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Analysis on Current Situation and Development Trend of Construction Worker's Occupational Mobility

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Abstract: Occupational mobility is one of the hotspots in academic research. The construction worker's occupational mobility is the key element of affecting the healthy and sustainable development of construction industry in China. Based on domestic and foreign occupational mobility literature, this paper analyze the regional distribution, classic literatures and hotspots about construction worker's occupational mobility, by Citation Network, Keyword Co-Occurrence and other bibliometrics and qualitative tools. It sort out systematically the development skeleton so that we can grasp the future research directions of occupational mobility. Moreover, it will be important for solving the problem of construction worker's occupational mobility.

Keywords: Bibliometrics, construction worker, occupational mobility.

1. INTRODUCTION

Occupational mobility means workers switch from one occupation to another. As to construction workers, it refers in particular to different types of jobs or different units in this paper. Occupational mobility is very common in various industries. Normal occupational mobility is beneficial for the industry. However, abnormal occupational mobility maybe leads to adverse effect. For construction industry, construction workers are the fundamental of production and management related activities. Anyway, construction workers have to change jobs, occupation and even the city where they work in China [1]. So this matter becomes serious. A survey has showed 82 percent of the construction workers experienced occupational mobility [2], and 73.3 percent changed their jobs in construction, which is the highest rate in all industries [3, 4]. In addition, many scholars point out that occupational mobility will have a disproportionate impact on workers' earnings, productivity and skills [5]. Frequent occupational mobility can lead to workers' skills declining so that the risk in quality and health increases [6, 7]. Meanwhile, it will be difficult to make out who is responsible for workers' technological training [8] and to protect the workers' rights.

Construction worker's occupational mobility is the key element affecting the healthy and sustainable development of construction industry in China. Lots of attention from home and abroad have been paid to occupational mobility, the results have showed there was significant difference in the aspects of the research theme and content, research perspective, research methods and so on. If we sort out systematically the research development skeleton, and generalize these research themes, perspective and methods, we will grasp the future research directions of occupational mobility. Moreover, it will be important for solving the problem of construction worker's abnormal occupational mobility. To achieve this goal, this paper analyzes the research findings and makes a systematic review by bibliometrics and qualitative methods.

2. RESEARCH METHODS AND DATA SOURCES

2.1. Research Methods

Generally combination of qualitative and quantitative approaches is very popular to analyze systematically the related literature. Qualitative method focuses on the analysis and comparison of literature contents. Researchers often use qualitative analysis to make an in-depth analysis of evolution process, a comprehensive comparison and summary about contents. Quantitative analysis uses bibliometrics to calculate and analyze the integral distribution and individual characteristic of related literature by quantifying. This paper selects the qualitative analysis methods of Citation Network. Citation Network reflects the quantitative features and the inherent laws of the literature through network mapping made up of references and cited articles. The Co-citation and Co-word are the two important methods for Citation Network. Co-citation can study the connection between key literature and research topics, and the referenced literature is more or less similar in the topics. Co-word takes key words as the object of the research, and forms co-word matrix according to the frequency of a group of words or phrases in the same article. Then based on the co-word matrix, it uses cluster analysis to explore the relationship between keywords so that it can analyze the changes and development of the disciplinary structure represented by these words [9]. Using professional literature analysis software to draw and analyze citation network, co-citation network and keywords association network of related literature, we can study objectively and accurately the concern of literature, division and cross relationship of sub-area and evolution of keywords hotspots.

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In order to reveal fully current situation and trend of occupational mobility, this paper combines the methods of qualitative analysis and quantitative analysis. It uses common quantitative analysis tools to make statistical analysis and trend forecast of the literature. Besides, it uses computer programming technology and professional literature analysis tools to carry out the quantitative analysis. And this paper makes theoretical analysis through further reading and thinking of vital domestic and foreign literature.

2.2. Data Sources

The research data is the basis for literature analysis. It will have an impact on the reliability and accuracy of the result. To reflect fully the research findings in construction and analyze accurately the trend of occupational mobility, this paper takes the Web of Science built up by American Institute for Scientific Information as retrieval system. Literature retrieval sees subject words as the retrieving object. And subject words can be divided into two categories. One is in construction, including "construction", "project*", "migrant workers" and "rural migrant workers". The other is about occupational mobility, including "occupational mobility", "career mobility", "job mobility", "job change*", "career transition", "mobility rate", "occupational stability", "occupational stratification". Generally, the time span of retrieval is related to the aim of the study. As this paper aims to study the trend of occupational mobility, the time span should be as large as possible. Therefore, it retrieves the data of all years in the database, which is from 1986 to 2014. "Article" is selected as the type of literature retrieval, and "SCI-EXPANDED", "SSCI" and "CPCI-S" as the types of the citation indices. By doing so, it gets 1,234 articles.

Moreover, in order to ensure that the theme of this study is consistent with the literature retrieval, we must filter the retrieval results and remove irrelevant articles. By refining retrieval results and reading the abstract and conclusion of these articles, finally, we get 190 articles.

3. CURRENT SITUATION AND DEVELOPMENT TREND OF OCCUPATIONAL MOBILITY

3.1. Statistical Analysis of Literatures Related to Occupation Mobility

Based on the 190 articles, this paper counts the number of papers in each year shown as Fig. (**1**). We can see that research on occupational mobility is still in its infancy. In terms of the total research articles, the average is 9 in recent twenty years and 16 in the recent decade. But as to the research trend, the increase is significant as a whole, which shows that scholars' attention to occupational mobility is increasing.

To further reveal the distribution of occupational mobility research, this paper analyzes the source of samples. Table **1** illustrates the article number of the top ten countries and regions. Because the article number is only 1 or even 0 before 2003, we just count the article number after 2003. And the result can be shown as Fig. (**2**). We can tell that most of the articles mainly come from developed countries such as the USA and the nations of Europe. USA is in the leading position, and its proportion accounts for 1/3 all over the world. Comparatively, the number of articles is fewer in Asia. Only PRC ranks in the top ten. It is obvious that Asia is weak in occupational mobility research.

Table 1. Result of experiments and theory.

Countries	Articles	Proportion
USA	63	33.2%
England	27	14.2%
Canada	14	7.4%
Germany	13	6.8%
Australia	9	4.7%
France	9	4.7%
PRC	8	4.2%
Netherlands	7	3.7%
Spain	7	3.7%
Sweden	5	2.6%

Table **2** lists the top 15 journals that publish the 190 articles about occupational mobility. Though the15 journals publish more than others, the absolute number is not large, which reflects that related research on occupational mobility is late.

Fig. (1). Changes in the number of literature about occupational mobility.

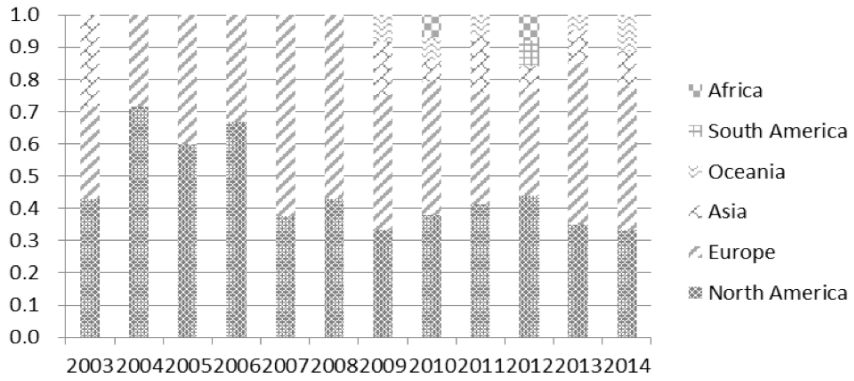

Fig. (2). Changes in the number of literature about occupational mobility.

Table 2. Result of experiments and theory.

Article number	Journal title
5	Relations Industrielles-Industrial Relations
5	Journal of Construction Engineering and Anagement-ASCE
5	International Journal of Manpower
4	Work and Occupations
3	Journal of Safety Research
3	Harvard Business Review
3	Revista Espanola De Investigaciones Sociologicas
3	Career Development International
3	Safety Science
3	Journal of Youth Studies
3	Employee Relations
3	Human Relations
3	Work Employment and Society
3	Human Resources for Health
3	International Journal of Project Management

3.2. Analysis of Co-citation

Co-citation analysis can reflect inherent laws between key literature and the research topics. Co-citation analysis takes the literature as the unit, and can also be applied to the characteristics of the relevant literature, including the Author Co-citation, Word Co-citation, Journal Co-citation and so on. The Document Co-citation and Author Co-citation are the most commonly used [10, 11].

3.2.1. Analysis of Co-citation

The Document Co-citation can study the connection between the cited literature and topics by building co-citation network. Based on the above 190 articles, this paper draws the co-citation network mapping (see Fig. **3**). The figure shows that after the cluster analysis these articles are clustered into 51 categories, of which only 20 categories can be clearly revealed. The other 31 categories at the edge containing very little literature tell that they have not formed a clear research direction. Most of the categories show in isolation and there are very fewer links between them, which indicates that there is no clear research school and related research is still in its infancy. Therefore, it is of great research value in this field.

Highly-cited papers play the foundational role in promoting the further research in the field. Table **3** lists the top eight articles by cited frequency. “Kanter-1977”, “Giddens-1991” and “Martin-2003” rank number one. Kanter groundbreaking analyzed gender’s effect to personal occupational choices and changes. He thought that industrial supply company members are almost all male would have a significant impact on the culture of the organization and men work experience [12]. Martin revealed the same behavior generated by

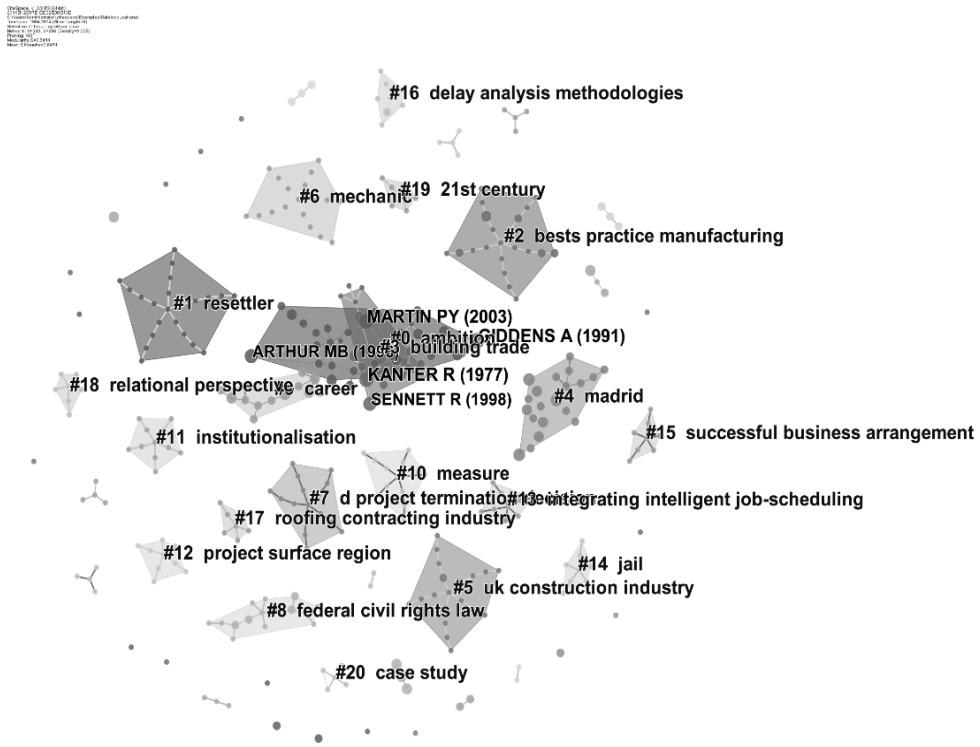

Fig. (3). Document co-citation network mapping.

Table 3. Result of experiments and theory.

Order	Citation Frequency	References	Clustering Number
1	6	Kanter R, 1977, MEN WOMEN CORPORATIO, V, P	3
2	6	Giddens A, 1991, MODERNITY SELF IDENT, V, P	0
3	6	Martin PY, 2003, GENDER SOC, V17, P342	0
4	5	Sennett R, 1998, CORROSION CHARACTER, V, P	3
5	5	Arthur MB, 1996, BOUNDARYLESS CAREER, V, P	0
6	4	Piore M, 1979, BIRDS PASSAGE MIGRAN, V, P	4
7	4	Featherman David L, 1975, SOC SCI RES, V4, P329	4
8	4	Chiswick BR, 1978, J POLIT ECON, V86, P897	4

different genders has different explanation at work. He elaborated the impact of mobility generated by gender on the performance of employees from the perspective of dual dynamic [13]. And the researchers gradually focused on the impact of occupational mobility.

The centrality of nodes in co-citation network shows the importance of node location. The higher the centrality is, the more important its position in the set structure is. They play an important role in connecting to other nodes or different clustering. Tables **3**, **4** lists the top eight articles by centrality. In construction occupational mobility, the article of highest centrality is "Kelan-2010" with the centrality of 0.04. Kelan EK mainly analyzed the influence of gender on job performance and behavior of the organization members [14]. From the citation mapping we are able to observe the structure of the article directly. Besides, Hall DT made his great contribution to occupational mobility research. Based on his personal experience and academic research, he found that personal occupation always changed and personal core values played an important role in the occupation mobility [15]. What's more, there are four of the top eight articles clustered into one category according to the cluster distribution, which indicates that these articles of this research direction are instructive and at the heart of occupational mobility research.

3.2.2. Analysis of Author Co-citation

Author Co-citation can reveal the current situation of the development and changes in scientific structural. It can also make analysis on frontier and the field [16]. Author Co-citation Network Mapping (Fig. **4**) shows that after the

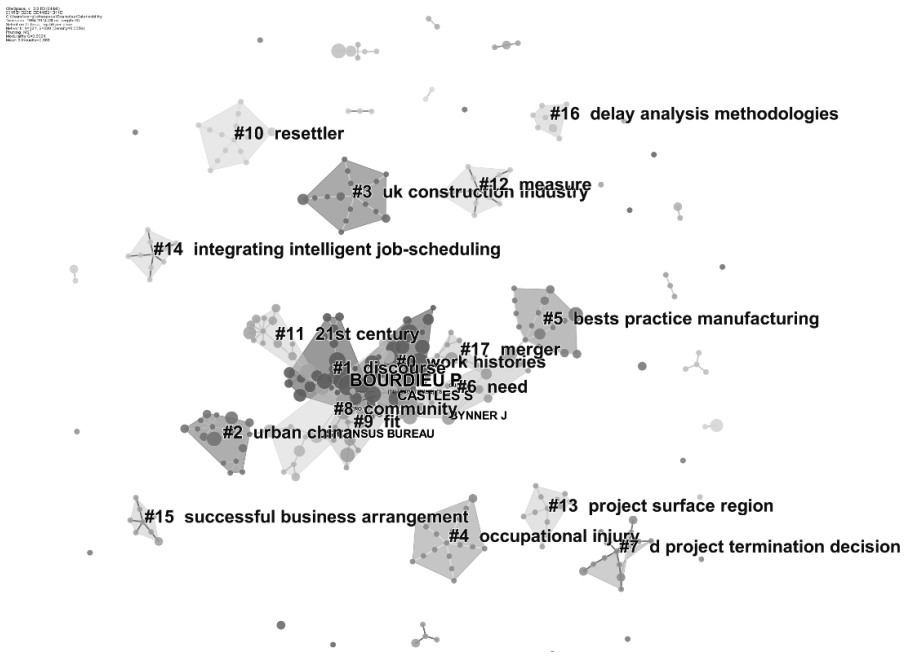

Fig. (4). Author Co-citation network mapping.

Table 4. Result of experiments and theory.

Citation frequency	Centrality	Publication Year	Cited Author	Clustering Number
12	0.03	1970	BOURDIEU P	0
10	0.07	1993	BECK U	0
10	0.07	2008	OECD	6
9	0.01	1987	MASSEY DS	0
8	0.06	1998	PORTES A	0
8	0.02	1998	SENNETT R	8
8	0.10	1990	GIDDENS A	0

cluster analysis they are clustered into 17 categories, of which only 12 categories can be clearly present. The other 5 categories at the edge do not connect intensely with other authors. The 12 categories show in isolation and there are very fewer even no links between them, which indicates that there is no clear research school and their contacts should be further strengthened.

Through further analysis, it figures out the authors who has been cited for 8 times or above, as shown in Table **4**. The high cited authors can lay the foundation for the others' further research. The high degree centrality authors confirm that the authors play an important role in connecting authors of different research scope. And through the comparison of the high cited authors and the high degree centrality authors, we can find out the scholars who make great contribution to occupational mobility research. As can be seen from the table, the highest cited frequency and the highest centrality author is Bourdieu, indicating that Bourdieu plays an important role and is the leader in this field. From the clustering distribution, five of the top seven high cited authors are clustered into the same category, which means that these authors in this direction push forward the development of occupational mobility.

Through the Document Co-citation and Author Co-citation, we figure out important documents and authors, and make further analysis on them. According to the result, it shows that the occupational mobility research is at the stage of development. The research perspectives are decentralized and not systematic. And the communication between researchers is not much. As a rusult, occupational mobility has great research potential and value.

4. ANALYSIS BASED ON HOT KEYWORDS

4.1. Keywords can Refine and Summarize the Core

Contents of the paper and high frequency keywords can reflect the hotspot in the study. Therefore, keywords can be regarded as an important indicator in bibliometrical study [17-19].

Table 5. Keywords with strongest citation burst.

Keywords	Strength	Begin	End	1994 - 2014
Mortality	3.4266	2001	2005	
Occupational health	3.415	2007	2010	
People	4.5936	2009	2009	
Immigrants	3.4897	2009	2011	
Social class	4.7238	2010	2011	
Participation	4.2687	2012	2012	
Spain	3.4094	2013	2014	

Fig. (5). Knowledge map of the hot spot.

Kleinberg (2003) indicated that Burst Word Monitoring can be applied to the analysis of the changing structure of the subject, focusing on certain keyword or subject term of which relative growth rate increased suddenly [20]. According to the analysis of keywords with Citespace, Table **5** identifies 7 burst words, "mortality", "occupational health", "people", "immigrants", "social-class", "participation" and "Spain". Research on occupational mobility lags behind and theme is also relatively scattered. There was no obvious research hotspots until 2001 mortality, scholars paid much more attention to the study of relationship between occupational health and occupational mobility from 2007 to 2010. Since 2009, starting from the perspective of the people and the social class, relevant research topics such as behavior and characteristics of occupational mobility gradually increased. Notably, due to the particularity of Spanish occupational mobility, many scholars have been researching on Spanish immigration and occupational mobility in 2014.

Generally speaking, research on the occupational mobility of construction industry in foreign countries mainly revolves around the influencing factors, improves gradually theory, and then proposes the corresponding countermeasures based on above theory to reduce occupational mobility.

4.2. Analysis of Keywords Co-occurrence and the Hotspot

Keyword co-occurrence can analyze the hotspot and development trends of occupational mobility. This paper extracts keywords from 190 literatures, merges similar meaning or similar keywords. It then draws the keywords co-occurrence network based on 445 keywords. (See Fig. **5**).

In Keywords co-occurrence network, the center degree of a point can reflect the centricity of nodes, namely the node degree of close contact between the node and other nodes. It can also reveal the importance of the keywords. Text label size in Fig. (**4**) corresponds to keywords center degrees. As shown in Fig. (**4**), words with high frequency and high center are: construction, employment, migration and work. However, the center degree of these words is not particularly high and the density of the entire network is 0.0128.The degree illustrates that the connection between the various keywords isn't tough and research system has not been established. Its content is broad and is short of core theme. As can be seen from the figure, in addition to the above high-frequency words, there are also some related hotspot words in the surrounding, including model, gender, discrimination, job-satisfaction, earnings, attitudes, performance and so on.

Through literature deeply, factors influencing occupational mobility in construction industry mainly manifest in two aspects: One is the outcome, the other one is the direct and indirect factors. Researches have shown that occupational mobility has different effect on individual income, working efficiency [21] and technical level. After empirical analysis of the 2004 samples of the British labor relations in 2009, Brown (2009) [22] proved that under the wage negotiation mechanism, high turnover rate would bring positive effect to enterprise performance. On the other hand, based on lots of empirical data, Granovetter (1995)[23] proved that occupational mobility is not only resulting from labours to pursue benefit maximization. It also results from many non-economic factors. Bian and Ang (1997) [24] found relation close degree can affect the occurrence of occupational mobility frequency, but José Ignacio, García Péreza and Yolanda Rebollo Sanzb (2005) [25] focused on the relationship between the wage income and occupational mobility, and validated the wage income is direct factors.

Further analysis found that at the same time of researching related influencing factors, analysis of countermeasure is an important part of occupational mobility. Main countermeasures: the traditional strategies are applied to reducing occupational mobility, including the harmonious labor relations, standardized labor market and labor safeguard measures; more targeted countermeasures should be developed. Elger Tony, Smith Chris, Daskalaki Maria, Brown Donna (2004) [26] said when studying the labor service personnel retention measures, the selection work should be strengthened according to labors' historical record of the. In 2007, Taplin and Winterton's studies [27] have shown that taking the initiative to establish a good relationship with employees to help prevent the loss of employees.

In conclusion, the current research hotspot about the construction industry occupational mobility mainly focused on its influential factors and countermeasures. Devoted to studying the influential factors and the consequences of occupational mobility, foreign scholars put forward the corresponding countermeasures. Their study stresses on empirical research, attempting to establish construction workers mobility model and analyzing the behavior in a deeper way.

CONCLUSION AND OUTLOOK

The abnormal mobility of the construction workers is very severe in China, which has directly affected the overall performance of projects, the product quality and industry production efficiency. However, due to the particularity of the construction industry, the relevant study in the initial exploration stage. It has not formed a system and lacks of combing its context. Therefore, this paper, combines quantitative with qualitative analysis, on the basis of a large number of domestic and foreign literature review. Then it analyzes and summarizes the related research comprehensively. The main research results are as follows:

(1) Statistical analysis on the related literature has found that the research of occupational mobility in construction is still in its infancy. From the perspective of the research trend, the number of literature has obviously increased on the whole and attention is rising. In addition, the literature mainly comes from developed countries and regions such as North America and Europe. The journal is not concentrated.

(2) Document Co-Citation Analysis can be applied to excavating the literature which the position and significance is important. Then it offer reference for the researchers.

(3) As the total cited network shows, the research on construction workers occupational mobility has not yet become a genre. It is still in the initial stage and the development is relatively slow.

(4) Based on Keywords Co-Occurrence Analysis, this paper has searched out important keywords which reveal the research hotspot.

(5) In the construction industry, the research on occupational mobility focuses on the characteristics analysis and countermeasure analysis. Impact analysis is especially lack of the occurrence mechanism, but it will be research direction and hotspot in the future.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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