Basic Concepts and Disciplinary Position of Management --A recognition based on scientometrics

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Abstract

Based on review and clarification of domestic and international disciplinary concepts on management, this dissertation takes data in academic journals of international management as the sample, makes use of latest mapping knowledge domains method, reveals the disciplinary boundary of modern management and disciplinary position of general management as a basic discipline, demonstrates the relationship between management and other relevant disciplines, such as psychology, sociology, economics, mathematics, etc., shows the trend of ascending position of management in mankind's knowledge system as an independent discipline and provides inspiration for management in China to move forward to the international academic frontline and also reasonable layout of disciplines.

1 Introduction

Modern management has been introduced into China for nearly 30 years and made great progress. Deeper exploration at frontiers of management will have undoubtedly great realistic significance to speed up modernization of management and enhance the establishment and development of the discipline of management.

Although management has been the hot-spot field in Chinese academic circle, still, disputes exist at such basic concepts as management and management science(s). "The Principle of Management" (Yang Wenshi and Zhang Yan，1994) lists eight definitions of "management" given by management scholars home and abroad, which attempt to describe the attributes of management from different angles and aspects. People have also diversified understandings on "management" semantically.

In domestic literature, "management" and "management science(s)" are generally academic terms that are not strictly distinguished, which is possibly caused by two factors: the first is originated from substandard naming by state management education and research institutions, and the second is originated from habitual misunderstanding in translation from Chinese to English. In the Catalogue of Disciplines and Majors published by the State Council Academic Degree Committee, "management" is listed under the category of disciplines and five first-level disciplines are established underneath, i.e. Management Science and Engineering, Business Management, Agricultural and Forestry Economics Management, Public Management and Library, Information and Archive Management. According to the Management Discipline Group in State Natural Science Fund Committee, "management sciences" includes restricted management science, management engineering,

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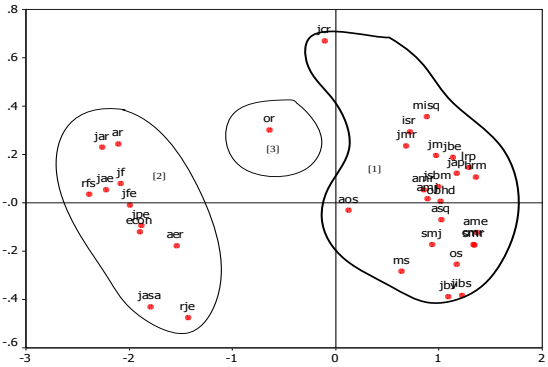
economic management, business management, and macro management and scientific and technical management （CHEN Xaiotian, JIN Bihui, YANG Liexun, LI Ruoyun, LU Yun and LI Lin,1999）. Two of them are roughly identical if examined by what included in "management" in the catalogue of discipline and majors and "management science" in the group of management disciplines. Professor Wang Xukun(2003) prefers more the naming of "management sciences" and thinks that management sciences is the disciplinary category to study various management activities in mankind society and the general name of many management disciplines that take management activities as the object to study. English terms related with management include "Management" and "Management Science". According to Chinese's translation habit, the former is easily considered as management practice and the latter as management theory accordingly. Actually, the former could be interpreted at two aspects of both verb and noun. In academic study literature, the former acts more as the noun of "management" and the latter is close to operational research that focuses on the method of mathematical analysis.

This paper attempts to take data in international academic journals of management category as the sample, make use of latest method of mapping knowledge domains in scientometrics and recognize basic concepts, disciplinary boundary, disciplinary structure and disciplinary position of management and the relationship between management and relevant disciplines based on clarification of domestic and international disciplinary boundary regarding management.

2 Modern management within the horizon of knowledge map

2.1 Disciplinary structure of modern management

With reference to co-citation analysis method regarding represent journals, this paper takes top-level journals in business management field listed in table 1 as the object to analyze, to determine disciplinary structure in management and its disciplinary position and role. We retrieved and downloaded the record from 2000 to 2005 of 35 journals through SSCI and obtained 12777 papers and 474459 citation records, and then conducted standardized processing, co-citation analysis, principal components analysis, cluster analysis and multi-dimensional multi-dimensional scaling analysis on data by means of a series methods and steps in mapping knowledge domains and plot the knowledge map of co-citation of business management journals through SPSS software(Fig.1)



Fig。 1 Map of management discipline structure based on co-citation analysis of business management journals

The map divides clearly journals in the category of business management into groups of disciplinary knowledge represented by three groups of journals. Group [1] includes 23 journals. Based on the name of journals, they could be considered to represent marketing, human resource management, organizational behavior, strategic management, management science and other disciplines. It also includes the journal "Accounting, Organization and Society" (AOS), this knowledge group represents the contemporary mainstream modern management. Group[2] includes 11 journals, which represent disciplines under categories of accounting, finance and economics, and also one statistics journal. In strict sense, they don't belong to management itself, but are supporting disciplines as important tools in management.

It should be observed that group[3] has only one journal extracted, i.e. "Operational Research" (OR).and the study field represented by this journal takes the position close to the center in the map, and between two knowledge group of disciplines [1] and [2], which indicates that operational research acts as a bridge or link between knowledge in finance and economic category and that in management category. It could be thought that ac-

counting, finance and economics support the management decision-making, organizational management and strategic management through operational research from certain angle, which reflects that the study on real-life organizations' management activities, including operation of macro economic management and business management can't be separated from operational decision-making and optimized configuration on social economy and financial resources through application of operational research.

As examined from distance on the map, the knowledge groups of disciplines where the operational research and management science belong to are closer. Another issue worth for reconsideration arising hereof is how to view the relationship between two disciplines of operational research (OR) and management science (MS). Just like the viewpoint of Herbert, the management circle generally believes that "operational research" and "management science" are equivalent and interchangeable. But, why OR is out of the group of disciplinary knowledge where MS belongs to in the map? How do they distinguish or relate with each other? After citation analysis by these two journals(Table 1.), it is found that, on one hand, self-citation of the two journals rank both on the top and mutual quotation the second, which indicates that two journals do have close relationship and both are advantaged at quantitative analysis means, and on the other hand, as far as other journals cited by these two journals are concerned(Tab.2), all journals cited by OR are those under the category of operational research and applied mathematics. While, among top 20 journals that appear frequently in MS's citation, except for MS and OR, nine journals fall under management category, eight under the category of economics, finance and accounting and one under the category of sociology, and only one under the category of management. Moreover, upon further analysis of journals that cite them, the difference isn't obvious. Only journals under management category prefer more MS. Thus, the difference between two disciplines could be examined: although both MS and OR apply the means of applied mathematics for analysis, but the former prefers more solution of management issues and the latter more study of applied mathematics.

Tab。1 parision between the citing journals for MS and OR

No.	MS	Citing Fre。	OR	Citing frequency
1	MANAGE SCI	438	OPER RES	204
2	OPER RES	131	MANAGE SCI	157
3	ECONOMETRICA	129	EUR J OPER RES	55
4	AM ECON REV	100	MATH PROGRAM	52
5	MARKET SCI	81	TRANSPORT SCI	42
6	EUR J OPER RES	74	IEEE T COMPUT AID D	39
7	J POLIT ECON	65	NAV RES LOG	35
8	RAND J ECON	59	IEEE T AUTOMAT CONTR	22
9	J FINANC	55	ANN OPER RES	21
10	J ECON THEORY	51	MATH OPER RES	21
11	ADMIN SCI QUART	47	IEEE T VLSI SYST	20
12	Q J ECON	46	QUEUEING SYST	20
13	ORGAN BEHAV HUM DEC	39	ANN APPL PROBAB	19
14	J MARKETING RES	37	NETWORKS	19
15	AM J SOCIOL	36	OPER RES LETT	18
16	STRATEGIC MANAGE J	36	IIE TRANS	16
17	HARVARD BUS REV	33	IEEE ACM T NETWORK	14
18	J FINANC ECON	32	INTERFACES	14
19	ACAD MANAGE J	31	IEEE J SOLID-ST CIRC	13
20	MANUF SERVIC	31	J OPER RES SOC	13

2.2 Disciplinary position of general management

Journals in Journal Group[1] are broken down with the same journal co-citation analysis and mapping knowledge domains method and the map as shown in fig.2 is plotted.

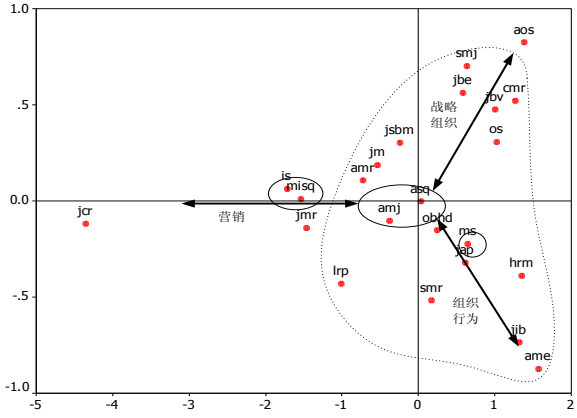


Fig. 2 Analysis of Structure of Journals in Journal Group[1]

Tab. 2 Comparision between the cited journals for MS and OR

No.	MS	Cited frequency	OR	Cited frequency
1	EUR J OPER RES	496	EUR J OPER RES	395
2	MANAGE SCI	438	COMPUT OPER RES	231
3	INT J PROD ECON	251	ANN OPER RES	213
4	LECT NOTES COMPUT SC	212	LECT NOTES COMPUT SC	207
5	COMPUT OPER RES	206	OPER RES	204
6	INT J PROD RES	195	MANAGE SCI	131
7	IIE TRANS	183	IIE TRANS	118
8	OPER RES	157	J OPER RES SOC	110
9	NAV RES LOG	127	INT J PROD ECON	100
10	STRATEGIC MANAGE J	127	NAV RES LOG	96
11	PROD OPER MANAG	126	INT J PROD RES	89
12	J OPER MANAG	117	QUEUEING SYST	78
13	J OPER RES SOC	112	OPER RES LETT	73
14	ANN OPER RES	108	TRANSPORT SCI	72
15	IEEE T ENG MANAGE	101	INTERFACE S	52
16	J MANAGE INFORM SYST	100	INFORMS J COMPUT	51
17	DECISION SCI	96	COMPUT IND ENG	47
18	INFORM MANAGE-AMSTER	84	TRANSPORT RES REC	43
19	MARKET SCI	81	MATH OPER RES	42
20	APPL MATH COMPUT	80	APPL MATH COMPUT	41

In the map's center are two important journals under management category confirmed by A.D. Sharplin and R.H. Mabry（1985）, i.e. Administrative Science Quarterly (ASQ) and Academy of Management Journal (AMJ). Both are most classic journals under management category and were founded respectively in 1956 and 1958. As examined from the map, the distribution of each journal is formed into a three-direction dot chart with the two journals as the center, i.e. the direction of marketing, the direction of strategic organization and the direction of organizational behavior. It is worth to notice that "Management Information System Quarterly" (MISQ), "Information System Management Review" (SMR) and "Management Science" (MS) with technical aspects and quantification as the major content are amongst them and play its role in the entire field. To sum up, inside the dotted line circle in the map is dominant journals and these journals represent just restricted modern management, including general management, strategic management, organizational behavior and information decision-making and etc.

Based on the concept of relevant management disciplines, the map further clarifies that the restricted modern management belongs to group of principle management disciplines under the group of business management disciplines and is dominant in the generalized management as a category of disciplines. Since the two journals belong to comprehensive journals under management category, the map also indicates the position of general management as a fundamental discipline in modern management.

3.3 The relationship between management and relevant disciplines

To analyze the relationship between management and relevant disciplines, we could take represent management journals as the sample and study by the disciplines represented by source journals of citation in management journals. Hence, the key is to select represent journals in management, while the relatively objective basis for selection is journal ranking. Due to diversity and sophistication of topics to study in management, ranking of management journals itself has become one hot spot in academic study. Here, we referred to some study achievements related with ranking of management journals since 1980's（Tail and Meye,1999;Sharplin and Mabry,1985; Salancik,1986;MacMillan,1993,1989; Johnson and Podsakoff,1994; Exlejt and Smith,1990; Coe and Weinstock, 1984; Shane，1997）, conducted necessary incorporation and complementation and selected and established a rather complete collection of management journals represented by a number of disciplines, which include 26 journals of strategic management, human resource management, leadership, general management, industrial and labor relationship, entrepreneur management, organizational behavior, organizational science, decision-making science, international business, quantitative management and other disciplines (Table 3.). This is a collection of restricted management journals with a slightly narrower coverage than generalized management and with general management included.

Tab。3 A Collection of Academic Journals under Management Category.

	Journal	Number of papers	Start time
1	Administrative Science Quarterly(ASQ)	3148	1956
2	Harvard Business Review(HBR)	10162	1956
3	Human Relations(HR)	2659	1956
4	Journal of Applied Psychology(JAP)	4865	1956
5	Management Science(MS)	4797	1956
6	Monthly Labor Review(MLR)	7760	1956
7	Personnel Psychology(PerPsych)	5447	1956
8	Academy of Management Journal(AMJ)	2497	1958
9	California Management Review(CMR)	1896	1958
10	Industrial Relations(IR)	1628	1961
11	Journal of Human Resources(JHR)	1675	1966
12	Journal of Management Studies(JMS)	2458	1966
13	Sloan Management Review(SMR)	1868	1970
14	Journal of Vocational Behavior(JVB)	1366	1971
15	Journal of Business Research(JBR)	2029	1973
16	Journal of International Business Studies(JIBS)	1339	1976
17	Strategic Management Journal(SMJ)	1467	1980
18	Academy of Management Review(AMR)	1675	1983
19	Journal of Management(JOM)	1505	1983
20	Decision Science(DS)	983	1984
21	Human Resource Management(HRM)	814	1985
22	Organizational Behavior and Human Decision Processes (OBHDP)	1216	1985
23	Journal of Business Venturing(JBV)	582	1987
24	Journal of Organizational Behavior(JOB)	1006	1988
25	Journal of Occupational and Organizational Psychology (JOOP)	525	1992
26	Leadership Quarterly(LQ)	400	1994
sum		65767	

The knowledge map of management and relevant disciplines was plotted by taking 26 representative journals of management in Table 2 as the sample, extracting 63 journals with citation frequency above 400 times, establishing journals' co-citation matrix and applying SPSS software through the same serial methods of mapping knowledge domains (Fig. 3).

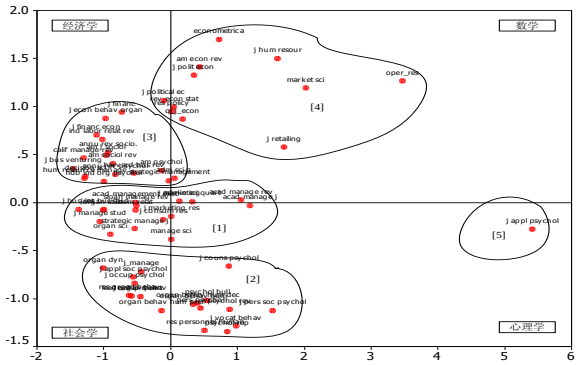


Fig. 3 Knowledge Map of Co-citation of Management Journals and Relevant Disciplines (1996~2000)

The figure shows five groups of journals. When we used Wordsmith4.0 to conduct keywords frequency analysis on journal names of these five groups of journals(Tab.4) and found co-word phenomena among high-frequency words in each group of journals: the journal groups [2] and [3] have the same word of "society", the journal groups [3] and [4] have the same word of 'economy" and the journal groups [2] and [5] have the same word of "psychology". On such a basis, the map could be divided into four quadrants, which incline towards "psychology", "sociology", "economics" and "mathematics" respectively along with changes of coordinates (the "oper-res" on the right top corner focuses more on application of mathematic means), which could reflect the relationship between five journal groups and disciplines reflected by high-frequency words. The journal group [1] with "management" as the high-frequency word is at center of the map, which indicates that management is the intersection set of four disciplines represented by other four journal groups, i.e. "psychology", "sociology", "economics" and "mathematics" are major relevant disciplines of management.

Tab.4 High frequency words in the title of journals

Jounal group [1]	Jounal group[2]	Jounal group[3]	Jounal group[4]	Jounal group[5]
Management (manage)	Psychol Soc Organ	Finance Econ Sociol	Econ Political (policy) oper	Psychol

3.4 Changing relationship between management and relevant disciplines

Cross citation of journals shows knowledge flow between disciplines. Through citation analysis and based on the frequency of cited journals, we found top 100 journals in each period (five years as a period) and divided them into four major categories of psychology, sociology, economics and others (mainly mathematics, statistics, natural science and engineering science), i.e. relevant disciplines of management, based on content of the journal study. Overall citation frequency of journals of relevant disciplines by journals under management category is defined as knowledge flow between disciplines. The extent of influence between disciplines could be calculated by knowledge flow between disciplines.

Along with evolution of management, the extent of influence exerted by relevant disciplines on management may vary. In order to indicate the extent of influence exerted by relevant disciplines on management, we assume

$$t_i = \frac{N_i}{\sum N_i}$$

While, t_i—the extent of influence exerted by relevant discipline i on management disciplines; N_i—knowledge flow between relevant discipline i and management discipline; $\sum N_i$--the knowledge flow between relevant discipline and management discipline. Based on this formula, influence of relevant disciplines in each period and the changing trend of influence extent (fig. 4) are calculated (Tab. 6)

Tab.6 Influence of Relevant Disciplines on Management

	Management	Psychology	Economics	Sociology	Others
56-60	0.176	0.684	0.012	0.107	0.021
61-65	0.274	0.538	0.026	0.136	0.02
66-70	0.277	0.543	0.068	0.087	0.025
71-75	0.333	0.491	0.057	0.106	0.013
76-80	0.456	0.349	0.07	0.107	0.019
81-85	0.496	0.32	0.097	0.073	0.013
86-90	0.573	0.272	0.094	0.049	0.012
May-91	0.592	0.265	0.093	0.039	0.011
96-00	0.649	0.24	0.066	0.039	0.005
1 月 5	0.68	0.24	0.042	0.038	

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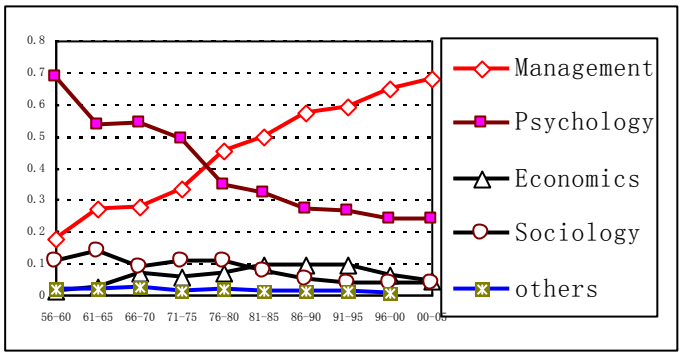

Fig. 4 Changing trend of the influence between management and relevant disciplines.

We could observe from the changing curve in fig. 4 that the influence of psychology drops rapidly, but, is still the greatest supporting discipline when compared with other disciplines. Along with the arrival of new century, it seems to bounce back. With detailed analysis of the influence by psychology, we found that the influence of applied psychology is still the greatest, followed by general psychology, social psychology and personality psychology. It is worthy to notice that the influence of experimental (clinic) psychology is dropping, recognition psychology exerted its remarkable influence on management in middle period of 80's, and the influence of behavior science started since 1960's and ebbed gradually in 1980's.

Compared with the influence extent curve of psychology, those of other disciplines are relatively flat and stable. The supporting degree of economics journals change steadily, and seemed to weaken since 90's. Actually, disciplinary relationship between management and economics is quite complicated and this simple analysis isn't sufficient to address the issue. The supporting degree of sociology journals changes steadily, but the influence of politics can't be neglected. Among other types of journals, "Science" (U.S.A) always appears at top 100 (except for the period from 2000 -2004). "Science" founded in 1880 is a famous comprehensive academic journal of natural science in the world and covers all disciplines of natural science, especially the progress of most important studies in physics, life science (biology), chemistry, material science and medicine and enjoys great reputation in the world academic circle. The influence element of volume of being cited ranks always in top ten among 5700 science journals

collected by SCI, which indicates that management has never been far away from natural science and engineering science.

The figure indicates that the influence extent curve of management itself follows an abrupt upward trend and management is becoming increasingly a relatively independent group of disciplines. We could say that management has got rid of the constraint of psychology and obtained the principal status during 70's to 80's. In view of changing relationship between management and relevant disciplines, we could see that the status of modern management in mankind's knowledge system keeps going up and its influence is expanding.

4. Conclusion

Looking back at thoughts of management scientists that played the role of a founder for birth and evolution of management in early 20th century, we are clear with the disciplinary concept of management and management science(s) and understand that modern management has implications at three aspects: generalized management that cover the entire category of disciplines, restricted management that include several specific disciplines and general management as the fundamental discipline of management, and the concept of management science(s) is also divided into generalized and restricted. Disciplinary setting of management in China is quite close to international common understanding on management and management science(s), especially American management academic circle, however, there is still obvious semantic difference regarding disciplinary concepts of management between China's management circle and international counterparts.

We made use of a series of metering methods in the mapping knowledge domains, conducted co-citation analysis on 35 top journals in the field of business management as listed by American "Financial Times", revealed the disciplinary structure and its distribution status of modern management originated from business management activities, illustrated that the restricted modern management belongs to the group of principal management disciplines under the group of business management disciplines and is dominant in the generalized management as a category of disciplines, described the link and difference between two journals of Operational Research (OR) and Management Science (MS) and carried co-citation analysis on 26 representative journals of management, clarified that psychology, sociology, economics and mathematics are major relevant disciplines of management, demonstrated the changing influence of relevant disciplines on management through citation statistics and the abrupt upward trend of management in mankind's knowledge system as an independent discipline, which provides valuable inspiration for management in China to move forward to international academic frontline and also reasonable layout of disciplines.

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