen. Figure 3 shows the authors with a minimum of 30 citations and indicates

<sup>4</sup> In order to ensure that a clear analysis was achieved, the document analysis level had to be reduced to the dimension of first authors for technical reasons.

**Table 1** Authors with more than two contributions in the database

| Name                   | Number of contributions |
|------------------------|-------------------------|
| Albach, Horst          | 8                       |
| Bassen, Alexander      | 6                       |
| Balsmeier, Benjamin    | 5                       |
| Theisen, Rene Manuel   | 5                       |
| Böcking, Hans-Joachim  | 4                       |
| Fallgatter, Michael J. | 4                       |
| Middelmann, Ulrich     | 4                       |
| Quick, Reiner          | 4                       |
| Köhler, Annette G.     | 3                       |
| Pellens, Bernhard      | 3                       |
| Schmid, Frank A.       | 3                       |
| Witt, Peter            | 3                       |

**Table 2** Most frequently cited documents of the 267 source publications

| Document                   | Number of direct citations | Direct citations in % | Subject area                                     |
|----------------------------|----------------------------|-----------------------|--------------------------------------------------|
| Jensen and Meckling (1976) | 62                         | 23.22                 | Principal–agent theory                           |
| Shleifer and Vishny (1997) | 30                         | 11.24                 | Current overview of the field                    |
| Murphy (1999)              | 17                         | 6.37                  | Remuneration                                     |
| Jensen (1986)              | 17                         | 6.37                  | Principal–agent theory                           |
| Hart (1995)                | 17                         | 6.37                  | Comparison of corporate governance systems       |
| Witt (2003)                | 15                         | 5.62                  | International corporate governance comparison    |
| Berle and Means (1932)     | 15                         | 5.62                  | Separation of ownership and power of disposition |
| Jensen and Murphy (1990)   | 15                         | 5.62                  | Remuneration                                     |

whether they are from a German-speaking country (“National”) or of international origin (“International”).

**Results of the co-citation analysis**

In absolute terms, the strongest co-citation connections exist between Jensen and Meckling (1976) and, respectively, Shleifer and Vishny (1997), Berle and Means (1932), and Jensen (1986) as well as between Shleifer and Vishny (1997) and Berle and Means (1932) (cf. Table 3). This can mainly be attributed to the general focus of these documents.

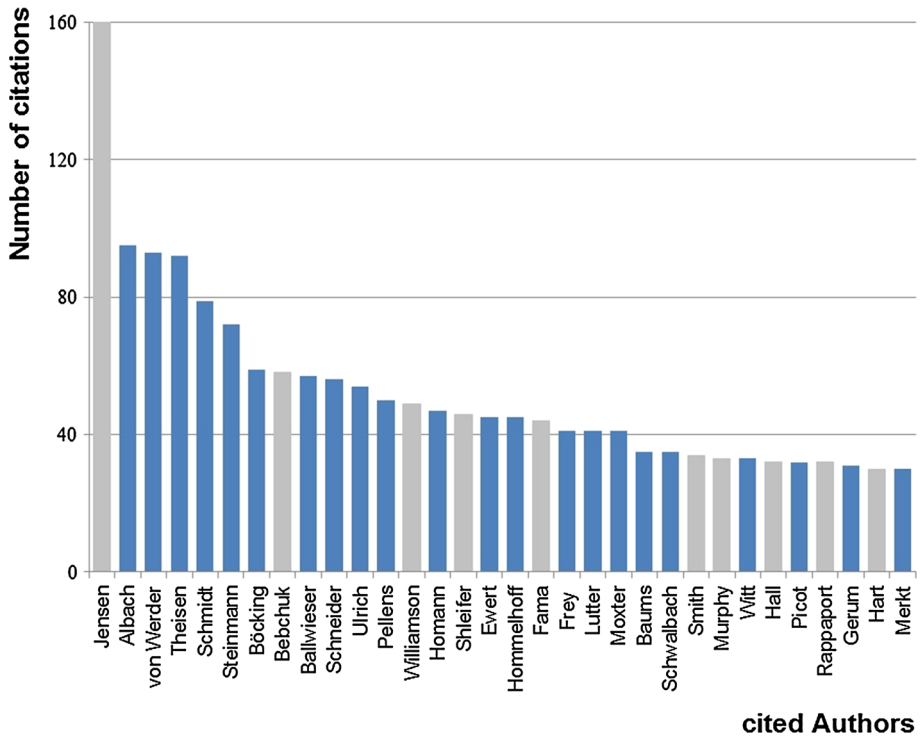


Fig. 3 The 32 most frequently cited first authors with at least 30 citations

Table 3 Document pairs with the highest absolute numbers of co-citations

| Document pair                                           | Number of co-citations |
|---------------------------------------------------------|------------------------|
| Jensen and Meckling (1976) – Shleifer and Vishny (1997) | 21                     |
| Jensen and Meckling (1976) – Berle and Means (1932)     | 13                     |
| Jensen and Meckling (1976) – Jensen (1986)              | 12                     |
| Shleifer and Vishny (1997) – Berle and Means (1932)     | 12                     |

Using cluster analysis, the co-citation connections identified were divided into 32 different clusters containing between 156 documents (Cluster #1) and 2 documents (Clusters #15 to #32). Figure 4 shows the number of documents per cluster.

As shown in Fig. 4, the number of documents per cluster decreases markedly in ascending order of the cluster number. For this reason, the following analysis is confined to the six main clusters (#1 to #6) as, together, these cover 381 (82.3%) of the 469 cited documents. Figure 5 shows these six clusters and their key documents. The clusters are colour-coded to distinguish them from each other. The nodes represent the 469 co-cited documents, while the lines between the nodes indicate the normalized co-citation strength between two documents (Van Eck and Waltman 2012).

The small clusters on the edge of the network contain documents with no direct connection to the main components at the centre of the network. These mainly represent

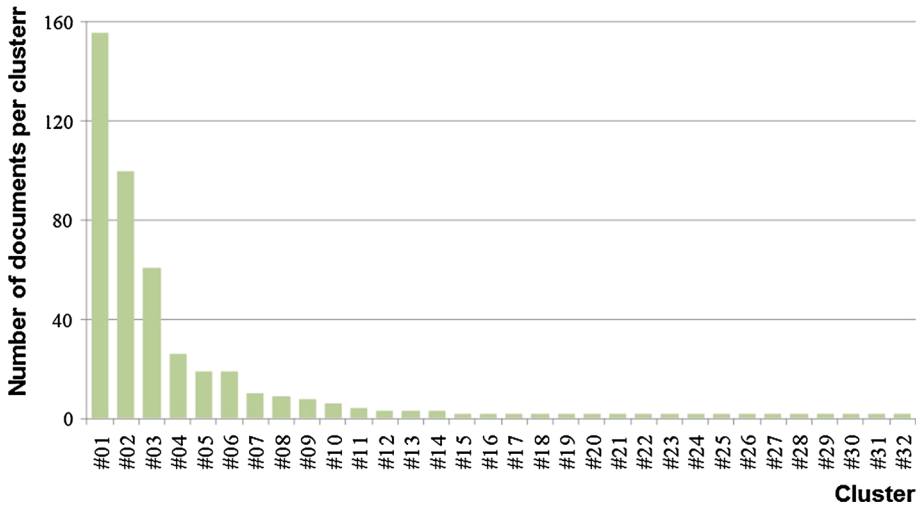


Fig. 4 Distribution of the documents over the 32 clusters

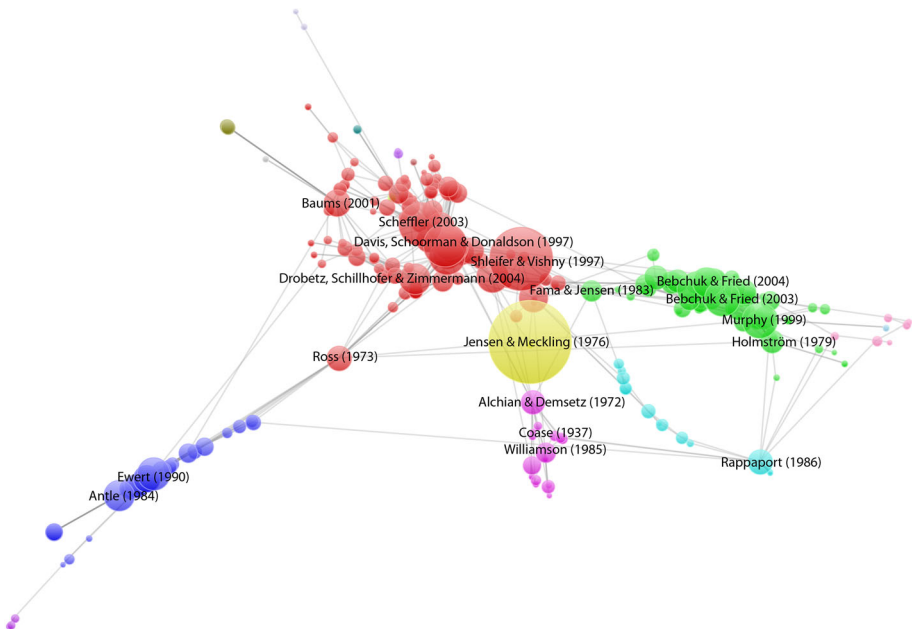


Fig. 5 Central components of the network showing the most important documents

peripheral topics in the business-related corporate governance discussion, such as corporate ownership or finance management.

Due to the clear dominance of the six main clusters, the following content-related analysis will concentrate on the main components at the centre of the network because, as

previously mentioned, the size of the clusters decreases rapidly thereafter. Figure 6 shows the six largest clusters in the entire network.

Figure 5 shows the relationships between the co-cited documents graphically in the form of a network (it does not contain any axes). Clusters are characterised by the same colour of the dots and form thematic clusters of the set of publications examined in the field of corporate governance (see interpretation of the content of the individual clusters in the following). The size of the individual nodes depends on the “degree”, i.e. the number of connections in the overall network, so the larger a node is, the more connections it has to other nodes in the network. In the overall network an article by Jensen and Meckling (1976) entitled “Theory of the firm: Managerial behaviour, agency costs and ownership structure” has the most connections in the network, cited in 208 of the remaining 462 documents and a total of 479 times. The more central publications are for the set of documents examined (i.e. the more frequently they are cited together with others), the more central the position of these publications in the network. Centrality results from the fact that a publication is linked to a larger number of (other) publications via co-citations.

Due to its large number of connections within the overall network, this document occupies a central position in German-language corporate governance research. Thus, the article by Jensen and Meckling (1976) is connected to documents from all of the central clusters (#1 to #6). Due to the high number of co-citations from all clusters, this publication seems to be very important.

#### (b) Business research results

From 2003 onwards, a notable increase was observed in the number of publications on corporate governance. As a result, the topics within the research field also diversified accordingly. Publications appeared on the remuneration of executive and supervisory boards, accounting, and controlling. However, from 2005 onwards there was also an increase in the number of corporate governance publications relating to the topics of business ethics, co-determination, competition and the DCGK.

### Content-related description of the clusters

The following description provide a brief outline of the topics in the central clusters:

#### #1 Conceptual Framework of German-language corporate governance research

Cluster #01 is to be interpreted as a conceptual framework for German-language corporate governance research. The fundamental work of Berle and Means (1932), Ross (1973), Shleifer and Vishny (1997) and Hart (1995) is to be regarded as a theoretical foundation of corporate governance due to their positioning. Jensen (1993) and Meyer and Rowan (1977) are two other theoretical sources in the network, each of which looks at the corporate organization and the associated structure of corporate governance. The theoretical foundation is expanded by Davis et al. (1997) and Donaldson and Davis (1991) by developing and using stewardship theory as an alternative approach to principal-agent theory.

#### #2 Remuneration of management

Cluster #02 deals with management remuneration. Holmström (1979) and Fama and Jensen (1983) use the principal-agent theory and the findings of Jensen and Meckling (1976) to investigate the basic problems of corporate governance. Holmström (1979) analyses the emergence and impact of Moral Hazard and Fama and Jensen (1983), examining the importance of the Board of Directors for the functioning of corporate

governance and the possibilities of control. The two studies refer to the US-American, monistic board structure. Although this differs from the dualistic management structure, the knowledge gained can nevertheless be transferred to the Management Board and the Supervisory Board, since the monistic corporate governance system also separates executive and supervisory actors and the tasks and problem areas mentioned can be found in both corporate governance systems. Management remuneration is discussed in more detail by Murphy (1999).

### #3 Auditing

Cluster #03 includes the final audit as part of corporate governance. Starting from the independence of the auditor, as addressed by Antle (1984), Ballwieser (1987) combines the theoretical model of the principal-agent relationship with the activity of the external auditor and Ewert (1990) expands the analysis to include asymmetric information. The position of the auditor in the corporate governance system is an important component of German-language corporate governance research and can be found in numerous publications. The audit is a shareholder control mechanism and ideally reduces existing information asymmetries between the shareholders and the responsible management.

### #4 Principal-agent theory

Cluster #04 is characterized by the contribution of Jensen and Meckling (1976) and the principal-agent theory developed therein. The principal-agent theory is the most important and universally valid approach for describing and analysing the interactions of the actors involved in the corporate governance system. The importance of principal-agent theory is shown by the fact that each of the other main clusters has a connection to cluster #04. The principal-agent theory provides an explanation for shareholder value theory (cluster #06), management remuneration (cluster #02), transaction cost theory (cluster #05) and the auditing (cluster #03).

### #5 Transaction cost theory

Cluster #05 also integrates numerous theoretical works and deals increasingly with transaction cost theory, but also with the property rights approach. The publications of Coase (1937), Alchian/Demsetz (1972) and Williamson (1985) deal with these theories of companies from the perspective of New Institutional Economics. Accordingly, companies are to be regarded as a system of contracts or rights of disposal that leads to a more or less efficient execution of transactions between different actors. In addition, Jensen and Meckling (1979) refers to the connection between the property rights approach and co-determination, which theoretically deals with the individual maximisation of benefits taking into account the rights of disposal and production functions of companies.

### #6 Shareholder value theory

Shareholder value theory is the subject of Cluster #06. A great influence has the source Rappaport (1986), which deals intensively with the shareholder value. Aligning all corporate activities to maximize shareholder value is one way of resolving the problems that result from separating ownership and corporate responsibility. As a result of the shareholder value orientation, the target congruence between the shareholders and the responsible managers is sought. By contrast, the stakeholder approach is integrated by Freemann (1984), which establishes the balance of interests of various stakeholder groups as an objective of companies. Both approaches, shareholder value theory and stakeholder approach, are also used to support the German-speaking, more stakeholder-oriented

corporate governance systems, whereby the shareholders are regarded as very important stakeholders of a company.

## Summary and conclusions

The present paper aimed to use citation, co-citation, and cluster analysis to create a useful, structured portrayal of the corporate governance research scene, to achieve deeper insight into the relationships between research disciplines and authors, and, if possible, to illustrate connections to other scientific disciplines. Furthermore, by taking key documents and key authors into account, a better understanding was achieved of the structure of citations and co-citations in the context of corporate governance. Cluster analysis enabled the researchers to take the most important publications on a subject area into consideration as well as to illustrate connections to other research disciplines based on the existing nodes.

The research areas in German-speaking countries are directly and transparently linked on the basis of key publications from English-speaking countries. These English publications appeared first predominantly because of the long-established capital market orientation and the related separation of ownership and power of disposition, which has also been an established topic of discussion in the Anglo-American academic community for many years. While in principle this situation also applies to German-speaking countries, further development here often relies on a transformed elaboration of the monistic board model (one-tier system) to conform to the regulatory framework in these countries, through the separation of company management by an executive board from company monitoring by a supervisory board (two-tier system).

The networks represented in this paper verify that corporate governance often has a clear connection to jurisprudence. This is primarily due to the fact that the subject areas relevant to business research, such as cooperation between supervisory and executive boards or auditing, are regulated by considerable legislation and provisions. In contrast, the connection to behavioural science is less evident, and can be distinguished primarily in the fields of management remuneration or group decision-making processes, particularly in relation to the topic of board dynamics. On the whole, a more detailed study of these neighbouring disciplines is required in order to provide further conclusions and explanations.

These results provide interesting points of reference for research and practice perspectives. From a scientific point of view, the bibliometric analysis and the related network representation enable individual research areas to be presented within a clear structure and also allow the interdependencies between individual topics and the connections between individual documents to be visualized. In terms of research, the individual clusters provide researchers with both a useful framework for narrowing down their own research and a basis for identifying and addressing gaps in existing research. From a practical perspective, the network representation reveals the subject areas that are relevant for the (scientific) corporate governance discussion and indicates the potential implications for practical research.

The authors wanted to find out, what kind of bibliometric analyses are possible to be prepared with a special database exact for this topic. We showed that it is also possible to carry out complex bibliometric analyses with this kind of data source. The bibliometric results (e.g. the power laws) were described and interpreted for the bibliometric community as well as the results concerning the Corporate Governance topic are interpreted for the economics community. It can be shown, that it is possible to describe publication



behaviour and publication networks for this topic. With the background of Corporate governance these results are confirmed and also a clustering of co-cited literature in a network can be conducted. The authors show how quantitative results can be interpreted and used in the context and with the background of a very specialised field to describe patterns in it.

It should be noted that bibliometric analysis is generally based on a large number of highly aggregated data. This explains why negative impacts (e.g. due to courtesy citations, failure to cite the original work, etc.) only have a limited effect (Schlögl 2000). Some of the limitations of the present paper and other remarks should be noted at this point. While the analyses presented here provide a comprehensive insight into the structure of corporate governance research, other potential dimensions of analysis have been excluded for the present. These include descriptive analyses, which could for instance consider the average number of cited documents, self-citations, or authors. However, the authors of this paper believe that the additional knowledge gained from such analyses would be of questionable value, as this information, although interesting, would only reflect the scientific development of a topic to a limited extent. A country-specific evaluation of the cited sources with regard to the affiliated institutions could also be envisaged. In terms of internationalization, another possible option would be to compare networks for different research locations, such as Germany versus the USA, in order to determine whether there is a tendency towards a transfer between the two locations and to further investigate the precise effects of this on research focus. In addition, keyword analysis could be used to obtain an initial overview. Finally, an additional dimension to a study could be an analysis of source type, which could involve a more detailed analysis of the cited journals, monographs, or edited volumes.

Moreover, the database could—and should ideally—be extended to include the dimensions of “internationalization” and “disciplines”. By conducting a comprehensive bibliometric analysis of the world’s leading journals, a more transparent understanding of global research could be achieved. In this case, however, it should be noted that the predominance of Anglo-American publications in the leading international business research journals would result in potential option in future. Other interesting aspects for future work may also be found by including further bibliometric indicators, e.g. which institutions can be regarded as leaders in terms of their research performance or in which institutions the degree of internationalization stands out in particular.

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