Visualizing the Knowledge Domain of Psychological Contract Research through Bibliometric Analysis

Huihui Li¹,² *, Congwei Xu¹

Abstract
Psychological contract refers to the understanding or belief of individuals regarding the mutual obligations of employers in the same organization. It has a direct bearing on the working attitudes of employees and the efficiency of the organization. In this paper, the relevant research on psychological contract is analysed visually to disclose the evolution history and future trend of the research domain. A total of 458 documents on psychological contract were extracted from the Web of Science Core Collection database, and pre-processed. The valid samples were visually displayed on CiteSpace, a Java-based information visualization software package, and then subjected to co-word analysis based on four keywords. In this way, the research frontiers and hotspots of psychological contract were summarized, and future research directions were identified. This research sheds new lights on psychological contract research.

Key words: Psychological Contract, Bibliometric Analysis, Co-Word Analysis, CiteSpace.

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INTRODUCTION
Argyris (1960) discusses an implicit and informal understanding and tacit relationship between workers and foremen in his book, Understanding Organizational Behavior. He first put forward the concept of a ‘psychological work contract’, and this book is the earliest study of ‘psychological contracts’. Rousseau (1990) redefines the definition of a psychological contract. He proposes a special ‘psychological contract’ concept. He believes that a psychological contract is an individual’s understanding or belief regarding the mutual obligations of employers in an employment background. Morrison & Robinson’s (1997) study conducts an in-depth analysis of psychological contract breaches and violations and conducts a series of empirical researches on the influences on the results. He is the main expert in the field of psychological contract breaches and psychological contract violations. Currently, psychological contract is generally defined as an individual’s understanding or belief regarding the mutual obligations of employers in an employment background (Rousseau, 1990).

Since the birth of psychological contract research in the 1980s, the scope of research has been expanding. The scope of research has expanded from for-profit enterprises to non-profit enterprises. The object of this research further expands the scope of study, from enterprise employees, to students, patients, customers and other groups. The content of this study extends from employee behavior to the causes, essence and effects of psychological contract formation. All these have promoted the rapid development of psychological contract research. With the development of modern technology and intellectualization, enterprises’ organizational and personnel structures are constantly streamlined, bringing increasing work pressure and unemployment risk to employees. On the other hand, young employees’ attitudes toward life are gradually being liberalized, and
employee loyalty is declining, which also brings troubles to enterprises. Therefore, scholars are interested in discovering how to improve the psychological contract between employees and organizations and enhance employees’ job satisfaction and organizational performance. In order to explore existing research, development history and future development trends of psychological contract, this paper explores a visual analysis of the research field of psychological contract.

**METHOD INTRODUCTION AND DATA SOURCE**

**Method introduction**

Bibliometric analysis is a branch of science that uses mathematical methods, such as mathematical statistics and computer technology, to quantitatively analyze the input, output and process of scientific activities, and to assess the regularity of scientific activities. Co-word analysis comes from the concept of citation coupling and co-citation in bibliometric analysis. It mainly uses the co-occurrence of lexical pairs or noun phrases in the literature collection to determine the relationship among the subjects represented in the literature collection.

**Analysis tool**

CiteSpace is a Java language information visualization software developed by Chen Chaomei, Professor of Computer and Information Science at Dressel University. For this study, CiteSpace5.1 was used to perform a bibliometric analysis. This software is mainly based on the theory of co-citation and the routing algorithm (Path Finder). Visualization knowledge maps consist of nodes and links. Different nodes in a map represent elements such as a cited reference, institution, author, and country; links between nodes represent relationships of collaboration/co-occurrence or co-citations. The colors of nodes and lines represent different years. The purple circle represents centrality. Nodes with high centrality are usually regarded as turning points or pivotal points in a field (Chen, 2006; Chen, 2005; Xie, 2015).

**Data acquisition**

The Web of Science Core Collection is an important database for acquiring global academic information. It contains more than 12,400 authoritative and influential academic journals from all over the world. In order to highlight the importance of high-quality leading literature, we use the Web of Science Core Collection as our keyword search data source in this paper. Data retrieval strategy: title=psychological contract, OR topic=psychological contract, time span=2000 – 2018 (retrieval date: May 20, 2019). A total of 495 references were obtained. According to the following principles, the literature obtained is screened 1) excluding 2019 data because it would not be meaningful to compare incomplete data from 5 months of 2019 with data from complete years, 2) excluding types of literature for which full texts are unavailable, such as books, editorials and conference information, and 3) excluding duplicate information following a re-processing of collected data. The remaining 458 papers were taken as research samples. As shown in Figure 1:

*Figure 1. Number of articles published on psychological contracts between 2000 and 2018*
RESULTS

Analysis of countries cooperation
Based on information obtained from CiteSpace, the psychological contract analysis of countries from 2000 to 2018 is shown in Figure 2. There are 27 nodes and 46 links (Figure 2). This indicates that the 458 references are published by research teams from 27 countries. The top 5 countries in terms of psychological contract researches are shown in Table 1. As shown in Table 1 and Figure 2, the top five countries in terms of numbers of psychological contract studies are China, the United States, Britain, Australia and Germany. Among them, 31.22% of the total number of papers was from China, and the United States accounted for 22.05% of the total volume, showing a significant investment of Chinese and American scholars into the research of psychological contract. The top five countries (purple circle in Figure 1, Note: The full colour version of this figure is available online.) in terms of degree of centrality are the United States (0.82), Britain (0.40), China (0.30), Sweden (0.14) and Spain (0.11). As can be seen from Figure 2, the United States cooperates with Germany, the United Kingdom, Switzerland, Japan, Sweden, Canada and China. Although China has also cooperated with the United States, Canada and Australia, the degree of cooperation is significantly weaker than that of the United States.

Table 1. Top 5 countries in psychological contract research

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Centrality</th>
<th>Frequency</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.30</td>
<td>143</td>
<td>PEOPLES R CHINA</td>
</tr>
<tr>
<td>2</td>
<td>0.82</td>
<td>101</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>0.40</td>
<td>29</td>
<td>ENGLAND</td>
</tr>
<tr>
<td>4</td>
<td>0.09</td>
<td>29</td>
<td>AUSTRALIA</td>
</tr>
<tr>
<td>5</td>
<td>0.00</td>
<td>18</td>
<td>GERMANY</td>
</tr>
</tbody>
</table>

Figure 2. Analysis of all countries engaged in psychological contract research between 2000 and 2018
Analysis of authors and co-cited authors

The psychological contract analysis of co-authorship from 2000 to 2018 is shown in Figure 3. Four research teams form a stable cooperative triangle. They are the main authors in this field. Some of the authors are engaged in one-to-one cooperation.

The first team is De Cuyper Nele and De Witte Hans, who are both based at the University of Leuven, Belgium. Griep Yannick is based at University of Calgary. Together, these authors study the relationship between job insecurity, psychological contract violation and perceived control (Kirves, de Cuyper, Kinnunen et al., 2011; Griep, Kinnunen, Natti et al., 2016; Vander Elst, de Cuyper, Baillien et al., 2016), e.g., to clarify the role of perceived job insecurity and perceived employability in relation to psychological symptoms among permanent and temporary employees; and to compare the association between short- and long-term unemployment and perceived job insecurity with a diverse set of health and well-being indicators. The second team comprises Virtanen Pekka, who is based at the University of Tampere, Finland, and Janlert Urban, who is based at Umea University, Sweden. Hammarstrom Anne is from Uma University of Sweden. These authors work together to study the relationship between temporary employment, psychological contracts and physical health (Virtanen, Janlert, & Hammarstrom, 2011; Hammarstrom, Virtanen, & Janlert, 2011), e.g., to analyze interactions between job insecurity and temporary employment and health; and to analyze whether the health consequences of temporary employment are worse among low educated compared with high educated, after control for health-related selection. The third team comprises Lau, Tsui, and Griffiths Sian from The University of Hong Kong, who study humans’ expected response and behavioral response in the outbreak of epidemic infectious diseases (Lau, Yang, Pang et al., 2005; Lau, Kim, Tsui et al., 2007; Lau, Griffiths, Choi et al., 2010; Gu, Lau, & Tsui, 2011; Lau, Tsui, & Kim, 2010), such as the general population in Hong Kong at the initial stage of the H1N1 epidemic; cognitions, including unconfirmed beliefs about modes of transmission, perceived severity and susceptibility were associated with some of the avoidance behaviors and emotional distress variables. The fourth team comprises Zhu, Liu, & Wang (2006), who are from Shanghai Jiao Tong University, Zhu & Wang (2005), who is based at Zhejiang University, working together to study the relationship between salary management, psychological contracts and employee motivation, such as that psychological contract fulfilment has a significant effect on intention to resign, task performance and organizational citizenship behavior (OCB).

Figure 3. Author co-citation map related to psychological contract research from 2000 to 2018
Furthermore, GEMMEL and Trybou, both from Ghent University, have not yet officially formed a cooperative team. However, they have conducted many studies of one-to-one cooperation. They have studied the effects of perceived organizational support, social exchange and breach of psychological contracts on nurses’ work behavior, mental health and turnover intention (Trybou, de Pourcq, Paeshuyse et al., 2014; Trybou, Maaike, Elke et al., 2016; Trybou, Gemmel, Van Vaerenbergh et al., 2014).

As can be seen, research teams are mostly concentrated in universities. Team research mainly focuses on psychological contract and job security, physical health, mental health, and employee behavior.

Analysis of co-cited references
In order to further explore the research frontiers in the field of psychological contracts, we have introduced and analyzed the literature. In this network, there are 156 points and 459 sides, and the time slice is one year, as shown in Figure 4.

As shown in Figure 4 and Table 2, at present, the frontier areas of psychological contract research mainly include (1) community support, (2) organizational change, (3) moderating effect, and (4) unmet expectations.

Table 2. Research frontiers of psychological contracts

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Research frontier</th>
<th>Core paper (Paper)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Community support</td>
<td>25</td>
<td>108</td>
</tr>
<tr>
<td>2</td>
<td>Organization change</td>
<td>21</td>
<td>121</td>
</tr>
<tr>
<td>3</td>
<td>Moderate effect</td>
<td>21</td>
<td>116</td>
</tr>
<tr>
<td>4</td>
<td>Occupational function</td>
<td>19</td>
<td>141</td>
</tr>
<tr>
<td>5</td>
<td>Broken promise</td>
<td>14</td>
<td>155</td>
</tr>
</tbody>
</table>

Figure 4. Research frontiers of psychological contracts
(1) Community support: Organizational care for employees is a primary contributing factor for employees’ willingness to stay in an organization and work hard. Many scholars have studied this subject, hoping to help organizations improve their management ability, employee satisfaction and motivation. e.g., Rodwell, McWilliams, & Gulyas (2017) investigate the influence of characteristics of nurses’ relationship quality with their managers on engagement and trust, onto in-role or discretionary behaviors and intent to resign. Ye, Feng, & Choi (2015) shows that perceived community support and perceived leader support positively affect users’ knowledge contribution.

(2) Organizational change: Organizational development inevitably undergoes change, bringing many uncertainties to employees and impacting employees' behavior and health. e.g., Dahl (2011) analyzes the relationship between organizational change and employee health.

(3) Moderating effect: A moderating effect is an interactive effect with causal orientation, which can affect independent and dependent variables. Therefore, in many studies, scholars will use moderating variables. e.g., Eckerd, Hill, Boyer et al. (2013) explores when and how three conditions of psychological contract breach-attribute, severity, and timing – negatively impact outcomes, and assess the role of psychological contract violation in this relationship.

(4) Unmet expectations: Unmet expectations can cause various negative effects such as psychological contract damage, non-cooperative behavior and so on. Thus, scholars focus on the prevention and repair of broken promises. e.g., Chih, Kiazad, Li et al. (2017) investigated the interactive effects of broken promises, organizational justice, and tenure on workers’ job insecurity and job performance.

The above analysis shows the impact of psychological contract as a variable on the relationships between organizations and employees. Using different research methods to solve the problem is also a focus of scholars.

**Analysis of keywords**

Keywords can provide information about the core content of articles. Therefore, keyword analysis can be used to identify evolving research hotspots relating to a particular knowledge domain. In this paper, we use CiteSpace to cluster the relevant keywords. By analyzing 458 articles, we are able to generate a graph that has 140 nodes and 264 sides. By extracting the title of various citations, 10 related themes were formed. A co-word analysis of psychological contract keywords is shown in Figure 5, and the 10 clusters are shown in Table 3.

The values of the silhouettes for each cluster are greater than 0.5, suggesting reliable and meaningful results. CiteSpace can extract noun phrases from the titles of articles that cited the cluster, based on three specialized metrics, namely TFIDF, log-likelihood tests (LLR) and mutual information tests (MI). A LLR usually gives the best result in terms of the uniqueness and coverage of themes associated with a cluster. This paper mainly introduces the following four clusters.

**Table 3. Top 10 clusters in psychological contract research**

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Size</th>
<th>Silhouette</th>
<th>Label (TFIDF)</th>
<th>Label (LLR)</th>
<th>Label (MI)</th>
<th>Mean (Citee Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>18</td>
<td>0.797</td>
<td>knowledge exchange</td>
<td>organizational</td>
<td>citizen behavior</td>
<td>2011</td>
</tr>
<tr>
<td>1</td>
<td>17</td>
<td>0.788</td>
<td>online auction</td>
<td>online auction</td>
<td>online auction</td>
<td>2010</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>0.696</td>
<td>sexual</td>
<td>public sector</td>
<td>public sector</td>
<td>2010</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>0.744</td>
<td>risk behavior</td>
<td>Interorganizational new product development team</td>
<td>post-herpetic neuralgia</td>
<td>2011</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>0.745</td>
<td>case study</td>
<td>post-herpetic neuralgia</td>
<td>post-herpetic neuralgia</td>
<td>2009</td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>0.883</td>
<td>Japanese dual-earner couple</td>
<td>post-herpetic neuralgia</td>
<td>post-herpetic neuralgia</td>
<td>2009</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>0.771</td>
<td>Hong kong</td>
<td>psychological response</td>
<td>psychological response</td>
<td>2009</td>
</tr>
<tr>
<td>7</td>
<td>11</td>
<td>0.859</td>
<td>middle range theory</td>
<td>middle range theory</td>
<td>middle range theory</td>
<td>2009</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>0.917</td>
<td>negative work environment</td>
<td>negative work environment</td>
<td>negative work environment</td>
<td>2009</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>0.937</td>
<td>unemployed worker</td>
<td>post-herpetic neuralgia</td>
<td>post-herpetic neuralgia</td>
<td>2015</td>
</tr>
</tbody>
</table>
The first cluster covers the development of new products between organizations. This cluster, consisting of 15 members. With the development of an economy, cross organizational teamwork increases. Research shows that the perception of psychological safety among team members has a positive impact on a team's learning efficiency (Bstieler & Hemmert, 2010). However, emotional ties between team members may also inhibit their judgment (Marion, Eddleston, & Friar, 2015).

The second cluster covers online transactions. This is the second largest cluster and consists of 17 members. In online transactions systems, a psychological contract violation can affect the mentality of the buyer. The adverse effects can include reducing the positive impact of trust on trading intentions, and enhancing the negative impact of perceived risk on transaction intentions, thus having a negative impact on sales (Pavlou & Gefen, 2005). Also, trust has a significant positive impact on buyers' repurchasing intentions (Chiu, Huang, & Yen, 2010).

The third and largest cluster, comprising 18 members, covers organizational citizenship behavior. E.g., The relationship between personal characteristics and knowledge exchange behavior (Beck, Pahike, & Seebach, 2014). The relationship between employee job performance and organizational citizenship behavior (Liu, Liu, Luo et al., 2014).

The fourth cluster covers the case studies. In the study of psychological contract, besides empirical and qualitative research, scholars also use case studies. E.g., Pignata & Winefield (2015) paper- ‘Stress-reduction Interventions in an Australian University: A Case Study’.

As can be seen from the keywords with the strongest citation bursts (Figure 6), new burst keywords appear almost every year. From initial health behavior to meta-analysis and organizational citizenship behavior, we can see the evolution of research hotspots. First: Before 2010, ‘behavior’ and ‘health’ are the longest-lasting burst keywords.

**Figure 5. Co-word analysis of psychological contract keywords, from 2000 to 2018**
Health: Health, especially mental health, is an important component of modern people’s health, and more and more people are paying attention to this part of their overall wellbeing. Whether the specific theme is job insecurity and mental health, self-support and mental health (Love, Edwards, & Irani, 2010), employment contracts and mental health (Inoue, Kawakami, Tsuchiya et al., 2010), or even the relationship between HIV/AIDS and mental health (Pappin, Wouters, & Booysen, 2017), the scholars are concerned with all of them.

Behavior: The relationship between psychological contracts and behavior has always been a topic of concern for the scholars, including the influence of behavior control mechanisms on trust (Piccoli & Ives, 2003). Commitment and cooperation (Van Berg, 2008), the relationship between psychosocial factors and occupational diseases and the absenteeism of permanent and non-permanent employees, etc. are all areas of concern (Gimeno, Benavides, Amick et al., 2004).

In the Web of Science Core Collection, there are 162 papers related to both behavioral and psychological contracts. 32 articles are cited more than 20 times. There are 57 papers related to both behavioral and psychological contracts. 32 articles are cited more than 20 times. There are 57 papers related to both behavioral and psychological contracts. 32 articles are cited more than 20 times. Nine articles are cited more than 50 times. It can be seen that the relationship between psychological contract and behavioral health is a focus of scholars’ attention before 2010.

Second: After 2010, and organizational citizenship behavior are the two keywords with the greatest burst intensity.

Meta-analysis: After a period of research, scholars will conduct a statistical analysis of existing research, such as Zolnierczyk-Zreda’s (2016) paper entitled, ‘Psychological contract in the light of flexible employment: The review of studies’.

Organizational citizenship behavior: Cluster analysis has shown that ‘organizational citizenship behavior’ is the largest cluster at present, in a sense, a research hotspot. This is because neither psychological contract nor organizational citizenship behavior is bound by formal contract; Although the two concepts seem unrelated, the implementation of organizational citizenship behavior is deeply
influenced by psychological contract. Scholars therefore began to explore the relationship between psychological contract and organizational citizenship behavior. E.g., Gupta, Agarwal, & Khatri, (2016) explores the relationships between perceived organizational support, affective commitment, psychological contract breach, organizational citizenship behavior and work engagement, Liu, Huang, Huang et al. (2013) analyzes psychological contract breach, organizational trust and organizational citizenship behavior within the hotel industry in Taiwan.

**DISCUSSION**

This paper chooses the relevant literature pertaining to psychological contracts since 2000. A knowledge map based on information gathered from CiteSpace displays an analysis of the research cooperation and hot spots in psychological contract research, which is of great help to the follow-up study of psychological contract. However, this paper also has some limitations. First, in order to operate efficiently, we set the threshold. This kind of extraction has some limitations on the overall study of the reaction. Second, there is no manual merger of keywords with similar meanings, which brings additional limitations to this study.

Future research on psychological contract can be explored in the following aspects: The first is the expansion of the research objects as most of the current research focuses on the relationship between organizations and employees, or on specific objects, such as temporary employees, knowledge workers, etc., when in fact, psychological contract exists in all kinds of relationships. In the future, we can expand the research objects to include interpersonal relationships, customer relationships, relationships between citizens and governments, etc. Solving these problems is of great significance to both theoretical expansion and practical problems. The second is the restoration of psychological contract. Most of the existing studies focus on the impact of psychological contract on the relationship between enterprises and employees, and on the consequences of psychological contract breakdown. However, there are few studies on how to repair psychological contract after it breaks down. It is important to recognize the importance of psychological contract and to maintain it well, but psychological contract breakdown is a common occurrence. Repairing broken psychological contracts warrants future exploration.

**Acknowledgments**

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