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Pilkington, A., Rost, K. and Teichert, T.

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Katja Rost, Thorsten Teichert and Alan Pilkington

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Katja Rost, rost@soziologie.uzh.ch, Soziologisches Institut, Universita ¨t Zu ¨rich, Zurich, Switzerland

Thorsten Teichert, thorsten.teichert@uni-hamburg.de, AB Marketing und Innovation, Universita ¨t Hamburg, Hamburg, Germany

Alan Pilkington, A.Pilkington@westminster.ac.uk, Business Information Management and Operations, Westminster Business School, London, UK

Abstract

Impact factors are commonly used to assess journals relevance. This implies a simplified view on science as a single-stage linear process. Therefore, few top-tier journals are one-sidedly favored as outlets, such that submissions to top-tier journals explode whereas others are short of submissions. Consequently, the often claimed gap between research and practical application in application-oriented disciplines as business administration is not narrowing but becoming entrenched. A more complete view of the scientific system is needed to fully capture journals ´ contributions in the development of a discipline.

Simple citation measures, as e.g. citation counts, are commonly used to evaluate scientific work. There are many known dangers of miss- or over-interpretation of such simple data and this paper adds to this discussion by developing an alternative way of interpreting a discipline based on the positions and roles of journals in their wider network. Specifically, we employ ideas from the network analytic approach. Relative positions allow the direct comparison between different fields. Similarly, the approach provides a better understanding of the diffusion process of knowledge as it differentiates positions in the knowledge creation process. We demonstrate how different modes of social capital create different patterns of action that require a multidimensional evaluation of scientific research. We explore different types of social capital and intertwined relational structures of actors to compare journals with different bibliometric profiles. Ultimately, we develop a multi-dimensional evaluation of actor roles based upon multiple indicators and we test this approach by classifying management journals based on their bibliometric environment.

Keywords Social network analysis, Journal ranking, Management, Journal actor roles

Introduction

Impact factors and surveys are often used to assess journal relevance and importance in discourses and disciplines. This provides an over simplified view of science as a single-stage, linear process. Consequently, few top-tier journals are favored as outlets by both readers and authors. This reinforcement behavior leads to imbalance, as, for example, submissions to top-tier journals explode whereas others are starved of submissions. As a consequence, the gap between research and practical application in disciplines such as business administration is not narrowing but becoming entrenched. A more complete view of the scientific system is needed to fully capture the contributions of all the journals in the development of a discipline. Scientometric efforts have strived to address this issue for a while.

Citations measure the “utility,” which can be termed effect, resonance, reception, or “impact”, that a work or journal has had on different actors. Citations are since long recognized as prone to distortions from subjective perceptions and conscious manipulation (e.g. Johnson and Podsakoff 1994). The basic idea of citation approaches to assess journal influences is that influential journals receive high numbers of citations from other journals (Garfield 1979). Citations are an indicator that academic work is recognized and that it contributes to subsequent scholarly research (Salancik 1986). Thus, citation flow serves as a proxy for advancement of the state of knowledge.

The procedure of the citation analysis seems to be conclusive on first sight, has good handling and relies on “harder” information than subjective journal rankings. They differ from interviews (an approach taken e.g. by the German Association of Business Administration Professors) by not needing the explicit cooperation of the interviewee, which may influence their answers under certain circumstances. Citations are non-obtrusive and are also easily obtained. Potential biases at the level of the individual work are less relevant for aggregate analyses at the journal level where occasional errors are swamped by the rest of the data (Marx, Schier and Wanitschek 1998). However, the influence of differences between research areas as well as publication accessibility (Pisoschi and Pisoschi 2016) remains at the aggregate level. Obviously, not just how often but also *from where* an article is cited matters a great deal to perceiving its influence. This requires us to consider the “environment of a scientific publication", which relates the work to the comparable surroundings.

As a solution, most researchers restrict their analyses to a set of pre-identified "core" journals. The assumption is that a research field can be unequivocally identified and that the bibliometric parameters are the same across all data points within this field. This is however difficult to achieve in areas which are characterized by interdisciplinary research, such as management, which import knowledge from a wide range of research such as engineering, psychology, sociology and economics. This heterogeneity hinders both the identification of a

joint “core” as well as the comparison of publications from different scholarly stances. As an example, Baumgartner and Pieters (2000) restricted their journal analysis to the specific sub-field of marketing to identify groups of journals with strong mutual citation relationships. Such a grouping is however of limited use for the structuring within any wider set of journals.

Given that basic and applied research, scientific disciplines or also geographical regions (Bordons, Fernández, and Gómez 2002) differ highly in the amount and pattern of citations, the assumption that there exists *only one parameter* to measure the impact of a journal within a sub-area is unrealistic. Information transfer and therefore diffusion of knowledge constitutes an interdependent phenomenon on the level of actors and organizations. This interdependency is recognized in an early approach of Johnson and Podsakoff (1994)[1]. A substantial heterogeneity across journals in the process of knowledge creation/distribution and collection has to be considered when assessing the contributions of journals. Different modes of knowledge creation/distribution and collection require a multi-dimensional evaluation of scientific research. Science rankings neglecting this are biased towards overvaluing basic research and research fields that are cited often.

As such, the problems of assessing scientific journals using single-stage and one-dimensional view becomes apparent (Pendlebury and Adams 2012; Leydesdorff, Wouters and Bornmann 2016). The assumption that (1) *only one parameter* can capture the impact of a journal and that (2) *only one targeted audience* exists within a field is unrealistic. This article concerns itself with these issues, namely we seek to demonstrate a more valid method for defining the position of journals and so allowing a better comparison. To do this we assess and then select specific bibliometric indicators, which help to assess the impact of journals within their specific sub-areas. More specifically, we adopt the existing approach from the diffusion of management knowledge, which relies on the location of nodes and their roles within their citation network structure.

Conceptual Background

Citation networks are understood in the formal sense as networks among cooperative actors or journals (Schenk 1984; Pappi 1987; Scott 1988; Trezzini 1998). Accordingly, recent publications successfully utilize the method of social network analysis (SNA) to describe interrelations of theories (Khan et al. 2016), institutional collaborations (Koseoglu 2016) and entire research fields. We argue that the application potential of SNA is not only restricted to methodological aspects, but can be further enriched by an in-depth view at the underlying theoretical considerations.

1 This approach however stops at the level of single-stage relationships and thus at the comparison of direct citation frequencies. It does not encompass indirect and multi-level relationships between journals.

Citation networks rely on shared views about scientific paradigm and thus contain an element of recursiveness (Weber 1985; Luhmann 1997). More broadly, citation networks represent a construct for the development and distribution of knowledge (Powell 1990; Sydow 1992; Mayntz 1993; Willke 1995). Reflecting this notion, journals are seen as embedded in a relational and positional social structure that resembles the current knowledge of the discipline. Knowledge diffusion can be measured by the reciprocal referencing of journals. This is synonymous with ideas of *social capital* (Bourdieu 1983; Coleman 1990) which questions the impact of isolated knowledge or actions of actors (human capital) and emphasizes the societal contributions achieved by linking those actors together in a system of social exchanges. Accordingly, the focus of analysis of social network measures departs from the perspective of investigating single actors towards an analysis of the interrelations between actors. Concepts used by Granovetter (1973) and Burt (1992) such as "*strong ties", "weak ties"* and "*structural holes"* exemplify this approach by stressing advantages of strong or weak interrelations across actors. We now explore these terms of social network analysis in more detail before using them within the citation network context.

Foundations of social network analysis

Strong ties are direct and intense relationships between actors and are the base for *solidarity, trust, social influence* and *prestige*. An actor's *strong ties* are economically limited in that they can be redundant as they often lead to an already linked group of actors. *Weak ties* or weak relationships characterize less intense or indirect relationships. They are commonly less redundant and supply new *information* as they bridge disparate parts of the network and are therefore often seen as significant for the innovation and diffusion process itself (Burt 1992). *Structural holes* are a special case of *weak ties*, identifying the significant and unique position of a participant who bridges otherwise unlinked clusters. This position carries extensive *autonomy* and the realization of advantages due to his strategic positioning in the information process.

Social capital is an aspect of the social structure that provides individuals or groups of actors' opportunities. It is only transferable in a limited way and can transmit *information, social influence* and *profit potentials as a result of structural autonomy* (Coleman 1988; Coleman 1990; Burt 1982; Burt 1992; Portes and Sensenbrenner 1993). This social influence stems from Weber's definition of "Herrschaft" (Weber 1972), or social influence through prestige whilst the power over *information* includes controlling limited processing capabilities and ensuring the reliability of information (Simon 1955; March and Simon 1976). The social structure argument

assumes important information functions can be separated from the social influence whilst *autonomy* refers to Burt's (1982; 1992) reflections on economic behavior and groups.

These different types of social capital "s*tructural autonomy*" *(structural holes)*, "*information"* and "*social influence"* represent different coordination mechanisms, essentially: *power* and *trust*. The *power* of an actor relies on his control of key events whereas the value of these events is characterized by the interest of powerful actors in these events (Coleman 1990). *Trust*, in comparison, relies on elements of independence, centralism and indirect linkages of an actor within the network. It is based on informal contacts. However, if a system is too isolated from the environment, inflationary and deflationary spirals of confidence can result. Here intermediaries can replace existing actors (Coleman 1990) as confidence and trust in a different actor rises through more references to his service compared to the confidence in other third parties.

Social capital types within the scientific diffusion process

Within a citation network, *social influence* should be especially advantageous for journals focusing on basic research due to the presence of complementary and additive relationships to others. This positions these journals at the beginning of the knowledge production value chain and requires a high attentiveness from other journals. In such a positive network of communication and influence, the status and power of the participants rises with the number of external relationships and the influence of the journals.

For journals adopting an application or user-orientated perspective in a network, the *information* type of social capital is more likely. These journals tend to show more weak-tie relations as they diffuse and transfer knowledge economically. A key process is that they reach participants from other groups. However, the more application-orientation shown, the weaker the ties and so there is a danger of losing power and trust.

Structural autonomy should be the highest priority for any idea generators and innovators and these journals should be central to the relevant network, as well as reaching beyond the network itself, to acquire information and re-distribute it. On the other hand, such journals only have a few dependencies allowing more freedom to be a gatekeeper and so generate an increased importance.

We believe that *power* is a key measure for journals that are highly integrated into the knowledge value chain as they play an important role in its creation and implementation, and can be viewed as opinion leaders whilst they control important events. *Trust* on the other hand is relevant to groups of actors who refine knowledge and transfer it around the network. This requires both an interdependent, central position as well as a

detachment from specific reference groups so as to ensure a highly objective insight processing and to signal trust.

As a result, we suggest these different roles in the process of knowledge creation and distribution need to be considered when assessing journal contribution and an evaluation cannot really be made without taking such structural locations into account. Existing rankings, such as citation counts and so also impact factors, neglect this idea of role and so are biased towards overvaluing basic research by concentrating solely on the frequently cited. Also, this does not pay due tribute to the plural quality of understanding the science, in fact the opposite may be the case, reinforcing self-referring and not honoring application and the transfer of research.

We hope that the above has shown the need for alternative bibliometric measures which account for the location of journals as well as their popularity. We have also shown that tools to capture these different roles exist within the realm of the network analytic perspective. Next, we explore available network and bibliometric measures to determine which ones best capture the desired features of network role and location of journals when applied to bibliometrics.

A Social Network Model of Bibliometric Analysis

Data basis for social network analyses

In bibliometrics two methods are normally used, both of them based on a structural analysis of the patterns of relationships in the form of vectors. Bibliographic coupling reports the internal, static linkage of documents whilst co-citation analysis features an outward, dynamic linkage. The hypotheses which underlies co-citation analysis is that two works which have been cited by a third work, show some form of cognitive linkage and that the strength of this linkage is determined by the mutual frequency of co-citation (Garfield 1973; Small 1973). Clusters based on co-citation can be determined and are often thought to refer to subjects or fields, whilst the group linkage represents interdisciplinary relationships.

Insert Figure 1 about here

Figure 1 shows an adjacency matrix representation of co-citation and bibliometric coupling. Using both types of linkage increases the amount of information and so helps improve on the various existing grouping methods. This is useful as the asymmetric character of the relationship pattern means some loss of data occurs when only one approach is employed. Furthermore, the presence of indirect linkages between documents can also be included with a combined approach and utilized to identify latent groups. Such a hybrid grouping

approach constitutes an important aid for the selection of comparable subjects, geographical regions and information media without having to specify them in a more detailed way.

The direct as well as indirect relationships resulting from (co-)citation patterns can be characterized by measures of social network analysis. Hereby, the analysis can be conducted on several levels: at the overall network level, at the level of sub-groups and at the level of single actor connections. Measures at the overall network level (citation networks of journals of different disciplines) can inform about structures of knowledge exchange and can thus provide a holistic view of scientific discourse patterns in general. This analysis level is too aggregated for our analysis, as we aim to characterize the positions of journals within a scientific discourse/discipline. Thus, we are more concerned about network analyses at the group level, where journal citation patterns are compared and roles within subgroups revealed. Furthermore, analyses at the single node level inform us about each journal's position in the research discipline. Thus contrasts traditional citation measures where the analyses do not take indirect citations into account but only their direct linkage.

Analyses of sub-groups in networks

To adopt the ideas above, we adopt the network-analytic[2] procedure of *regular equivalences (position),* which relies on assumptions of abstract role patterns. A formal definition of regular equivalence is given (Burt 1976) : Two actors i and j are equivalent if the following statements for every relation are true: (a) i and j are identically connected to all others actors (a…z) which are different from themselves (b) i and j can be connected to equivalent actors (a...z), who play the same role, and not only the same actors, (c) i's relationship with j is reflected in j's relationship with i and (d) both actors share the same relationship with themselves.

Regular equivalent actors are redundant suppliers of information and are therefore in a position of potential competition. The concept of regular equivalence combines actors with similar external relationships. No connection between the actors is required and the density (quantity) of the citations is less important, but actors with similar relational patterns can have qualitatively different resources (Burt 1982).

This procedure is different from the concept of cliques and cluster analysis. The latter is characterized by the formation of subgroups with strong internal proximity or linkage (respectively distance) to the total network whereas cliques are defined by their high internal density and cohesion degree, therefore containing the tendency

2 A network is constituted by a limited number of nodes, in this context, journals and lines that connect the nodes (in this case citation relationships). A matrix represents the network and with one-directional relationships this matrix is asymmetrical. Reflexive relations, in this case own citations, lie on the main diagonal line. The network-analysis procedure refers mainly to three levels of actors: (1) Integration of the actor into the network, (2) properties of the whole network, (3) identification and description of the groups of actors.

to assimilate from each other and form consensus.[3] The idea of a clique lends itself well to explaining processes of influence which rely upon direct relationships whereas cluster analysis is useful in describing influence requiring close proximity (for example science-mapping). With our study of journal structuring in scientific publications, these approaches are only limitedly applicable as basic and applied research, scientific disciplines, geographical regions and so forth differ highly in the number of citations. This gives two problematic sources of errors: (1) as long as heterogeneous citing groups show no connections, these procedures deliver distinct results. However, the citations of a highly cited string of research can be dominated by other strings – meaning the latter cannot be identified as an independent subgroup due to its relatively low citation values. (2) An analogous problem occurs for journals belonging to the same scientific context but not having *direct connections*. These potential distortions become problematic when evaluating contributions within the value chain of knowledge in which all participants and not only the highly quoted strings contribute towards the generation, development and distribution of knowledge. Here, an evaluation procedure is needed which identifies comparable function.

Whilst the internal organization degree in cliques relies on *reciprocal influence*, the internal organization capability of the position relies on the potential exchangeability of roles and therefore on *competition*. The thesis of the redundancy of information of structurally equivalence assumes that actors of the same group are similar in their information value. The procedure of regular equivalences therefore offers itself as a way of forming groups of comparable scientific discourses. Furthermore, this procedure can describe functions and roles of journals within the context of their scientific discourse.

For revealing regular equivalence, we propose that the procedure *maximal regular* is used (White 1984; White and Reitz 1983). All citation data of the journals located within the network are used in the calculation whereas any citations not referring to the network are excluded. The often disputed issue of reflexive relationships (self-citations) only has an indirect effect on results due to the total amount of citations. *Maximal regular* is an iterative procedure for optimal grouping and rests on a hierarchical match of similarities of all the data vectors of an actor with others whilst respecting the asymmetry of relationships. The result of this procedure is a symmetrical matrix of the actors representing their equivalence, which can then be grouped with help of a single link hierarchical clustering routine. Outliers can be identified and thus have no influence on results, making the procedure robust. Our next step is to evaluate and describe different positions in the density-matrix (without paying attention to self-reflective relationships). The density of the network is the quotient of the number of relations realized in the network to the total possible relations and identifies the hierarchical interplay

3 A clique in the sense of graph theory contains at least three connected actors. The concept of the n-Clique, in which every actor can reach every other actor in n steps, is less rigid.

of the roles. The density measures are not standardized by the network size, allowing the evaluation of the extent of internal linkage of the roles (*identification*) and the extent of their external links (*effect*).

Network Analysis Measures of single journals

Due to the asymmetrical character of citation networks, measurements useful for the evaluation of journals can be based on the prestige of the roles enabled by network location. Such measures register the control actors have over the limited resources in the network, respectively esteem, authority and attention. Freeman (1979) identified three different prestige indices: (1) degree-based centralism, (2) proximity-based centralism and (3) betweeness-based centralism. Such measures were successfully used to characterize relationships in scientific fields (Groh and Fuchs 2011).

The d*egree* $C_D(n_i)$ of an actor represents the strength of the integration and esteem in a network. Indegree-based prestige represents the number of received links for an actor; whilst the outdegree-based prestige represents the participation of an actor in the network. In a citation network this means: people who cite others show that they are up to date in their scientific fields and that they have access to a lot of information (*Outdegree;* $C_{OD}(n_i)=\sum_j x_{ij}$). High influence however only occurs when the person himself is also quoted often (*Indegree;* $C_D(n_i)=\sum_j x_{ji}$). Due to the measurement of direct connections, the degree of an actor is an indicator for his control of events and so represents *power*. As an adjusted measure of the actual control exercised, the difference between indegree and outdegree can be used ($\Delta C_D(n_i), C_{OD}(n_i)$). In a favorable power condition, this difference is positive.

Proximity-based centralism (*closeness)* considers the indirect relationships of an actor. Whilst indirect relations are weaker than direct relations, they cost less to operate, as they need less time to maintain wide connections. Closeness to different actors is operationalized by path distance (geodesic paths) to other actors. In the case that an actor is unconnected, the path distance is infinite. As a reciprocal, this measure of distance becomes a measure of proximity. The maximal centralism of actors is 1/(n-1). In a directed network, a sphere of influence I_i of actor i may be defined. These are all actors who can be reached by actor i directly or indirectly (*prominence through centralism;* $C_{OC}(n_i)$) and conversely the actors who can reach actor i directly or indirectly (p*rominence through prestige;* $C_C(n_i)$). Prominence through centralism ($C_{OC}(n_i)$) is used as an indicator of *trust* due to its measurement of independence, centralism and indirect links. The extent of centralism measures the quantity of potential trustees that can be referred to strengthening trust. This is especially important in systems, which aren´t closed, such as research networks.

Hubbell´s concept of *dyadic influence* $(P_i(n_i) = \sum_{j=1}^{n} xi * jP_j)$ relies on the asymmetric, indirect choices of an actor (Hubbell 1965). The central difference is that the quality of the direct and indirect choices of an actor also contributes its part. Every actor contributes to the prestige of the chosen actor when he himself has more prestige, prestige can then be evaluated as the sum of the links that an actor i receives. The elements of the sum are weighted through the prestige of the sources. The prestige concept in asymmetrical networks can be divided into *quality of the directly and indirectly sent* choices of an actor *($P_{Oi}(n_i)$)* and *quality of the directly and indirectly received choices* of an actor *($P_i(n_i)$)*. The concept of the ranking prestige will be applied as an indicator of the measurement of *social influence* as it respects the reputation and the influence of indirect and direct receivers and emitters of links.

Information and *autonomy* can be expressed using Burt's adjusted measurements of the *efficiency* and *hierarchy* of an ego-network (1992). Burt measures the redundancy of the indirect network resources for an actor (1). Low values represent *efficient networks (efficiency E (n_i)*. The measurement of structural compulsion is achieved by assessing the direct contacts that are also connected among themselves (primary structural holes, (2)). Low values indicate low social pressure, as it is easier for the actor to put relationships up against each other. Secondary structural holes are based on the reachability of indirectly connected actors (3). Through the multiplication of the terms 1-3 Burt (1992) generates a unit of measurement for the structural force emanating from an actor j on an actor i, with a maximum value of 1. Through addition, constraints for the actions of an actor become apparent. The *hierarchy (H (n_i))* of an ego-network goes beyond such a unit of measurement by registering for every actor i to which extent a primary actor governs his constraints. The *efficiency* of a network should be high if there is much social capital *information* for the actors to exploit. Similarly, the a*utonomy* of an actor can be measured as the *hierarchy* of his ego-network. This unit of measurement should be low when there is high autonomy.

Insert Table 1 about here

As such, we have now developed our palate of network analytic measures and can explore their value in a bibliometric setting. In the next section, we introduce a data set to explore the landscape of management journals using our measures and discuss which are most suitable to each social capital feature.

Empirical Exploration

Data

To examine the measures outlined above, we examine a set of business and management journals. To ensure a comprehensive assessment of the English-speaking scientific discourse in this discipline, we analyze the complete set of *all* 101 SSCI-listed journals listed in the categories *management* and *business* (see Table 7 in the appendix). It should be noted that data retrieval from SSCI can be time-consuming due to export limitations of 500 articles per request. Thus, previously extracted and prepared data from a large-scale project from 2001 at the University of Bern (former joint affiliation of first two authors) was re-used for efficiency. In addition to time considerations, our retrospective approach enables cross-verification of the findings and acts as a check on the robustness of the approach..

With the help of some coding, the SSCI data was imported into MS Access and then exported to UCINET and SPSS for the statistical evaluations. As normal, manual corrections were necessary due to various database errors including making citation formats uniform, and we corrected with a table of conversion. Cited journals which were not in the original sample were confined to the category “others”.

We examined the adjacency-matrixes of citations from our journals generated using UCINET (Borgatti, Everett and Freeman 1996).[4] The final adjacency-matrix contains 106,008 citations for 2001, and about 41% of these citations are to those journals within the network sample itself, 9% are self-citations, i.e. citations to other articles from the publishing journal.

UCINET was used to estimate the full set of network measures as described above. A bivariate correlation in Table 2 shows that the estimated measures are in general independent from each other. Few instances with correlation coefficients greater than 0.8 (and none greater than 0.9) indicate that the measures are not fully confounded, meaning that they complement each other in providing related but different views on the journal positioning.

Insert Table 2 about here

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4 Neither adjustments on the age of sources nor on the annual amount of articles per journal have been undertaken. Following arguments underlie this: Concerning age, we argue that any literature quoted stills contains a high richness respectively has not been replaced by newer sources, thus it is equally relevant. Concerning amount of articles, we argue that citation networks measure the average effect. An adjustment corresponds to (1) not such a understanding in which low-circulation journals have a high (relative) effect attributed. (2) Furthermore in succession to the argument of limited information capacities an adjustment can occur in the other direction so that the citations of an article with a high-circulation is more worth more than the citation of an article in a journal with low-circulation.

Identification of journal subgroups

A grouping of journals was performed based on their regular equivalences. More specifically, before identifying the regular patterns we isolated outliers. First, *weak components* were used to test the network for the existence of isolated actors or groups. In this case, the direction of citation is ignored, and actors are said to be connected even through indirect links. Our results show that for the network only one component existed and so all the journals were taken forward to the rest of the evaluation. Second, the single link hierarchical clustering routine – *maximal regular* – was used to retrieve a dendrogram to check for the absence of role equivalence, i.e. missing group partitions. In total 18 journals reveal a lack of role equivalence, so that the remaining 83 journals were taken forward for analysis. The excluded journals show particularly high ratios of "other" quoted literature, and so are not well integrated into the network (see appendix, Table 7). We would propose that in future SSCI might examine how well these journals belong to the categories "business" or "management" and how comparable they are to the other journals.

The number of groups was determined by commonly applied, robust statistical measures of hierarchical clustering. A graphical preselection was achieved with help of the dendrogram, splitting the network into groups of suitable sizes as we simultaneously assessed the stability of the resulting groups. In total, we identified six distinct role patterns from our analysis of structural positions. The density of these role patterns helps to validate the results, and also to describe the management sub-discourses present. These are shown in Table 3 where the roles show the different referencing patterns (citation behavior) and also the influence and perception within the network (cited by others).

Insert Table 3 about here

Figure 2 shows the different groups graphically, with the arrow strength showing the reference focus of different groups. The direction of the arrows indicates received citations from other journal groups, and so is the transfer of knowledge into a group. If the creation and development of knowledge is regarded as a value chain, the most intensive network rays emanate from group 4 and this group represents *foundation & fundamentals*, and has an intensive discourse among themselves and a strong effect on the other groups of the network.

Strong referencing to group 4 was observed from groups 1 and 3 in particular. We called group 1 *Foundation and application transfer* and there is clear diffusion from group 4 into group 1, due to their strong shared referencing. Group 5 is also characterized by strong input from group 4, but gives little knowledge back to group 1 suggesting a later phase of knowledge creation, more specifically we note the application orientation of these journals and called group 5 *current management studies*. Group 2 is an initiator in the network and these

journals are characterized by a central and economical dominant position. Journals of this group function as an idea provider by having a strong influence within the network and few referencing other groups.

Insert Figure 2 about here[5]

We labeled group3 *idea feedback* as they have a detached position exchanging foundation & fundamentals with group 4 and transferring it to the foundation-application transfer group 1. Management journals in group 6 labeled *toolboxes* are characterized by little or no input into the network as well as by only slight integration, thus they are making use of the others knowledge.

Insert Figure 3 about here

At this point, it is useful to consider the age of the cited literature (which can represent "o*bsolescence")* and the age of the received citations (*"hardness")*,[6] and the groups identified can be divided roughly into four segments as you can see in **figure 3**. The *current management studies* cite young literature, whilst t*oolboxes* older citations. Both discourses seem to have a short-lasting effect as their younger articles are primarily cited. The management discourses *idea provision* and *idea feedback* are both characterized by a high obsolescence and high hardness. Finally, the groups of *foundation & fundamentals* and in particular the *foundation-application transfer* show low obsolescence combined with a high hardness.

Typology of journal groups

Now we have identified the role equivalency and age characteristics of the data, we are in a position to classify the various management discourses based on social capital and action coordination. We employed distinctions made earlier about *social influence, information* and *autonomy*, on social capital and include *power* and *trust* as forms of action coordination.

The group *foundation & fundamentals* (group 4) processes knowledge in particular from their own group and thereby provide the basis for discourse, specification and distribution of knowledge within the network. This action is supported by group 1 *foundation - application transfer* which provides knowledge refinement before

5 Annotation to Figure 2: The figure displays the diffusion of knowledge in the network. The thickness of the arrows portrays the extent of reciprocal referencing; the direction portrays the direction of the transfer. So, for example, group 4 gets quoted often by group 1 meaning that knowledge flows from group 4 into group 1. Furthermore, within groups the corresponding percentage of the size of the groups is indicated; for example group 4 accounts for 13,2% of all journals of the network. In the legend there is an indication concerning the age of the quoted and quoting literature and the relation of the sources of literature that have not been included into the network of management journals. The delimitation of the differences in the groups occurred with help pf the Scheffe´-test with a significance level of 5%.Group 4 for example quoted on average 44% different sources that are not included in the network. The age of the literature quoted on average is from the year 1986,5: the age of the quoting sources from group 4 is on average 1988.

6 This distinction between "obsolescence" and "hardness" is analogous to citing Half-life und cited half-life of a journal (Burton and Kebler 1960, critically Szava-Kovats 2002). Our measurement of obsolescence includes "other" literature not respected in the network.

transferring it back to the internally and externally open group of fundamental research. For these two groups, the social capital type *social influence* is evident. Due to the generation and development of knowledge, these groups receive much attention from other information carriers. For the *foundation & fundamental research* group, the action type power is evident in that they have direct influence on their following groups. In contrast, *trust* dominates the *foundation-application transfer* group due to its "refinements function" and knowledge transfer role. These journals have high centrality and a high number of potential trustees at their disposal.

The group of *current management studies* follows the recent results of group 4, *foundation & fundamentals,* whilst t*oolboxes,* or group 6, is characterized by low network involvement and is rarely cited by other journals. It refers to sources with low "obsolescence", demonstrating less current content than others, as the sources from other groups quoted are older than average. For groups 5 and 6, the application-orientated journals, *information* is the dominant type of social capital as they have many "*weak ties"* and the networks have little redundancy. This is different to the high trustworthiness, which is shown through "*strong ties"* and can be seen in *current management studies* where this type of action trust is present as they are mostly feeding back into the network. *Power* is significant within the t*oolboxes* group because of their low network involvement and direct processing of older knowledge, combined with direct input into practice or other networks.

Insert Figure 4 about here

Figure 4 shoes that the *idea providers* (group 2) are the beginning of the value chain as can be seen from their high obsolescence, their close network integration and their high influence on other groups. Group 3 (*idea feedback*) acts as transfer mediators between group 1 and 4, showing high obsolescence. Groups 2 and 3 exhibit *autonomy* as a social capital type, based on their approaches to the reference group and cartel formation. Due to the positioning of these groups as transfer mediators between influential groups, others possess little chance of influence. Furthermore, the transfer groups keep the chance of substitution as low as possible due to their unstable position. *Idea providers* have a high influence in the network even though their external relationships are limited, but they have high levels of control and *power*. With its transfer position, group 2 (*idea feedback*) exhibits high trust for the fulfillment of its functions. Table 4 shows an overview of these typologies as they apply to management discourse as well as the key measurements employed.

Insert Table 4 about here

Empirical validation

To study the revealed patterns of roles for the different journals, the measures in Table 1 and Table 4 gave homogenous sub-groups based on network position. In this way, they identify roles. We proposed s*ocial influence* as key for the foundation-orientated journals in groups 1&4, as they require a high attention, involvement and quality control within the network (*Row Sums ($P_{Oi}(n_i)$, Col Sums $P_i(n_i)$).* As demonstrated in Table 5, the quality of outward links dominates within these groups. Furthermore, the quality of the direct and indirect inward links is high for the journals in the *foundation & fundamentals* group. Meanwhile, the journals which represent transfer and application exhibit the *information* style of social capital and we can see the contact efficiency is especially high with the journals of group 6 (*E (ni))*. We also expected that innovators within the network who generate new ideas should show the social capital type *autonomy*. This is particularly striking here for group 3 (idea feedback) where the degree of hierarchy through a primary actor is the least developed (*H (n_i)).*

Insert Table 5 about here

We also proposed two types of action coordination within the types of social capital, and it is clear that *power ($\Delta C_D C_{OD}$)* is a key difference for the *foundation & fundamentals* group 4 when compared to the *foundation-application transfer* group 1. The same is true for group 6 *toolboxes* and group 2 *idea providers* respectively. *Trust ($C_{OC}(n_i)$)* is exhibited as the type of action coordination for the remaining groups. This can best be seen for group 3 *idea feedback* when compared to group 2-idea *provision*. The same can be seen when comparing group 5 *current management studies* and group 6 *toolboxes*.

Figure 5 provides a simplified drawing of the results and shows how social *influence* and *autonomy* are negatively correlated. As *information* requires a mixture of strong- and weak ties, the figure clarifies the alternating role of the weighting of power and trust in a network and the subsequent knowledge diffusion process.

Insert Figure 5 about here

Discussion and Interpretation

As we have shown above, there are many different roles, which journals can adopt in the creation, development and application of knowledge. This means that we need ways of capturing or measuring the different types of social capital to enable a more appropriate evaluation. Such measures should orientate themselves to the specific functions that the carriers of knowledge fulfill.

For these alternative measures to work, we propose that they rely on (1) the structural positions within a discourse, and (2) the relevant function as identified above (the social capital trait).

There is some possible trade-off or contradiction if qualitatively different measures of action mechanism or social capital are combined, which limits the use of a simple ranking. As a result, and in order to get to a robust index, we propose to combine several measures. These are normalised using a z-transformation so that the units become standardised and comparable. Our new index evaluates every structural position from Table 4 and Table 5 separately, with the final index showing the role pattern and so valuation within the group.

Table 6 contains a list of our results. There are considerable differences in the way the different journals fulfill their functions within the roles and this can be seen in the similarities within different measures for the journals we grouped above. This is useful as it allows us to explore differences within each group. Table 6 also shows the impact factors from the SSCI to allow us to compare our measure with the most widely used. Importantly, we find that our measures and impact factors correlate poorly, empirically supporting our claim above that a single measure is not appropriate and that impact factors are quite weak at describing roles. The highest similarity exists for our group *foundation & fundamental* (group 1), and we can see how this closeness captures the bias of the one-sided SSCI measure in favor of frequently cited journals. As such, this confirms that the impact factor is closest in character to measuring our social influence power roles, and shows that it should only be taken as a measure of this dimension.

To extract more value from our results for management scholars, we offer the following observations about key journals based on their roles. The *Strategic Management Journal* has the highest social influence and power in the group *foundation & fundamentals*. In the group 2 of the *foundation-application transfer*, the journal with the highest social influence and greatest trust is the *Journal of Management Studies*. The journal *Organization* has the highest values concerning the judgment of power and information within the group of the *toolboxes* (group 6). For the group 5 (m*anagement studies)* the relevant indicators were the fulfillment of the functions of the social capital type information and the coordination of action type trust. Here, the *Journal of Business and Psychology* has the highest value. For group 2 (*idea provider*), power and autonomy are important, and the *Harvard Business Review* clearly dominates these criteria. The *California Management Review* obtained the highest value within the *idea feedback* group, for which autonomy and trust were postulated.

Within our dataset, we can identify the key journals depending on the roles exhibited. This is of value to scholars in this area and their understanding may have been clouded by reliance on just impact factor or other one-dimensional measures. Such understanding is becoming more important as research output and the resulting funding decisions have become increasingly measured on many dimensions. For example, in the United

Kingdom the REF assessment now stresses not just academic value but also “impact”. We can say with confidence that our Group 6 “toolbox” is the more significant for impact closely followed by groups 1 and 5, whilst the roles of the others are unlikely to have a direct effect on practice.

Whilst our results offer compelling evidence of us achieving our initial aims, we must also note we appreciate the need for further work to assess the generalizability and robustness of the approach. It works well for our data and we see no reason why it should not represent other disciplines equally well. But those that follow should try and allow comparison with the analytic representation of their field and that presented by more traditional methods and also explore whether the method might lead to an over- or under-estimation of a journal.

Insert Table 6 about here

Conclusion

This study addresses several problems widely acknowledged when assessing the impact of scientific journals in interdisciplinary research fields utilizing only simple indicators, e.g. number of citations or impact factors. Multi-dimensional measurement instruments derived from social network analyses are utilized to better differentiate the contributions of journals within the overall scientific discourse. Complex network measures such as actor roles and social capital are combined to obtain multifaceted, in-depth insights into the specific contributions of different journals (types). Our proposed methodology provides researchers with an enriched set of analytical tools to assess the position of a journal in its research field and is the basis for an improved comparison among different journals.

This work has tried to show difficulties and errors in procedures designed to measure the quality of scientific research via quantification of one-dimensional structural data. Due to the interdependent character of the diffusion of knowledge and the differences of the methods that aid knowledge spread, a measure based on the summation or ratios of direct citations does not go far enough to capture the true significance of individual journals or the interactions and different roles within a discipline. This limitation favors more research that is basic and neglects contributions from subsequent scientific fields in the development of research findings.

Different types of social capital and types of action coordination were explored for a set knowledge network and the results support the value of viewing the process as a diffusion of knowledge at a structural level. A measurement of the quality of journals therefore needs to start with the context and role of an actor to enable an objective basis for comparison of the quality of scientific research. Despite the concerns of impact factors and

other counting measures, citation data is still suitable for such an analysis because it is relatively robust, easily obtained and records interdependencies.

We have proposed and tested a means for research evaluation, which includes a consideration of role contexts, and a multi-dimensional evaluation of the observed functions. To achieve this, we used network-analytic based units of measurement that we show are capable of identifying and measuring different types of social capital and action coordination. These units of measurement were condensed to generate indices, which our cases data shows give a clear evaluation of the efficiency of scientific research.

Findings can be used by researchers to better target journals as publication outlets according to the specific contributions aspired to by the researchers. If a researcher is particularly interested in achieving an immediate, wide-spread diffusion of her work, she might consider publication outlets with especially high outdegrees. In contrast, indirect measures of reachability matter more if the researcher is interested in building up reputation or in gaining prominence with prestige publications. While such choices are likely to be done intuitively by experienced researchers, younger scholars in particular should profit from such a systematic assessment. In this way, our findings help to de-emphasize the focus on publications purely in top-level journals and promote alternative opportunities which ultimately enhance both individual careers as well as societal knowledge.

On a more general level, our approach can be used to assess research and so reduce one-sided incentivization of top-level journals. The revealed interconnections between the different journal types devalues a single focus on A-publications if the objective is to link science outputs to subsequent technological or societal changes. Reviewers of innovation systems should look at the balance between the different journal types, as the strength of the overall system is not determined by the top performing institutions alone, but by the weakest link in the whole chain.

Further research is needed to verify the revealed patterns of roles, which requires realizing more empirical analyses within larger networks and across different subjects. One existing difficulty with our approach is in finding clear criteria to enable the delimitation of the network and its latent groups. This is especially relevant if the citation habits are subject to changes on the structural level.

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1 Tables

Table 1: Applied network-analytic units of measurement

Unit of measurement	Information content	Type of social capital/ coordination of actions	Applied procedure (UCINET)*
	Network-related units of measurements		
Density of the network Δ_k	Number of realized relationships in a network	-	Density
	Sub-groups in networks		
Regular equivalence	Patterns of roles, redundancy of information	-	REGE**
	Actor-related units of measurement		
Indegree $C_D(n_i)$	Extent of integration and esteem in a network	*Power* (ΔC_D,C_{OD})	FreemanDegree***
Outdegree $C_{OD}(n_i)$	Network participation of an actor	*Power* (ΔC_D,C_{OD})	FreemanDegree
InCloseness C_C (n_i)	Actors being able to reach the actor i directly or indirectly (prominence through prestige)		Freeman (geodesic paths)
OutCloseness $C_{OC}(n_i)$	Actors to be reached by the actor i directly or indirectly (prominence through centralism)	*Trust*	Freeman (geodesic paths)
Row Sums $(P_{Oi}(n_i)$	Quality of the directly and indirectly sent choices of an actor	*Social influence*	HUBBELL (DyadicInfluence)****
Col Sums $P_i(n_i)$	Quality of the directly and indirectly received choices of an actor	*Social influence*	HUBBELL (DyadicInfluence)
EfficiencyE (n_i)	Redundancy of indirectly exerted network resources	*Information*	Burt (Structural Holes)
Hierarchy H (n_i)	Hierarchization of an ego-network through a primary actor of the network	*Autonomy*	Burt (Structural Holes)

* Borgatti., Everett, & Freeman, 1996; ** White, 1984; White & Reitz, 1983; *** Freeman, 1979; **** Hubbell, 1965

Table 2: Correlation of Network Measures

	$C_{OD}(n_i)$	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{Oi}(n_i)$ #	$P_i(n_i)$	$H(n_i)$	$E(ni)$
$C_D(n_i)$	0.74	-0.31	0.06	0.70	0.10	0.55	0.49	0.78
$C_{OD}(n_i)$		0.08	0.47	0.85	0.07	0.62	0.63	0.68
$\Delta C_D C_{OD}$			0.59	0.17	-0.17	0.01	0.48	-0.08
$C_C(n_i)$				0.70	0.06	-0.02	0.76	0.38
$C_{OC}(n_i)$					0.16	0.40	0.79	0.77
$P_{Oi}(n_i)$ #						-0.13	0.04	0.15
$P_i(n_i)$							0.16	0.29
$H(n_i)$								0.63

Table 3: Density of the network of revealed roles

Density of the network Δk / SD Δk	**N**	**1**	**2**	**3**	**4**	**5**	**6**
1: Foundation-application transfer	16	10.6	10.4	4.4	40.0	1.7	0.3
SD 1		*15.5*	*14.0*	*6.3*	*50.6*	0.4	*1.5*
2: Idea provision	3	2.5	2.7	2.2	6.3	0.4	0.2
SD 2		*5.7*	*3.8*	*4.0*	*4.2*	*1.4*	*1.2*
3: Idea feedback	6	0.9	3.0	0.4	2.8	0.3	0.1
SD 3		*2.0*	*5.7*	*0.8*	*4.9*	*0.9*	*0.6*
4: Foundation & Fundamentals	8	16.4	11.7	4.0	56.6	1.6	0.2
SD 4		*24.7*	*17.1*	*6.0*	*80.4*	*4.0*	*1.1*
5: Current management studies	32	7.5	11.3	3.1	22.1	2.0	0.3
SD 5		*13.5*	*22.2*	*5.6*	*29.5*	*4.7*	*1.1*
6: Toolboxes (textbook knowledge)	18	2.7	4.7	1.4	6.5	0.8	0.1
SD 6		*5.9*	*8.3*	*4.4*	*9.0*	*2.6*	*0.4*

Table 4: Typology of Roles

Type of Social Captial / Coordination of action	*Social Influence*	*Information*	*Autonomy*	*Units of measurement*
Power	4: Foundation &Fundamentals	6: Toolboxes	2: Idea providers	*Δ (Indegree $C_D(n_i)$; Outdegree $C_{OD}(n_i)$)*
Trust	1: Foundation-Application transfer	5: Manage-ment studies	3: Idea feedback	*OutCloseness $C_{OC}(n_i)$*
Units of measurement	*Row Sums ($P_{Oi}(n_i)$, Col Sums $P_i(n_i)$*	*EfficiencyE (n_i)*	*Hierarchy H (n_i)*	

Table 5: Empirical Measures of Network Analysis

Structural Position (ST)	$C_D(n_i)$	$C_{OD}(n_i)$	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{Oi}(n_i)$ #	$P_i(n_i)$	$H(n_i)$	$E(ni)$
									Social Influence
			- Power						
4: Foundation, Fundamentals	2237.5$^{(c)}$	1117.3$^{(c)}$	*1120.2$^{(d)*}$*	45.5$^{(b.c)}$	38.9$^{(b)}$	4.72$^{(a)*}$	8.62$^{(a)*}$	0.41$^{(ab)}$	.84$^{(a.)}$
					- Trust -				
1:Foundation-Application Transfer	742.7$^{(b)}$	746.9$^{(bc)}$	-4.2$^{(b)}$	42.6$^{(ab)}$	*39.3$^{(b)*}$*	3.15$^{(ab)*}$	2.97$^{(b)*}$	0.42$^{(b)}$	.81$^{(ab)}$
									Information
			- Power -						
6:Toolboxes	59.3$^{(a)}$	184.6$^{(a.)}$	*-125.3$^{(ab)*}$*	32.8$^{(a)*}$	36.4$^{(b)}$	1.42$^{(b)}$	1.06$^{(b)}$	0.38$^{(ab)}$	.75$^{(b)*}$
					- Trust -				
5:Management Studies	203.7$^{(a)}$	501.5$^{(ab)}$	-297.8$^{(a)}$	36.4$^{(ab)*}$	40.5$^{(b)*}$	2.17$^{(b)}$	1.29$^{(b)}$	0.37$^{(ab)}$	.80$^{(ab)*}$
									Autonomy
			- Power -						
2:Idea provision	798.0$^{(b)}$	194.0$^{(a)}$	*604$^{(c)*}$*	56.3$^{(c)}$	24.8$^{(a)}$	1.49$^{(b)}$	2.73$^{(b)}$	0.32$^{(ab)*}$	.83$^{(ab)}$
					- Trust -				
3:Idea feedback	271.5$^{(a)}$	91.5$^{(a.)}$	180$^{(bc)}$	40.8$^{(ab)}$	*34.4$^{(b)*}$*	1.18$^{(b)}$	1.59$^{(b)}$	0.27$^{(a)*}$	.83$^{(ab)}$
Oneway Anova	498.7**	498.7**	498.7**	38.7**	38.2**	2.34**	2.34**	0.37**	.78**

#) Attention Score = 30 citations, Scheffe´ Test Homogenous Sub-groups $^{(a,b)}$, Dummy-Variable (*) $^{(a,b)}$/*- significant at 5%

Table 6: Valuation of Management Journals in respect to Social Capital and Coordination of Action

Social influence/Power (4: Foundation &Fundamentals)										
Abbreviation	*ST*	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{OI}(n_i)^{\#}$	$P(n_i)$	$H(n_i)$	$E(ni)$	$\sum \Delta C_D C_{OD} + P_{OI} + P_i$	*SSCI*
SMJ	4	1.28	1.56	1.03	4.00	4.00	0.45	-0.14	*9.28*	2.682
AMJ	4	1.17	2.20	1.64	3.00	3.00	0.56	-0.03	*7.17*	2.831
AScQu	4	4.00	2.20	-0.52	0.40	2.50	1.28	-0.48	*6.90*	3.980
AMR	4	2.50	2.20	-0.04	1.55	2.17	0.31	0.04	*6.22*	3.157
JPeSoPsy	4	2.17	1.08	-0.91	0.23	1.92	0.27	1.92	*4.32*	
Jmar	4	1.92	1.28	0.43	0.98	1.41	-0.59	2.50	*4.31*	2.403
JMarRe	4	1.41	1.08	0.27	0.56	1.28	-0.44	2.17	*3.25*	1.671
JCoRe	4	1.72	0.43	-0.79	-0.23	0.82	-0.17	1.55	*2.31*	1.821
Social influence / trust (1: Foundation-Application Transfer)										
Abbreviation	*ST*	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{OI}(n_i)^{\#}$	$P(n_i)$	$H(n_i)$	$E(ni)$	$\sum C_{OD} + P_{OI} + P_i$	*SSCI*
JMngSt	1	-0.99	0.56	2.34	2.50	0.56	0.11	-0.50	*5.40*	0.634
JIBuSt	1	0.31	0.65	2.34	1.72	1.07	-0.09	-0.06	*5.13*	0.866
OrSc	1	-0.12	0.86	1.35	2.17	1.55	0.68	-0.73	*5.07*	2.058
JMng	1	-0.52	1.56	-0.09	1.92	0.90	0.98	-0.69	*2.73*	0.634
JAMaSc	1	-0.55	0.25	1.64	0.51	0.19	0.23	-0.09	*2.34*	1.844
JBuVeb	1	-0.79	-0.09	0.33	1.28	0.62	1.41	-0.86	*2.23*	0.574
MngSc	1	1.55	3.00	0.04	0.45	1.72	-0.94	3.00	*2.21*	1.502
HuRel	1	-0.66	0.75	0.72	1.07	0.40	-0.48	0.23	*2.19*	0.858
OrBHDP	1	0.27	1.08	-0.04	0.62	0.75	0.04	1.07	*1.33*	1.269
OrSt	1	-0.35	0.25	-0.24	0.82	0.15	-0.30	-0.66	*0.73*	0.899
PerPsy	1	0.40	-0.03	-0.48	0.19	0.36	-0.63	-0.35	*0.07*	
PsyBul	1	1.07	1.56	-0.73	-0.28	0.98	1.55	1.41	*-0.03*	
Jret	1	-0.28	0.04	-0.20	-0.25	0.01	-0.06	-0.39	*-0.44*	0.826
PsyRev	1	0.75	0.65	-0.93	-0.61	0.68	3.00	0.82	*-0.86*	
MarSc	1	0.90	0.13	-0.75	-0.66	0.45	0.15	-0.17	*-0.96*	1.830
JAdRe	1	-0.14	-0.28	-0.75	-0.48	-0.12	0.90	-0.52	*-1.35*	0.522
Information/ Power (6: Toolboxes)										
Abbreviation	*ST*	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{OI}(n_i)^{\#}$	$P(n_i)$	$H(n_i)$	$E(ni)$	$\sum \Delta C_D C_{OD} - E$	*SSCI*
Org	6	0.19	-0.74	-0.71	-0.80	-0.63	-0.12	-0.91	*1.10*	0.607
JPrAn	6	0.11	-0.84	-0.96	-0.94	-0.84	2.50	-0.99	*1.10*	0.926
SyDyRe	6	0.06	-0.76	-0.87	-0.91	-0.80	1.07	-0.84	*0.90*	0.588
PRRe	6	0.01	-0.93	-0.89	-0.90	-0.77	1.17	-0.80	*0.81*	
IJMR	6	-0.20	-0.96	-0.57	-0.87	-0.98	0.51	-0.95	*0.75*	0.189
JConsPsy	6	-0.24	-0.89	-0.89	-0.89	-0.91	0.40	-0.93	*0.69*	1.821
JIT	6	-0.30	-0.91	-0.45	-0.73	-0.94	-0.87	-0.89	*0.59*	0.545
CG	6	-0.41	-0.87	-0.77	-0.44	-0.87	-0.35	-0.98	*0.57*	
SyReBS	6	-0.35	-0.94	-0.57	-0.74	-0.89	-0.90	-0.79	*0.44*	0.588
IJMngR	6	-0.54	-0.80	-0.39	-0.52	-0.90	-0.32	-0.94	*0.40*	
GrDeN	6	-0.24	-0.83	-0.67	-0.83	-0.86	0.19	-0.63	*0.39*	0.304
ERD	6	-0.46	-0.91	-0.57	-0.63	-0.95	-0.20	-0.68	*0.22*	
TouMng	6	-0.35	-0.95	-0.52	-0.64	-0.79	-0.74	-0.30	*-0.05*	0.259
CJAS	6	-0.69	-0.78	0.17	-0.41	-0.93	-0.89	-0.59	*-0.10*	0.039
IJElCo	6	-0.57	-0.86	-0.34	-0.69	-0.82	-0.93	-0.32	*-0.25*	1.179
JConRe	6	0.23	-0.54	-0.94	-0.84	-0.39	4.00	0.68	*-0.45*	1.821
TeFoSC	6	-0.03	-0.71	-0.29	-0.79	-0.68	-0.57	0.62	*-0.65*	0.509
RDMng	6	-0.82	-0.98	-0.34	-0.57	-0.96	-0.96	0.19	*-1.01*	0.406

Information/ Trust (5: Management studies)										
Abbreviation	*ST*	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{Oi}(n_i)^{\#}$	$P_i(n_i)$	$H(n_i)$	$E(ni)$	$\sum C_{OC}$-E)	*SSCI*
JBuPsy	5	-0.90	-0.99	4.00	-0.17	-0.99	-0.73	-0.23	*4.23*	0.136
JBuRes	5	-0.94	0.51	3.00	0.75	0.04	0.01	0.51	*2.49*	0.358
IEEE	5	-0.89	-0.28	1.92	0.11	-0.14	-0.84	0.36	*1.56*	0.378
JBuEth	5	-0.86	-0.35	1.03	0.90	0.07	-0.69	-0.28	*1.31*	0.401
BJM	5	-0.75	-0.48	0.72	-0.03	-0.59	-0.68	-0.54	*1.26*	
InfMng	5	-0.80	-0.60	1.35	0.04	-0.57	-0.80	0.27	*1.08*	1.176
OmIJMS	5	-0.75	-0.23	1.03	-0.06	-0.54	-0.23	0.07	*0.96*	0.486
IJHRM	5	-0.98	-0.68	0.53	1.41	-0.41	-0.55	-0.41	*0.94*	
IMMng	5	-0.93	-0.14	0.17	0.36	-0.44	1.72	-0.57	*0.74*	0.556
JMaIT	5	-0.59	-0.41	1.03	0.01	-0.46	-0.86	0.31	*0.72*	
IJOPM	5	-0.96	-0.73	0.72	1.17	-0.17	-0.37	0.01	*0.71*	0.638
JWoBu	5	-0.73	-0.68	-0.14	-0.12	-0.64	-0.61	-0.77	*0.63*	0.583
IJReMng	5	-0.91	-0.14	0.17	0.27	-0.32	0.62	-0.44	*0.61*	0.645
JOrChM	5	-0.63	-0.64	-0.14	-0.39	-0.71	-0.66	-0.74	*0.60*	0.250
IMRe	5	-0.95	-0.28	0.72	0.31	-0.55	-0.28	0.15	*0.57*	
LeaQu	5	-0.87	-0.54	-0.39	0.68	-0.09	-0.79	-0.87	*0.48*	2.511
JPrInM	5	-0.06	0.04	0.33	-0.14	0.11	-0.71	-0.12	*0.45*	0.673
AME	5	0.06	0.43	-0.39	0.15	0.23	-0.39	-0.83	*0.44*	
IJSIM	5	-0.77	-0.82	0.17	-0.46	-0.76	0.36	-0.25	*0.42*	0.185
JIMar	5	-0.71	-0.60	-0.14	-0.30	-0.66	-0.54	-0.55	*0.41*	0.463
LoRaPl	5	-0.17	0.33	-0.24	0.07	-0.30	-0.03	-0.61	*0.37*	0.393
JMngIn	5	-0.39	-0.60	-0.62	-0.55	-0.52	-0.46	-0.96	*0.34*	0.520
OrReMe	5	-0.64	-0.78	-0.45	-0.54	-0.83	-0.82	-0.64	*0.19*	
AiCR	5	-0.68	-0.14	-0.62	-0.32	-0.20	1.92	-0.71	*0.09*	
MarLe	5	-0.09	-0.44	-0.84	-0.82	-0.50	0.07	-0.90	*0.06*	
TQM	5	-0.84	-0.68	0.43	-0.20	-0.69	-0.76	0.45	*-0.02*	0.320
JAd	5	-0.83	-0.48	-0.52	-0.09	-0.37	0.82	-0.37	*-0.15*	0.688
JEcPsy	5	-0.44	-0.54	-0.64	-0.71	-0.74	-0.52	-0.46	*-0.18*	
IJTeM	5	-0.61	-0.39	0.04	-0.50	-0.61	-0.77	0.56	*-0.52*	0.179
InrFac	5	0.15	-0.35	-0.82	-0.77	-0.48	0.75	-0.20	*-0.62*	0.376
JOpReS	5	-0.48	-0.60	0.04	-0.37	-0.23	2.17	0.75	*-0.71*	0.438
SeInJ	5	-0.50	-0.48	0.53	-0.68	-0.73	-0.25	1.28	*-0.75*	0.257
Autonomy/ Power (2: Idea Provision)										
Abbreviation	*ST*	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{Oi}(n_i)^{\#}$	$P_i(n_i)$	$H(n_i)$	$E(ni)$	$\sum \Delta C_D C_{OD}$-$H(n_i)$	*SSCI*
HBR	2	3.00	4.00	-0.99	-0.99	1.17	-0.95	4.00	*3.95*	2.465
RePo	2	0.68	-0.20	-0.69	-0.35	0.51	-0.50	-0.76	*1.18*	1.286
HRM	2	0.51	0.04	-0.67	-0.59	-0.03	-0.14	0.11	*0.65*	1.161
Autonomy/ Trust (3: IdeaFeedback)										
Abbreviation	*ST*	$\Delta C_D C_{OD}$	$C_C(n_i)$	$C_{OC}(n_i)$	$P_{Oi}(n_i)^{\#}$	$P_i(n_i)$	$H(n_i)$	$E(ni)$	$\sum C_{OC}$-$H(n_i)$	*SSCI*
CMR	3	0.98	0.86	-0.29	-0.86	0.31	-0.98	1.72	*0.69*	1.352
OrDyn	3	0.62	0.33	-0.84	-0.95	-0.06	-0.91	0.90	*0.07*	0.841
JBu	3	0.56	0.13	-0.98	-0.98	-0.28	-0.99	0.98	*0.01*	1.357
JOrBeM	3	0.82	0.19	-0.95	-0.93	0.27	-0.83	1.17	*-0.12*	1.176
ReTeMa	3	0.45	-0.35	-0.86	-0.96	-0.35	-0.64	0.40	*-0.22*	
GrOrgM	3	0.36	-0.06	-0.79	-0.76	-0.25	-0.41	-0.82	*-0.38*	0.730

#) Attention Score = 30 citations, ST = Structural position, $\Delta C_D(n_i) C_{OD}(n_i)$, $C_C(n_i)$, $C_{OC}(n_i)$, $P_{Oi}(n_i)$, $P_i(n_i)$, $H(n_i)$, $E(ni)$ = Savage value (z-transformation) over all groups, SSCI= Journal Impact Factor of the SSCI of 2001

1 Appendix

Table 7: Overall Sample

#	Abbre-viation	Journal	Out-lier	%of „other“ lit. cited
1	AME	ACADEMY OF MANAGEMENT EXECUTIVE		93.2%
2	AMJ	ACADEMY OF MANAGEMENT JOURNAL		46.6%
3	AMR	ACADEMY OF MANAGEMENT REVIEW		36.9%
4	AScQu	ADMINISTRATIVE SCIENCE QUARTERLY		40.3%
5	AiCR	ADVANCES IN CONSUMER RESEARCH		48.2%
6	ABLJ	AMERICAN BUSINESS LAW JOURNAL	#	54.1%
7	BFuP	BETRIEBSWIRTSCHAFTLICHE FORSCHUNG UND PRAXIS	#	97.2%
8	BJM	BRITISH JOURNAL OF MANAGEMENT		88.3%
9	BH	BUSINESS HISTORY	#	48.4%
10	CMR	CALIFORNIA MANAGEMENT REVIEW		58.9%
11	CG	CORPORATE GOVERNANCE-AN INTERNATIONAL REVIEW		65.1%
12	CJAS	DES SCIENCES DE L ADMINISTRATION		58.5%
13	ERD	ENTREPRENEURSHIP AND REGIONAL DEVELOPMENT		73.5%
14	Fort	FORTUNE	#	0.0%
15	GrOrgM	GROUP & ORGANIZATION MANAGEMENT		73.7%
16	GrDeN	GROUP DECISION AND NEGOTIATION		50.0%
17	HBR	HARVARD BUSINESS REVIEW		0.0%
18	HuRel	HUMAN RELATIONS		49.9%
19	HRM	HUMAN RESOURCE MANAGEMENT		56.4%
20	IEEE	IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT		58.2%
21	IMMng	INDUSTRIAL MARKETING MANAGEMENT		66.7%
22	InfMng	INFORMATION & MANAGEMENT		72.2%
23	InrFac	INTERFACES		51.1%
24	IJElCo	INTERNATIONAL JOURNAL OF ELECTRONIC COMMERCE		80.8%
25	IJFor	INTERNATIONAL JOURNAL OF FORECASTING	#	56.5%
26	IJHRM	INTERNATIONAL JOURNAL OF HUMAN RESOURCE MANAGEMENT		57.7%
27	IJMngR	INTERNATIONAL JOURNAL OF MANAGEMENT REVIEWS		60.3%
28	IJMan	INTERNATIONAL JOURNAL OF MANPOWER	#	29.7%
29	IJMR	INTERNATIONAL JOURNAL OF MARKET RESEARCH		66.8%
30	IJOPM	INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT		43.4%
31	IJReMng	INTERNATIONAL JOURNAL OF RESEARCH IN MARKETING		76.0%
32	IJSeAs	INTERNATIONAL JOURNAL OF SELECTION AND ASSESSMENT	#	38.5%
33	IJSIM	INTERNATIONAL JOURNAL OF SERVICE INDUSTRY MANAGEMENT		45.7%
34	IJTeM	INTERNATIONAL JOURNAL OF TECHNOLOGY MGT		63.0%
35	IMRe	INTERNATIONAL MARKETING REVIEW		52.0%
36	JAd	JOURNAL OF ADVERTISING		46.9%
37	JAdRe	JOURNAL OF ADVERTISING RESEARCH		38.2%
38	JBu	JOURNAL OF BUSINESS		31.9%
39	JBuPsy	JOURNAL OF BUSINESS AND PSYCHOLOGY		92.5%
40	JBuTeCo	JOURNAL OF BUSINESS AND TECHNICAL COMMUNICATION	#	57.1%
41	JBuEth	JOURNAL OF BUSINESS ETHICS		58.2%
42	JBuRes	JOURNAL OF BUSINESS RESEARCH		42.5%
43	JBuVeb	JOURNAL OF BUSINESS VENTURING		96.6%
44	JCMaSt	JOURNAL OF COMMON MARKET STUDIES	#	44.8%
45	JConRe	JOURNAL OF CONFLICT RESOLUTION		89.2%
46	JCoAf	JOURNAL OF CONSUMER AFFAIRS	#	73.9%
47	JConsPsy	JOURNAL OF CONSUMER PSYCHOLOGY		82.2%
48	JCoRe	JOURNAL OF CONSUMER RESEARCH		48.3%

49	JEcPsy	JOURNAL OF ECONOMIC PSYCHOLOGY		45.3%
50	JEcMSt	JOURNAL OF ECONOMICS & MANAGEMENT STRATEGY	#	86.4%
51	JEnEcM	JOURNAL OF ENVIRONMENTAL ECONOMICS AND MGT	#	69.6%
52	Jfor	JOURNAL OF FORECASTING	#	85.0%
53	JIT	JOURNAL OF INFORMATION TECHNOLOGY		82.5%
54	JIBuSt	JOURNAL OF INTERNATIONAL BUSINESS STUDIES		45.0%
55	JIMar	JOURNAL OF INTERNATIONAL MARKETING		41.5%
56	JMng	JOURNAL OF MANAGEMENT		66.9%
57	JMaIT	JOURNAL OF MANAGEMENT INFORMATION SYSTEMS		63.1%
58	JMngIn	JOURNAL OF MANAGEMENT INQUIRY		31.5%
59	JMngSt	JOURNAL OF MANAGEMENT STUDIES		36.4%
60	Jmar	JOURNAL OF MARKETING		45.0%
61	JMarRe	JOURNAL OF MARKETING RESEARCH		58.6%
62	JOrBeM	JOURNAL OF ORGANIZATIONAL BEHAVIOR MANAGEMENT		46.1%
63	JOrChM	JOURNAL OF ORGANIZATIONAL CHANGE MANAGEMENT		76.8%
64	JPeSoPsy	JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY		67.3%
65	JPrInM	JOURNAL OF PRODUCT INNOVATION MANAGEMENT		61.2%
66	JPrAn	JOURNAL OF PRODUCTIVITY ANALYSIS		64.1%
67	Jret	JOURNAL OF RETAILING		79.3%
68	JAMaSc	JOURNAL OF THE ACADEMY OF MARKETING SCIENCE		27.7%
69	JOpReS	JOURNAL OF THE OPERATIONAL RESEARCH SOCIETY		35.5%
70	JWoBu	JOURNAL OF WORLD BUSINESS		48.2%
71	LeaQu	LEADERSHIP QUARTERLY		42.5%
72	LoRaPl	LONG RANGE PLANNING		46.6%
73	MngSc	MANAGEMENT SCIENCE		41.7%
74	MarLe	MARKETING LETTERS		43.5%
75	MarSc	MARKETING SCIENCE		61.8%
76	NegJ	NEGOTIATION JOURNAL-ON THE PROCESS OF DISPUTE SETTLEMENT	#	67.5%
77	NTeWE	NEW TECHNOLOGY WORK AND EMPLOYMENT	#	72.7%
78	OmIJMS	OMEGA-INTERNATIONAL JOURNAL OF MANAGEMENT SCIENCE		67.6%
79	Org	ORGANIZATION		58.2%
80	OrSc	ORGANIZATION SCIENCE		49.4%
81	OrSt	ORGANIZATION STUDIES		77.4%
82	OrBHDP	ORGANIZATIONAL BEHAVIOR AND HUMAN DECISION PROCESSES		64.6%
83	OrDyn	ORGANIZATIONAL DYNAMICS		48.0%
84	OrReMe	ORGANIZATIONAL RESEARCH METHODS		51.2%
85	PerPsy	PERSONNEL PSYCHOLOGY		58.9%
86	PsyBul	PSYCHOLOGICAL BULLETIN		79.4%
87	PsyRev	PSYCHOLOGICAL REVIEW		85.4%
88	PRRe	PUBLIC RELATIONS REVIEW		86.1%
89	RDMng	R & D MANAGEMENT		57.9%
90	RePo	RESEARCH POLICY		94.6%
91	ReTeMa	RESEARCH-TECHNOLOGY MANAGEMENT		93.2%
92	ReInOr	REVIEW OF INDUSTRIAL ORGANIZATION	#	68.8%
93	REEFTr	RUSSIAN AND EAST EUROPEAN FINANCE AND TRADE	#	35.2%
94	SeInJ	SERVICE INDUSTRIES JOURNAL		64.6%
95	SMJ	STRATEGIC MANAGEMENT JOURNAL		33.7%
96	SyDyRe	SYSTEM DYNAMICS REVIEW		58.2%
97	SyPARe	SYSTEMIC PRACTICE AND ACTION RESEARCH	#	60.4%
98	SyReBS	SYSTEMS RESEARCH AND BEHAVIORAL SCIENCE		72.5%
99	TeFoSC	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE		72.0%
100	TQM	TOTAL QUALITY MANAGEMENT		78.5%
101	TouMng	TOURISM MANAGEMENT		59.5%