

## An Invisible Knowledge Network of Leadership Studies: Tag Cloud Analysis

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**Abstract.** The purpose of this study is to identify the evolution of the intellectual structure of leadership studies and to propose a theory of an invisible network of knowledge. Tag cloud analysis was used to trace the development path of leadership research. By analyzing 22,487 citations of 840 articles published in SCI and SSCI journals in the leadership field from 2002 to 2011, this study maps the intellectual structure of leadership studies. This article dwells upon the wide spreading social tags of website applications. By so called “crowd wisdom”, the tag cloud analysis reveals the preliminary investigation from a social network viewpoint, provides researchers with profiles of leadership related subjects and theories, and sheds light on future directions of studies. The results profile the invisible network of knowledge production in the leadership studies. The contribution of this study is to provide important insights and implications of current and future research paradigms for both management scholars and practitioners.

**Key words:** leadership, Intellectual Structure, Invisible Network of Knowledge, Tag Cloud Analysis

### 1. Introduction

If I have seen further, it is by standing on the shoulders of giants (Sir Issac Newton, 1645-1736). It's said “stand on the shoulders of giants (the under-box slogan of Google Scholar®)” in which giants means the highly cited authors, papers and books. As shown in the following INK poem inspired by Kotler [01], we realized that via INK model [02] could help a novice like a brand new doctoral student in nurture process to escape from vicious cycle of chick-egg with a clear scientific map at hand first to navigate the blue ocean of knowledge domain when the novice knows nothing [03] :

*I don't know in which field I am.*

*I don't know what theory in the field is.*

*I don't know when they created good theories.*

*Now, what was it you wanted to tell me?*

The past decade has especially seen extensive research on leadership. Yet even though leadership has established itself as an academic discipline, its establishment has been a slow process because researchers in this area prefer to publish their best work in more established journals. Another major obstacle to the development of leadership lies in the subject's unusually high degree of interaction with other disciplines. This overlapping blurs the boundaries of leadership and as a result its distinct theoretical model and analytical tools are unjustly attributed to other competing fields. With limited resources contributing to the development of leadership, the cross-fertilization of ideas between scholars of leadership will be much more difficult to obtain. Consequently, while there is no doubt that there is an area or field of leadership, the question remains somehow unclear on what it is, how good its work is, and what are its prospects and needs for future development.

The aim of this study is to provide leadership researchers with a unique map to better understand leadership related publications and to provide a systematic and objective mapping of different themes and

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concepts in the development of leadership field. This study also attempts to help identify the linkage among different publications and confirm their status and positions in their contribution to the development of leadership field.

This article attempts on the sociality marks one of website widespread application characteristics: The tag cloud carries on the preliminary inquisition, pondered from the social network angle, uses the populace wisdom, a little at a time mounts up, or may be " leadership " the theory and the real diagnosis, provides a new ponder direction.

## **2. The Meaning of Tag Cloud**

The tag cloud is the common display mode for the search results in folk taxonomy-based websites, presenting tag sizes according to the frequency and the popularity of the key words. It is called the weighting detailed list in the visual design domain, one of user interface main design elements, uses for the achievement to describe the website content vision tool [04]. According to Rivadeneira [05], the tag cloud presents for the writing collection vision, usually for the tag collection which chooses based on some kind of reason, using the size, the weight, the color attributes and so on, to take the correlation character word the characteristic. While some people regard as the tag cloud as a thing semantics field the vision symbol [06].

The tag cloud in essentially may the emerging glossary which folkonomies transform for the public relations leads the survey tool and provide for filtering, quality, the society corresponds the relations(Social Affordance), the use remould the peaceful experience and so on the survey functions [07]. In other words, the tag cloud is one kind the sole glossary, demonstrated by the different color size font, encircles the shape with the succinct sole vision to present the subject index the network application way, may let human one see the popular tag, each tag all is a directional same subject group linking, simultaneously also is one kind of survey tool.

The tag cloud took an information vision new technology, describes individual information the effect to win in the association, may for the populace communication and the ponder new method; The website designs master Jeffrey Zeldman the tag cloud to describe for the pop culture tidal current element, is the Web20 application big creativity. Some people thought the tag cloud is very practical, may take the information survey tool, also some people thought may take the abundant series the use analysis tool.

## **3. Tag Clouds Analysis**

A tag cloud is a visual representation for summarizing text data, used to depict keyword metadata (tags) on websites. Typically, the tag size in a collection (cloud) signifies its frequency of use. It offers a spatial view of the frequency of keywords and draws our attention to high frequency ones in a specific area [08] [09]. Early application are Web 2.0 sites such as Flickr, del.icio.us and Technorati. E-Commerce websites such as Amazon or O'Reilly Media successfully provide tag clouds service to help users navigate through aggregated data [10]. However, tag clouds are not only used to display tag sets but are also increasingly applied in other contexts and for various data sets, for instance, in the areas of information visualization or text summarization [11] [12]. Clouds are an effective way to make the most of limited page space by showing tags alphabetically as well as ranked by popularity. In addition, they are a graphically interesting way to display a long list of tags [13].

The system user who marks the foundation may in the tag free choice join the key word: The network resources, are oneself perhaps everybody use together, browses in the vision in the tag gathers, in achieves by the dissimilar way. Generally speaking, in the tag defines the user limits the area represents a tag cloud to propose approximately the number also most Chang Yongdao. The typeface size represents this tag the number of times which quotes, therefore very easy to be possible to distinguish [14]. The tag cloud cartography and the graph plan, by passes through is short very much is used. Hassan-Montero and Herrero-Solana (See [08] ) proposed the improvement cluster similar symbol and removes some tags, carries on the tag cloud the layout. Rice roentgen, Feinberg, dynamic can eliminate not the remarkable mark with Millen, Feinberg, and Kerr [15] suggestion user, and increases an index tag, thus it can be seen, is more convenient and is fast. Bielenberg [16] proposed the circular tag cloud, in is not the typical rectangular layout,

in which most important weighting tag can appear and the stem for stem in among. However, the tag cloud is only a representative of a specific instance. For example, Dubinko, Kumar, Maigenani, Novak, LAC and Tomkins [17] proposed a model to represent the timesheet tag, and Russell [18] suggest a tool to study tags the cloud change over time. Jaffe, Tassa, Davis [19], to consolidate information into a map, as in a fixed location of photo, a volume in the volume tag will be displayed.

The past few years, Internet users to create and gather your own data concept has been on the rise. Information on the physical or digital resources (such as books, files, images, and so on). Most of them are based on the description, data structure and management distinction [20]. For metadata description of a resource, to promote discovery and resolution. Such as the title, abstract, author, and keywords or journals. Structural metadata and resources, for example, combining all the chapters in the book. Managing metadata support resource management, will provide the information, such as date created, file type, PIN, is all about understanding of resources and security. Overview: metadata is data about data (See [16] ). Mass classification to replace the traditional classifications become trends. Popular classification is simple, and provides the ability to freely chosen keywords, so anyone can operate. Now determine not only involve information, and a common understanding. Knowledge of the service, such as Flickr, Delicious, and Technorati, created a lot of interest in the tagging system, which allows users to freely (See [7] ) select keywords for different resource allocation (otherwise known as the volume tag). Volume tagl has been the focus of research in recent years [21] [22] [23] [24] [25].

#### 4. The Findings

Tag clouds are excellent ways to display long lists of tags. It was surprising to observe that tag clouds were not used extensively. The combination of tag clouds offers a spatial view of the frequency of words and draws our attention to high frequency words in a specific geographical area (See [09] ).(Slingsby et al., 2007).

In Stage 1, based on the results of tag cloud analysis shown in Figures 1 and Figures 2, there is clearly an immediate visual impact of these tag clouds that identifies dominant words, making what was tacit within the document more implicit. This study looks at changes in the use of words over time, describes the tag clouds for the individual documents, and identifies the prominent messages. (see Figure 1, Figure 2 and Table 1)The largest tag in the Stage 1 analysis (indicating the most frequently used term) is “**leadership**” (1071). The words “**organizational**,” (112).“**management**,” (152), and “**theory**” (74) are also dominant.



Fig. 1: Keyword Analysis of Tag Clouds from 2002 to 2006: Showing top 30 possible words



Fig. 2: Keyword Analysis of Tag Clouds from 2007 to 2011: Showing top 30 possible words

Table 1 Keyword Analysis of Comparison Chart from 2002 to 2011: Showing top 30 possible words

Ranking	Key word	Times(2002-2006)	Times(2007-2011)	Change
1	<b>leadership</b>	318	1071	+753
2	<b>organizational</b>	38	112	+74
3	<b>management</b>	34	152	+118
4	<b>theory</b>	34	74	+40
5	<b>transformational</b>	32	101	+69
6	<b>development</b>	31	99	+68
7	<b>social</b>	27	60	+33
8	<b>education</b>	23	66	+43
9	<b>team</b>	23	na	na
10	<b>school</b>	22	109	+87
11	<b>learning</b>	21	62	+41
12	<b>change</b>	18	64	+46
13	<b>performance</b>	18	64	+46
14	<b>identity</b>	17	na	na
15	<b>leader</b>	16	65	+49
16	<b>teacher</b>	15	41	+26
17	<b>innovation</b>	13	31	+18
18	<b>research</b>	13	44	+31
19	<b>spirituality</b>	12	na	na
20	<b>culture</b>	12	55	+43
21	<b>community</b>	12	na	na
22	<b>models</b>	12	31	+19
23	<b>gender</b>	11	33	+22
24	<b>strategic</b>	11	na	na
25	<b>emotions</b>	10	na	na
26	<b>effectiveness</b>	10	na	na
27	<b>organizations</b>	10	na	na
28	<b>power</b>	10	na	na
29	<b>group</b>	9	na	na
30	<b>work</b>	9	31	+22

In Stage 2, there is a tag cloud of the 30 most popular Author in the selected number possible words (see Figure 3). The word “de” appears 22 times in the document followed by “da” (20), “bj” (19), “rj” (18), “jc” (17), “ma” (16) and “anonymous” (13). Although there is still a focus on the word “expatriate”, we can see the beginning of the practice of replacing management words by the word “adjustment.” That is, the cross-cultural management words have been replaced by “cross-cultural adjustment,” and perhaps this shift in research emphasis is reflected in this change of wording. (see Table 2)

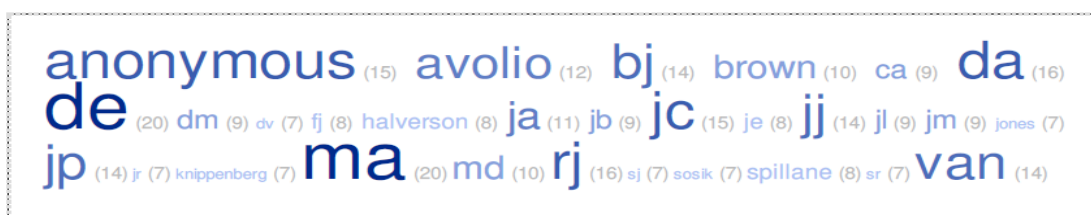


Fig. 3: Author Analysis of Tag Clouds from 2002 to 2006: Showing top 30 possible words



Fig. 4: Author Analysis of Tag Clouds from 2007 to 2011: Showing top 30 possible words

Table 2 Author Analysis of Comparison Chart from 2002 to 2011: Showing top 30 possible words

Ranking	Author	Times(2002-2006)	Times(2007-2011)	Change
1	de	20	22	+2
2	ma	20	16	-4

3	da	16	20	+4
4	rj	16	18	+2
5	anonymous	15	13	-2
6	je	15	17	+2
7	bj	14	19	+5
8	jp	14	na	na
9	jj	14	na	na
10	van	14	44	+30
11	avolio	12	na	na
12	md	10	13	+3
13	brown	10	na	na
14	jm	9	na	na
15	jl	9	12	+3
16	ca	9	16	+7
17	jb	9	12	+3
18	dm	9	na	na
19	fj	8	12	+4
20	je	8	na	na
21	spillane	8	na	na
22	halverson	8	na	na
23	ones	7	na	na
24	sr	7	na	na
25	sj	7	18	+11
26	sosik	7	na	na
27	jr	7	na	na
28	knippenberg	7	12	+5
29	dv	7	na	na
30	jones	7	na	na

In Stage 3, there is a tag cloud of the 30 most popular company title in the selected 1,013 possible words (see Figure 5, Figure 6 and Table 3). The largest tag in the Stage 3 analysis is “leadership” (538), followed by “performance” (317), “management” (179), “behavior” (137), “model” (125), “charismatic” (128), “transactional” (152), “work” (150), and “transformational” (127). (see Table 3).



Fig. 5: The company specify a title Analysis of Tag Clouds from 2002 to 2006: Showing top 30 possible words



Fig. 6: The company specify a title Analysis of Tag Clouds from 2007 to 2011: Showing top 30 possible words

Table 3 The company specify a title Analysis of Comparison Chart from 2002 to 2011: Showing top 30 possible words

Ranking	Company Title	Times(2002-2006)	Times(2007-2011)	Change
1	leadership	190	538	+348
2	performance	134	317	+183
3	management	86	179	+93
4	behavior	72	137	+65
5	model	63	125	+62
6	charismatic	60	128	+68
7	transactional	60	152	+92
8	work	60	150	+90
9	transformational	57	127	+70
10	organizations	47	117	+70
11	organizational	43	114	+71

12	member	33	71	+38
13	exchange	32	72	+40
14	perceptions	32	55	+23
15	perspective	30	75	+45
16	theory	29	46	+17
17	personality	26	49	+23
18	decision-making	24	na	na
19	teams	23	81	+58
20	social	22	48	+26
21	innovation	22	43	+21
22	commitment	21	53	+32
23	culture	18	na	na
24	satisfaction	18	na	na
25	identity	18	61	+43
26	empowerment	17	na	na
27	metaanalysis	17	39	+22
28	group	17	na	na
29	power	17	na	na
30	attitudes	15	na	na

In Stage 4, there is a tag cloud of the 30 most popular title analysis in the selected number possible words (see Figure 7, Figure 8 and Table 4). The largest tag in the Stage 4 analysis is “leadership” (861→1505), followed by “school” (92→153), “management” (54→103), “development” (54→96), “organizational” (46→95), “transformational” (55→94), “educational” (90→na), and “study ” (41→78), (see Table 4).



Fig. 7: Title Analysis of Tag Clouds from 2002 to 2006: Showing top 30 possible words



Fig. 8: Title Analysis of Tag Clouds from 2007 to 2011: Showing top 30 possible words

Table 4 Title Analysis of Comparison Chart from 2002 to 2011: Showing top 30 possible words

Ranking	Title	Times(2002-2006)	Times(2007-2011)	Change
1	leadership	861	1505	+644
2	school	92	153	+61
3	educational	90	na	na
4	transformational	55	94	+39
5	development	54	96	+42
6	management	54	103	+49
7	organizational	46	92	+46
8	organizations	42	na	na
9	study	41	78	+37
10	performance	38	80	+42
11	role	38	110	+72
12	theory	37	43	+6
13	learning	33	58	+25
14	research	31	43	+12
15	practice	29	47	+18
16	perspective	28	44	+14
17	teams	27	na	na
18	model	27	40	+13
19	strategic	26	na	na

20	social	23	50	+27
21	change	22	46	+24
22	effects	21	48	+27
23	case	21	33	+12
24	relationship	20	na	na
25	work	19	37	+18
26	leaders	19	52	+33
27	charismatic	18	na	na
28	teacher	18	61	+43
29	culture	18	48	+30
30	innovation	17	na	na

## 5. Conclusion

The past decade years have seen extensive research on leadership. This study investigates leadership research using citation and co-citation data published in SCI and SSCI from 2002 to 2011. This study constructs the INK of leadership studies for the period 2002–2011. Moreover, the so-called research procedures provided in the INK model can be applied to other fields of research. This methodology can easily be applied to other disciplines and provides a powerful research tool for understanding the epistemology of a field as it evolves. By tracing the research path of a specific field in which they are interested, researchers would be able to navigate through time to discover how certain ideas may have evolved into respected scientific concepts, theories, or practices. Researchers can also use this methodology to explore the knowledge network of their own fields so as to gain a vantage position with respect to their field and conduct seminal research.

The contribution of this paper is thus to provide valuable research directions in the leadership studies field, and to propose an objective and systematic means of determining the relative importance of different knowledge nodes in the development of the leadership studies subfield of management. This study offers value added, not only because it is the first study to apply tag cloud analysis, but also because it complements and improves the findings of other studies that have approached the subject from the qualitative perspective.

This article attempts on the sociality marks one of website widespread application characteristics: The tag cloud carries on the preliminary inquisition, pondered from the social network angle, uses the populace wisdom, a little at a time mounts up, or may be "leadership" theory and the real diagnosis, provides a new ponder direction.

## 6. References

- [1] Kotler, P. *Marketing Management: Analysis, Planning and Control*: Englewood Cliffs, NJ: Prentice-Hall,1972.
- [2] Etemad, H., & [Mc]Lee Y. "The Knowledge Network of International Entrepreneurship: Theory and Evidence." *Small Business Economics* 20(1) (2003): P5-23.
- [3] Tang-Ting WANG (2007). " An Invisible Network of Knowledge Production of International Business Management Studies: From Knowing Nothing to Knowing Something." ASAC 2007. Ottawa, Ontario. Yender McLEE. Christian University of Taiwan Everglory.
- [4] .Furner, J. (2010). Folksonomies. *Encyclopedia of Library and Information Sciences*, Third Edition,1858-1866.
- [5] Rivadeneira, A. W., Gruen.M,Muller, M. J., & Millen, D. R.(2007). *Getting our head in the clouds:toward evaluation studies of tagclouds*. Paper presented at the Proceeedings of the SIGCHI conference on Human factors in computing system.
- [6] Marinchev, I.(2006). Practical Semantic Web-Tagging and Tag Clouds. *Cybernetics and Information Technologies*, 6(3).
- [7] Sinclair, J., & Cardew-Hall, M. (2008). The folksonomy tag cloud: When is it useful? *Journal of Information Science*, 34(1), pp.15-29.
- [8] Hassan-Montero, Y., & Herrero-Solana, V. (2006). Improving tag-clouds as visual information retrieval interfaces. *International Conference on Multidisciplinary Information Sciences and Technologies* (InSciT2006), Mérida, Spain,

Oct. 2006.

- [9] Slingsby, A., Dykes, J., Wood, J., & Clarke, K. (2007). Interactive tag maps and tag clouds for The multiscale exploration of large spatio-temporal datasets. *In Proceedings of the 11th International Conference on Information Visualization*. Zurich, Switzerland, pp.497-504.
- [10] Aouiche, K., Lemire, D., & Godin, R. (2008). Collaborative OLAP with tag clouds: Web 2.0 OLAP formalism and experimental evaluation. *Proceedings of the 4th International Conference on Web Information Systems and Technologies (WEBIST 2008)*.
- [11] Viégas, F. B., & Wattenberg, M. (2008). Tag clouds and the case for vernacular visualization. *Interactions*, 15(1), pp.49-52.
- [12] Lohmann, S., Ziegler, J., & Tetzlaff, L. (2009). Comparison of tag cloud layouts: Task-related performance and visual exploration. Springer Berlin: Heidelberg.
- [13] Shiri, A. (2009). An examination of social tagging interface features and functionalities: An Analytical comparison *Online Information Review*,33(5), 901-919.
- [14] Bateman, S., Gutwin, C., & Nacenta, M. (2008). Seeing things in the clouds: The effect of visual features on tag cloud selections. *In: Proc. Of the 19th ACM conference on Hypertext and Hypermedia*, pp.193-202.
- [15] Millen, D. R., Feinberg, J., & Kerr, B. (2006). Dogear: Social bookmarking in the enterprise. In CHI '06,pp. 111-120.
- [16] Bielenberg, K. (2005). Groups in social software: Utilizing tagging to integrate individual contexts for social navigation. Master's thesis, University at Bremen.
- [17] Dubinko, M., Kumar, R., Magnani, J., Novak, J., Raghavan, P., & Tomkins, A. (2006). Visualizing tags over time. In 15th International World Wide Web Conference, pp. 193-202. New York: ACM Press.
- [18] Russell, T. (2006). Cloudalicious: Folksonomy over time. In JCDL'06, pp.364-364.
- [19] Jaffe, A., Naaman, M., Tassa, T., & Davis, M. (2006). Generating summaries and visualization for large collections of geo-referenced photographs. In MIR '06, pp. 89-98.
- [20] NISO (2004). National Information Standards Organisation (NISO). Understanding Metadata. Bethesda (USA): NISO Press.
- [21] Mathes, A. (2004). Folksonomies: Cooperative classification and communication through shared metadata. Retrieved July 8, 2010. <http://www.adammathes.com/academic/computer-mediated-communication/folksonomies.html>
- [22] Dye, J. (2006). Folksonomy: A game of high-tech (and hi stakes) tag: Should a robot dictate the terms of your search? *Econtent*, 29(3), pp.38-44.
- [23] Noruzi, A. (2006). Folksonomies: (Un) controlled vocabulary. *Knowledge Organization*, 33(4), 199-203.
- [24] Spieteri, L. F. (2006). The use of folksonomies in public library catalogues. *The Serials Librarian*, 51(2), pp.75-89.
- [25] Speller, E. (2007). Collaborative tagging, folksonomies, distributed classification or ethno classification: A literature review. *Library Student Journal*, February. Retrieved July 8, 2010, from [http://informatics.buffalo.edu/org/lsj/articles/speller\\_2007\\_2\\_collaborative.php](http://informatics.buffalo.edu/org/lsj/articles/speller_2007_2_collaborative.php).