

## Article

# A Co-Word Analysis of Organizational Constraints for Maintaining Sustainability

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Received: 28 September 2017; Accepted: 22 October 2017; Published: 24 October 2017

**Abstract:** A good understanding of organizational constraints is vital to facilitate organizational development as the sustainable development of organizations can be constrained by the organization itself. In this study, bibliometric methods were adopted to investigate the research status and trends of organizational constraints. The findings showed that there were 1138 articles and reviews, and 52 high-frequency keywords related to organizational constraints during the period 1980–2016. The research cores were “constraints”, “learning”, “institution”, and “behavior” in the co-occurrence network, and “constraints” played the most significant role. The 52 high-frequency keywords were classified into six clusters: “change and decision-making”, “supply chain and sustainability”, “human system and performance”, “culture and relations”, “entrepreneur and resource”, and “learning and innovation”. Furthermore, the indicators of organizational development (e.g., innovation, supply chain, decision-making, performance, sustainability, and employee behavior) were found to be significantly related to the organizational constraints. Based on these findings, future trends were proposed to maintain the sustainability of organizations. This study investigated the state of the art in terms of organizational constraints and provided valuable references for maintaining the sustainable development of organizations.

**Keywords:** organizational constraints; sustainability; co-word analysis; cluster analysis; strategic diagram

## 1. Introduction

The emergence of the global economy and the growing competition among organizations means that the sustainable development of organizations has become the focus of managers and researchers in organizational research. The sustainable development of organizations ensures that organizations can survive and realize their expected goals in an increasingly competitive environment for a long time into the future. Organizational development is generally measured based on organizational performance, organizational efficiency, organizational innovation, and organizational strategy, but previous studies have mainly considered factors related to employees (e.g., ability and motivation), where the research results are clear and abundant. However, some researchers consider that employees can be negatively influenced by their work situation when they are willing and able to complete one task [1]. For example, the decisions made by managers in the General Motors Corporation were constrained by their reward system from the 1930s to the 1980s, and the behavior of David Gonzalez who worked as a duty manager in Taco Bell restaurant was hindered greatly by strict institutional constraints [2]. Therefore, individual factors do not fully explain organizational performance and the organization itself also plays an important role in its sustainable development. Furthermore, few studies have considered the direct or indirect relationships between organizational constraints and sustainability.

For instance, Thomas and Amadei [3] found that organizational constraints can prevent the full realization of development models; Yugendar [4] suggested that violence and social breakdown can be the most severe constraints on social sustainability; and Ikhlef [5] noted that the sustainability of dairy cattle farms in suburban areas can be constrained by environmental factors. However, previous studies lacked comprehensive and systematic considerations of how organizational constraints might maintain organizational sustainability. Thus, it is necessary to systematically investigate the state of the art in terms of organizational constraints.

The research of organizational constraints originated from Western countries in the 1980s when researchers discovered that, besides their abilities and motivations, the performances of employees can be influenced by the work situation. Furthermore, the work situation can prevent employees from fully translating their abilities and motivations into high performance [1]. Peters and O'Connor [1] first defined situational constraints as: "factors in the work environment that negatively impact performance and are beyond the employees' control". Subsequently, many researchers have tried to provide definitions of organizational constraints. For example, Kane [6] defined organizational constraints as: "circumstances beyond the worker's control that may limit performance to levels below perfection". Klein and Kim [7] defined organizational constraints as: "features of the work environment that act as obstacles to performance by preventing employees from fully translating their ability and motivation into performance". Adkins and Naumann [8] defined organizational constraints as: "factors which place limits on the extent to which attitudes, personal attributes and motivation translate into behaviors and performance". It should be noted that these definitions are based mostly on the perspective of the employees and organizational performance. These definitions of organizational constraints are distinct, but research into organizational constraints has been consistently similar, such as job-related information, tools and equipment, materials and supplies, budgetary support, required services and help from others, time availability, rules and procedures, being interrupted by others in the workplace, conflicting job demands, job-relevant authority, and other constraints [1,9]. Furthermore, these definitions are incomplete as many variables can be influenced by organizational constraints, but they are mostly made from the perspective of employees and organizational performance. Previous research has focused mainly on the relationships between organizational constraints and employees, performance, innovation, product, system, supply chain, and sustainability, but researchers have not been able to fully capture the latest research themes and evolutionary trends of organizational constraints as they have generally focused on a specific field. In fact, only a small number of bibliometric analyses have been performed of related topics. For instance, Villanova and Roman [10] reviewed the conceptualizations of constraints, and found that constraint scores had a weak negative relationship with performance measures according to a meta-analytic method; and Pindek and Spector [11] found that constraints as unique stressors had significant relationships with behavioral, physical, and psychological strains, as well as with well-being variables by applying a meta-analysis method. It should be noted that previous reviews focused mainly on the relationships between organizational constraints and employee characteristics and performance, but the relationships between organizational constraints and organizational development still remain unknown, and the research trends that could guide the sustainable development of organizations also need to be explored. Therefore, a descriptive review of previous research would make a great theoretical contribution because it may provide a comprehensive understanding of the state of the art in organizational constraints, and suggest further research issues that should be addressed. Furthermore, the practical implications are mainly for organizations, which can learn from the conclusions obtained in previous studies in order to reduce organizational constraints and maintain sustainable development.

The purpose of this study was to investigate the state of the art in organizational constraints, and to explore the research trends related to the maintenance of sustainable development in organizations. The remainder of this paper is organized as follows. In Section 2, we explain the methods and data collection procedure employed in this study. In Section 3, we describe the evolution of publication

activities. In Section 4, we analyze the results. In Section 5, we present the research status and suggest possible future work. In Section 6, we give our conclusions.

## 2. Materials and Methods

### 2.1. Methodology

In science and technology studies, the co-occurrence of words is regarded as the carrier of meanings across different fields [12]. The co-word analysis method is associated with content analysis, which can be used mainly for status analysis, trend analysis, comparative analysis and citation analysis. Co-word analysis can be used to analyze the research status and trends of certain subjects or research fields by exploring the relationships among keywords or subject headings extracted by co-occurrence analysis for specific terminologies. The basis of co-word analysis is frequency analysis. First, some keywords or subject headings that are closely related to certain subjects or research fields are extracted from the literature (the frequency should usually exceed a certain critical value). A co-word matrix should then be established by developing statistics of the co-occurrence of high-frequency words in the same document. Finally, deep analysis should be performed based on the co-word matrix.

Cluster analysis can simplify the data by data modeling. In order to ensure that the similarity of data objects within the same cluster is as high as possible and that the differences in the data objects outside the same cluster are as high as possible, cluster analysis divides a set of data into different classes or clusters using a certain standard. In general, two-step cluster, K-means cluster and systematic cluster can be employed for cluster analysis, and several types of metrics can be used, such as the Euclidean distance, squared Euclidean distance, cosine, Pearson's coefficient, and Chebychev distance.

The strategic diagram method was developed by Law et al. [13] to describe the internal relationships in certain research fields ("field" can also be replaced by "cluster") or the interactive relationships between different research fields. The strategic diagram should be drawn based on the results of cluster analysis, and the centrality and density should be employed to measure the character of each cluster. The centrality represents the depth of the relationships between a cluster and other clusters, where a higher centrality value indicates the core status of this cluster in the entire research field. The density represents the degree of the relationships among different keywords within a cluster, where the density value reflects the ability to maintain the cluster and the development process in the research field. The strategic diagram is a two-dimensional coordinate graph, where the X-axis represents the centrality and the Y-axis represents the density, and the origin of the coordinates is the average centrality value and the average density value [14].

In this study, co-word analysis, cluster analysis, and the strategy diagram were used to analyze the research status and trends of organizational constraints, where the following procedures were performed: the first step comprised the selection of data, the second step involved the selection of keywords, co-word analysis was performed in the third step, cluster analysis was conducted in the fourth step, and the strategic diagram was produced in the last step.

### 2.2. Data Collection and Data Processing

The data were extracted from the Institute for Scientific Information Web of Science database which covers more than 8500 academic journals, and it has been used in many fields, such as higher education and science [15], and creativity research [16]. In this study, topics comprising "organi\*ational constrain\*" and "situational constrain\*" were searched because the sustainability of organizations can be influenced by both organizational constraints and situational constraints. Moreover, situational constraints comprise the origin of research into organizational constraints. The asterisk widened the search range. The first definition of "situational constraints" was proposed by Peters and O'Connor in 1980 [1], so the period covered in this study was 1980–2016. The citation indexes were set as Science Citation Index Expanded and Social Science Citation Index, and the document types were then

set as “article” and “review”, and the research categories were set as “management”, “economics”, and “business”. Finally, 1138 research articles and reviews were extracted from the database.

Bicomb 2.0 (Bibliographic Items Co-occurrence Matrix Builder 2.0, China Medical University, Shenyang, China) was used to process the raw data. Bicomb 2.0 was developed by Cui Lei and his team at China Medical University for processing literature records downloaded from the ISI Web of Science, China National Knowledge Infrastructure, and other databases. Certain fields (e.g., title, author, keywords, journal, and date of publication) can be extracted via Bicomb 2.0 and the frequency of their occurrence can be analyzed statistically. For the articles that did not contain keywords, keywords were assigned based on the title, abstract, and full text. Additionally, the co-occurrence matrix can be developed by studying high-frequency items [17]. The following processes performed before calculating the statistics for high-frequency keywords. (1) Irrelevant keywords in the organizational constraints field were deleted, such as pineapple, pillow, and other words. (2) A few keywords had similar academic meanings and the frequency of occurrence was relatively low, thereby leading to unexpected omissions in the summary of high-frequency keywords, thus the keywords with similar meanings were merged and renamed as a new keyword. For instance, “institutions”, “institutional analysis”, “institutional capital”, “institutional change”, “institutional complexity”, “institutional constraints”, “institutional context”, “institutional distance”, “institutional entrepreneurship”, “institutional environment”, “institutional gap”, “institutional influences”, “institutional isomorphism”, “institutional logics”, “institutional pressure”, “institutional regime”, “institutional theory”, “institutional transformation”, “institutional transitions”, “institutionalized trust”, and “institution-based view” were merged and renamed as “institution”; “career”, “career anchors”, “career capital”, “career development”, “career restructuration”, “career mobility”, and “career aspiration” were merged and renamed as “career”.

### 3. Publication Activities in the Organizational Constraints Literature

It is necessary to analyze some indicators of publication activities in order to describe the quantitative evolution and structure of organizational constraints research [18,19]. Table 1 exhibits the distribution of selected publications. Clearly, the research on organizational constraints has been growing in recent years, and this increase indicates a continuing focus on organizational constraints. It is notable that the publication output had two peaks in 2013 and 2015.

**Table 1.** Annual number of selected articles related to organizational constraints.

Year	Number	Year	Number	Year	Number	Year	Number	Year	Number
1980	2	1988	0	1996	21	2004	41	2012	71
1981	1	1989	0	1997	21	2005	44	2013	93
1982	2	1990	2	1998	30	2006	37	2014	86
1983	0	1991	5	1999	27	2007	43	2015	101
1984	2	1992	10	2000	31	2008	34	2016	89
1985	1	1993	16	2001	32	2009	60		
1986	1	1994	23	2002	38	2010	61		
1987	0	1995	19	2003	26	2011	68		

Table 2 shows the journals that published at least ten research articles between 1980 and 2016. It can be found that “Organization Science” has published the most articles about organizational constraints (62 articles), and distantly followed by “Organization Studies” (37 articles). “Journal of Management Studies”, “Strategic Management Journal”, and “Journal of Business Ethics” rank third, fourth and fifth, respectively.

**Table 2.** Journals that have published at least ten research articles.

Journal	Number	% of All Articles
Organization Science	62	5.45
Organization Studies	37	3.25
Journal of Management Studies	32	2.81
Strategic Management Journal	28	2.46
Journal of Business Ethics	25	2.20
Administrative Science Quarterly	23	2.02
International Journal of Human Resource Management	21	1.85
Journal of Management	19	1.67
Journal of Organizational Change Management	18	1.58
Human Relations	18	1.58
Journal of Product Innovation Management	17	1.49
Journal of Business Venturing	17	1.49
Journal of Applied Psychology	17	1.49
Journal of Organizational Behavior	16	1.41
Academy of Management Review	13	1.14

Table 3 lists the countries and regions that have published at least ten research articles between 1980 and 2016. It can be seen that there are 20 countries and regions produced at least ten articles, and seven countries have produced more than 50 research articles. Furthermore, the USA was the largest contributor with 574 research articles about organizational constraints by the end of 2016, while England and Canada come next, ranked second and third, respectively. It should be noted that the top seven in Table 3 are all developed countries, which indicates their greater attention to organizational constraints.

**Table 3.** Countries and regions that have published at least ten research articles.

Rank	Country and Region	Number (%)	Rank	Country and Region	Number (%)
1	USA	574 (50.44)	11	Taiwan	22 (1.93)
2	England	188 (16.52)	12	Italy	22 (1.93)
3	Canada	85 (7.47)	13	New Zealand	20 (1.76)
4	Australia	79 (6.94)	14	Scotland	19 (1.67)
5	Netherlands	55 (4.83)	15	Denmark	19 (1.67)
6	France	54 (4.75)	16	Singapore	16 (1.41)
7	Germany	50 (4.39)	17	Israel	16 (1.41)
8	China	46 (4.04)	18	Finland	16 (1.41)
9	Switzerland	28 (2.46)	19	Belgium	16 (1.41)
10	Spain	24 (2.11)	20	Wales	12 (1.05)

Table 4 presents the institutions that have published at least ten research articles about organizational constraints. It can be found that the 25 institutions are all universities and the most productive university is University of California (43 articles), followed by University of London (34 articles) and Harvard University (26 articles). Further analysis showed that 18 of the universities are located in the USA, which indicates that researchers in the USA have a greater interest in organizational constraints.

It would be difficult to show every article considered in the co-word analysis, thus ten of the most frequently cited articles and their findings related to organizational constraints are listed in Table 5. The ten articles are ranked based on their citations. The article “Organizing and the process of sense making” was cited 1325 times and it was the most frequently cited article related to organizational constraints.

**Table 4.** Institutions that have published at least ten research articles.

Rank	Institution	Number (%)	Rank	Country	Number (%)
1	University of California	43 (3.78)	14	University of North Carolina	16 (1.41)
2	University of London	34 (2.99)	15	Texas A M University College Station	11 (0.97)
3	Harvard University	26 (2.28)	16	Copenhagen Business School	11 (0.97)
4	State University System of Florida	25 (2.20)	17	Arizona State University	11 (0.97)
5	Pennsylvania Commonwealth System of Higher Education	22 (1.93)	18	Aalto University	11 (0.97)
6	University System of Georgia	20 (1.76)	19	University of Toronto	10 (0.88)
7	University of Pennsylvania	20 (1.76)	20	University of Cambridge	10 (0.88)
8	University of Michigan	20 (1.76)	21	State University of New York	10 (0.88)
9	University of Michigan	20 (1.76)	22	Royal Holloway University London	10 (0.88)
10	University of Illinois	18 (1.58)	23	New York University	10 (0.88)
11	University of California Berkeley	18 (1.58)	24	Michigan State University	10 (0.88)
12	Stanford University	18 (1.58)	25	Cranfield University	10 (0.88)
13	Penn State University	17 (1.49)			

**Table 5.** Ten of the most frequently cited articles related to organizational constraints.

Rank	Article Title	Year	Related Findings	Times Cited
1	Organizing and the process of sensemaking	2005	People will increase skills at sensemaking when they are socialized to treat constraints as self-imposed. [20]	1325
2	The essential impact of context on organizational behavior	2006	Context defined as situational opportunities and constraints can affect the occurrence and meaning of organizational behavior. [21]	846
3	The mutual knowledge problem and its consequences for dispersed collaboration	2001	Cohesion and learning can be indirectly influenced by unrecognized differences in constraints of dispersed collaborators. [22]	656
4	Looking forward and looking backward: cognitive and experiential search	2000	A simple, low-dimensional representation of cognition can usefully constrain the direction of subsequent experiential search. [23]	580
5	Managers as initiators of trust: an exchange relationship framework for understanding managerial trustworthy behavior	1998	An exchange relationship framework is presented to encourage or constrain managerial trustworthy behavior. [24]	572
6	Personal networks of women and minorities in management: a conceptual framework	1993	Organizational context produces unique constraints on women and racial minorities, which made their networks different. [25]	556
7	A personality trait-based interactionist model of job performance	2003	Constraints relevant to trait expression operate different at task, social and organizational levels. [26]	509
8	Design and devotion: surges of rational and normative ideologies of control in managerial discourse	1992	A theory combined cultural constraints and material forces is proposed to explain the patterns in managerial discourse. [27]	500
9	The social side of creativity: a static and dynamic social network perspective	2003	Social network positions are proposed to facilitate and constrain creative work. [28]	487
10	Overcoming local search through alliances and mobility	2003	Constraints of contextually localized search can be overcome by alliances and the mobility. [29]	476

Note: the information of times cited is created on 12 September 2017.



## 4. Results

### 4.1. Statistical Analysis of High-Frequency Keywords

The number of high-frequency keywords can be judged and determined using the following model [30].

$$N = \frac{1}{2} \left( -1 \pm \sqrt{1 + 8I_1} \right) \quad (1)$$

$N$  represents the number of high-frequency keywords, and  $I_1$  represents the number of keywords that occurred only once.

In total, 1398 keywords occurred only once in the collected data. The number of high-frequency keywords was then calculated as 52. The high-frequency keywords and their frequencies related to organizational constraints are listed in Table 6. The range of frequency was 9–72, where “institution” ranked first (72) and “knowledge” second (67).

**Table 6.** High-frequency keywords related to organizational constraints.

Rank	Keywords	Frequency	Rank	Keywords	Frequency	Rank	Keywords	Frequency
1	institution	72	19	resource	22	37	sensemaking	13
2	knowledge	67	20	China	21	38	small and medium enterprises	13
3	innovation	63	21	networks	20	39	stress	13
4	learning	53	22	workplace constraints	20	40	supply chain	13
5	behavior	45	23	environment	19	41	legitimacy	12
6	constraints	44	24	job	19	42	sustainability	12
7	change	42	25	organizations	17	43	case studies	11
8	performance	41	26	quantitative research	17	44	process	11
9	strategy	38	27	trust	17	45	team	11
10	entrepreneur	35	28	decision making	16	46	organizational structure	10
11	culture	32	29	interorganizational relations	16	47	research and development	10
12	human resource management	30	30	identity	15	48	boundary	9
13	technology	29	31	collaboration	14	49	exploration	9
14	gender	26	32	complexity	14	50	production	9
15	information	26	33	group	14	51	project	9
16	career	25	34	leadership	13	52	risk	9
17	system	24	35	multinational corporations	13			
18	management	23	36	product	13			

### 4.2. Co-Occurrence Network of High-Frequency Words

According to Yang and Xiao [31], a co-occurrence network was established by using UCINET (University of California–Irvine, Irvine, CA, USA) to visually present the relationships between the 52 high-frequency keywords. In the co-occurrence network diagram, the size of the nodes represents the intermediation between these high-frequency keywords or the ability to connect with other high-frequency keywords, and the lines represent the co-occurrence relationships between these high-frequency keywords. Therefore, when a node is large, the corresponding high-frequency keyword usually plays a key role in the co-occurrence network. The co-occurrence

network related to organizational constraints was drawn on the basis of the  $52 \times 52$  co-occurrence matrix, which was produced using the co-occurrence frequencies by arbitrarily combining the 52 high-frequency keywords. Figure 1 shows the co-occurrence network of high-frequency words related to organizational constraints. It should be noted that “constraints” had the largest node, followed by “learning”, “institution”, and “behavior”. Hence, “constraints” played the most significant role in the organizational constraints field although the frequency of “constraints” was not the highest. Additionally, “learning”, “institution”, and “behavior” were also research cores related to organizational constraints issue as they had large nodes.

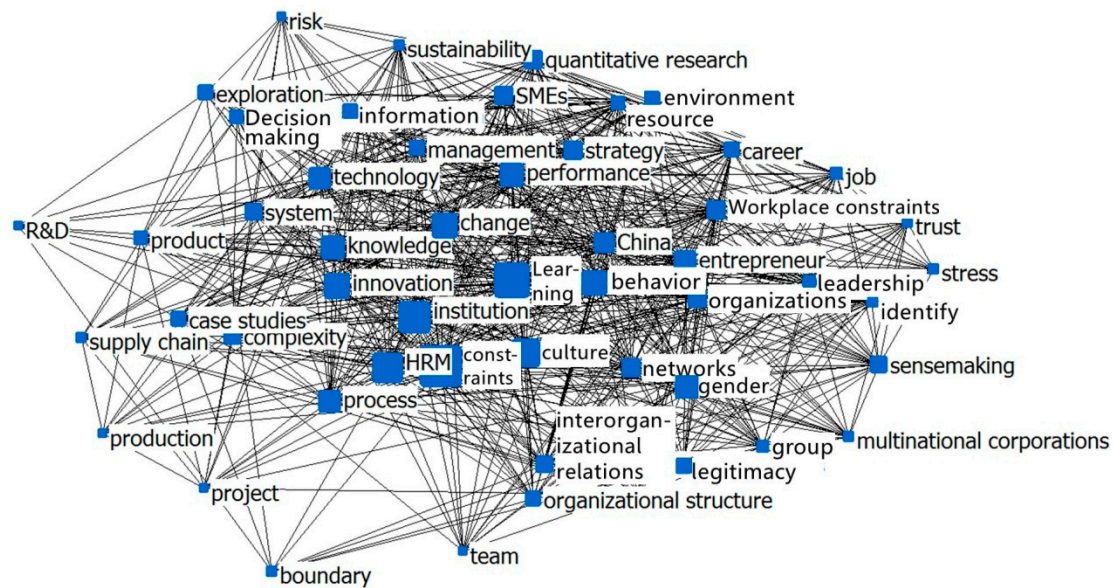


Figure 1. Co-occurrence network of high-frequency keywords.

#### 4.3. Cluster Analysis of High-Frequency Keywords

High-frequency keywords related to organizational constraints can be categorized by cluster analysis based on a dissimilarity matrix of high-frequency keywords. The figures in the dissimilarity matrix are equal to “1” minus the figures in the correlation matrix. The co-occurrence frequencies of arbitrary combinations of the high-frequency keywords are influenced by their frequencies during the analysis of the co-occurrence matrix. Therefore, to present the co-occurrence relationships accurately, the Ochiai coefficient [32] was used to convert the co-occurrence matrix into a correlation matrix.

$$H = \frac{C_{ij}}{\sqrt{C_i \times C_j}} \quad (2)$$

$H$  represents the correlation between two high-frequency keywords,  $C_{ij}$  represents the co-occurrence frequency between  $i$  and  $j$ ,  $C_i$  represents the frequency of keyword  $i$ , and  $C_j$  represents the frequency of keyword  $j$ .

According to the dissimilarity matrix of high-frequency keywords, systematic cluster analysis (software: SPSS 19.0 (International Business Machines Corporation, Armonk, NY, USA); method: Ward; metric: squared Euclidean distance) was adopted to categorize the high-frequency keywords in the organizational constraints field [33]. As shown in Table 7, the 52 high-frequency keywords could be divided into six clusters. The first cluster was designated as “change and decision-making” (C1) as it included the following keywords: “institution”, “group”, “team”, “change”, “leadership”, “decision making”, and “risk”. The second cluster was designated as “supply chain and sustainability” (C2) because it contained the following keywords: “technology”, “gender”, “system”, “management”, “sustainability”, “process”, “case studies”, “complexity”, “supply chain”, “production”, and “project”.



The third, fourth, fifth, and sixth clusters were designated as “human system and performance” (C3), “culture and relations” (C4), “entrepreneur and resource” (C5), and “learning and innovation” (C6), respectively.

**Table 7.** Six clusters of high-frequency keywords identified by systematic cluster analysis.

Symbol	High-Frequency Keywords	Issue
C1	institution, group, team, change, leadership, decision making, risk	change and decision-making
C2	technology, gender, system, management, sustainability, process, case studies, complexity, supply chain, production, project	supply chain and sustainability
C3	behavior, strategy, constraints, stress, China, workplace constraints, job, environment, performance, human resources management, small and medium enterprises, career, quantitative research, organizations	human system and performance
C4	culture, information, networks, trust, interorganizational relations, multinational corporations	culture and relations
C5	entrepreneur, collaboration, resource, legitimacy, identity, sensemaking	entrepreneur and resource
C6	knowledge, innovation, learning, boundary, exploration, product, research and development, organizational structure	learning and innovation

#### 4.4. Strategic Diagram of Organizational Constraints

The following formulae [14] were applied to calculate the centralities and densities of the six clusters.

$$E(k) = \frac{\sum_{i \in \varphi_s, j \in (\varphi - \varphi_s)} C_{ij}}{N - n} \quad (3)$$

$$D(k) = \frac{\sum_{i, j \in \varphi_s (i \neq j)} C_{ij}}{n - 1} \quad (4)$$

$E(k)$  represents the centrality of cluster  $k$ ,  $D(k)$  represents the density of cluster  $k$ ,  $C_{ij}$  represents the co-occurrence frequency between the keyword  $i$  and  $j$ ,  $n$  represents the number of high-frequency keywords in a cluster,  $N$  represents the number of all high-frequency keywords,  $\varphi_s$  represents the cluster  $s$ , and  $\varphi$  represents the whole of the organizational constraints field. The centralities of the six clusters (in order from C1 to C6) were calculated as 5.71, 7.76, 13.11, 4.85, 4.54, and 6.25, respectively, and the densities of the six clusters were 42.83, 31.80, 38.31, 44.60, 41.80, and 39.29. The average centrality was 7.04 and the average density was 39.77. Therefore, the strategic diagram was drawn for the organizational constraints field (Figure 2) based on the centralities and densities. The size of the circle in Figure 2 is proportional to the number of articles in each cluster. Research articles about “human system and performance” were the most common, which indicates that more researchers considered “human system and performance” when focusing on organizational constraints. Furthermore, it should be noted that C1, C4 and C5 are all in the second quadrant with low centrality and high density, which indicates that they are potential research areas in the organizational constraints field, but they may disappear without further effective progress. C6 is in the third quadrant with low centrality and low density, which shows that it is a partial theme in the organizational constraints field, and it requires more attention. C2 and C3 are in the fourth quadrant with high centrality and low density, which indicates that they are potential research areas, but they are easily broken up and evolved into other clusters. Hence, the research trends in organizational constraints could be assigned to the six clusters.

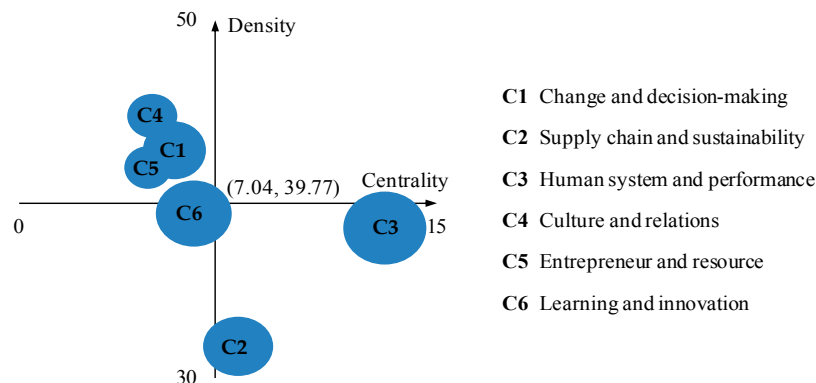


Figure 2. The strategic diagram related to organizational constraints.

## 5. Research Status and Trends of Organizational Constraints

### 5.1. Research Status of Organizational Constraints

The sustainable development of organizations is inevitably influenced by organizational constraints. Organizations generally need to learn from practical experience, but scientific research can also provide valuable references for organizations. Thus, it is necessary and important to analyze the research status of organizational constraints to maintain organizational sustainability. The research status of organizational constraints can be described as follows based on the six clusters.

C1: “Change and decision-making”: The development of an organization is largely dependent on organizational change, which aims at improve the effectiveness of organizations. Some researchers have reported that organizational change can be influenced by organizational constraints. For instance, Anderton, Conaty and Miller [34] showed that varying resistance to organizational change is mainly due to durable capital investment, and the failure to take constraints into consideration when analyzing organizational change can result in misleading results. Maier and Finger [35] found that organizational change to allow the successful introduction of organic products can be constrained by four interacting and mutually re-enforcing factors. Furthermore, the premise of organizational sustainability is reasonable for decision-making, but the decision-making process is generally hindered by organizational constraints. For example, Ordóñez and Iii [36] found that risky decision making can be constrained by time pressure. Peterson [37] showed that the decision-making processes of staffs at a Mexican national marine park could be affected by internal, external, and relational constraints. Hung and Petrick [38] noted that self-efficacy can be affected by travel constraints according to an alternative decision-making model. Friess [39] found that a strong concern for time constraints is important for making groups productive or successful in decision-making meetings. Furthermore, risk can be affected by organizational constraints, e.g., there is a positive correlation between the familial risk of breast cancer and social constraints [40], and the cash flow risk will be increased when facing financing constraints [41]. In fact, organizations can also be constrained by institutions and groups, e.g., organizational choices and investment decisions [42], and the performance of Spanish car dealerships [43] can be determined by institutional constraints. The implementation and internalization of a best management practice model in an organization can be constrained by group behavioral factors (i.e., conflicts and tensions) [44]. Teams are also closely related to organizational constraints such as decision-making behaviors of team players can be shaped by changes in practice task constraints [45], and teamwork engagement during deployment can moderate the relationship between organizational constraints and post-deployment fatigue symptoms [46]. Additionally, leadership is an important element related to organizational constraints issue as some constraints can hinder the development of leadership [47] and ratings of leadership effectiveness can mediate the relationship between organizational constraints and organizational citizenship behaviors [48].

C2: “Supply chain and sustainability”: The sustainability of organizations is found to be hindered by organizational constraints. For example, the comprehensive achievement of sustainable community development is limited by organizational constraints [3]; the sustainability of fiscal stances can be hindered by intertemporal borrowing constraints in Mexico, the Philippines and South Africa [49]; the sustainability of China can be influenced by resource constraints and environmental degradation [50]; and sustainable production is often constrained by structural factors such as industrial development, neoliberal democracy, growing population, and globalization of the consumer culture [51]. The supply chain can also be influenced by organizational constraints because it has a significant role in the organizational development process. For instance, Saldanha et al. [52] indicated that operational environments can constrain supply chain technology based on the investigations of 46 logistics and supply chain managers in India. Song and Wang [53] showed that capital constraints can reduce the profits of downstream manufacturers and even the whole supply chain, which is harmful for the sustainable development of the supply chain. Further analysis showed that technology, system, project, production and process may be constraints that influence other factors, e.g., organizational system can affect organizational performance and organizational efficiency [9,54], and technological compatibility can constrain the success of business-to-business electronic e-commerce efforts [55]. However, they can also be affected by organizational constraints, e.g., the strategic planning process can be influenced by organizational structure constraints via case analysis [56], the development of organizational information systems can be negatively impacted by organizational constraints [57], and the organizational change process may be constrained by four interacting and mutually re-enforcing factors [35]. In addition, organizational constraints are different for males and females. An investigation conducted among 231 Greek adults showed that the males had higher stress levels in terms of the interpersonal conflict scale and in organizational constraint scale [58].

C3: “Human system and performance”: People play increasingly important roles in organizational management as the driving forces of organizational development, which is becoming more people-oriented. It should be noted that components of human systems such as stress, behaviors, job, and career can also be influenced by organizational constraints. Physical strain is the first component to be influenced by organizational constraints [59,60], but organizational constraints affect other aspects related to employees, such as stress [9,48], feelings of frustration [10,61], burnout [62], work anxiety [48], job dissatisfaction [10,62], employee energy [63], career [64], counterproductive work behavior [65,66] and organizational citizenship behavior [67]. Organizational strategy and performance as important indexes of organizational sustainability are found to be negatively influenced by organizational constraints. Tannenbaum and Woods [68] demonstrated that organizational constraints can influence evaluation strategy. Steel and Mento [69] found significant effects of situational constraints on performance criteria by investigating 438 branch managers. Garriga, Krogh and Spaeth [70] found that resource constraints can decrease innovative performance via a survey of Swiss-based firms. Bacharach and Bamberger [71] found that resource inadequacy mediates the relationships between individual ability, effort, and individual performance. Brewer and Walker [72] indicated that “difficulty in removing poor managers” is harmful to organizational performance. Pindek and Spector [11] suggested that organizational constraints are contextual factors that interfere with task performance. In fact, various forms of organizational constraints in the organizational environment can have effects on organizational development, such as knowledge constraints, resource constraints, financial constraints, cultural constraints, and personnel constraints [10,27,70,72–74]. In addition, researchers commonly adopt quantitative research methods [74], where China [9] and small and medium enterprises [75] have been considered as samples when studying “human system and performance” issues.

C4: “Culture and relations”: The organizational culture formed to solve survival and developmental issues in organizations can be influenced by organizational constraints [47,76], but also constrain organizational management, i.e., organizational behavior management can be influenced by structural and cultural constraints [77], and the emergence of women leaders can be affected

by cultural constraints [78]. Networks, including interorganizational relationships and relationships among multinational corporations, can produce unique constraints on women and racial minorities [25]. However, they are generally influenced by organizational constraints, e.g., organizational strategies and contextual constraints can influence interorganizational networks [79], transnational data flow can constrain multinational corporations in both large and small firms [80], and institutional constraints such as institutional conformist, institutional evader, institutional entrepreneur and institutional arbitrageur can hinder the implementation of emissions trading schemes in multinational corporations [81]. The trust is regarded as a relationship of dependence can also be influenced by organizational constraints, e.g., trust in organizations can be constrained by cognitive modules and emotional dispositions [82], and purchasing managers will be trusted by suppliers when they are free from constraints that limit their abilities to interpret their boundary-spanning roles [83].

C5: “Entrepreneur and resource”: Entrepreneurs play dominant roles in the development process of organizations, i.e., entrepreneurship is regarded as an organizational capacity that can allow enterprises to systematically overcome internal constraints [84], and entrepreneurial firms can succeed even when bounded by severe initial resource constraints [85,86]. Furthermore, resources are regarded as an extremely important constraint has attracted the attention of many researchers. For instance, individual ability and effort can be affected directly by inadequate resources, which can also mediate the relationships between individual ability, effort, and individual performance [72], policy change and the poor implementation of some plans in a mental health services organization can be due largely to resource constraints [87], the efforts of managers to balance the interests of stakeholders can be constrained by indivisible resources [88], innovative performance in Swiss-based firms can be constrained by the application of firm resources [70], and task performance by Machiavellian employees can be influenced by resource constraints [74]. In addition, organizational identity as a constraint can influence strategic action [89], while legitimacy is a phenomenon that can constrain change and put organizations under pressure to conform to their institutional environments [90], and people will increase skills their sense making skills when they are socialized to treat constraints as self-imposed.

C6: “Learning and innovation”. Learning and innovation are indispensable as driving forces for organizations. Organizational learning is found to be negatively related to organizational constraints, i.e., numerous constraints on organizational learning led to the difficulties in implementing a new service delivery model at a mental health services organization [87]. It should be noted that innovation is likely to develop in a free environment rather than a defined environment. Some studies have explored the relationships between organizational constraints and innovation. For instance, Caniëls and Rietzschel [91] found that perceived organizational constraints were negatively related to the practiced creativity of employees, but positively related to the creative potential of employees, and they suggested that the relationship between constraints and creativity is complex, fascinating, and understudied. Gibbert and Scranton [92] explained the negative impacts of organizational constraints on innovation. Knowledge is also an important element for organizational development as an abundance of external knowledge can increase innovative performance [70], but the development of knowledge can be influenced by constraints via a multi-perspective examination of a project [93]. In addition, the organizational structure can constrain the production of culture [76], product constraints can influence research and development team creativity [94], and the reduction of organizational slack can facilitate the migration of organizational boundary activities from the organization to the work unit level [95]. An exploratory method was also used to study the relationship between operational environments and supply chain technology [52].

## 5.2. Research Trends of Organizational Constraints

Research trends are proposed to produce an informative route map for researchers by linking the status of organizational constraints to sustainability.

First, from the perspective of “change and decision-making”, organizational change as an indispensable element for organizational development is found to be negatively influenced by some constraints, but do all constraints have negative effects on organizational change? More attention should be paid to various constraints based on previous research. Thus, it is necessary to examine the relationships between multiple constraints and organizational change by using various methods to efficiently reduce the constraints on organizational change. Furthermore, decision-making is a crucial step that will directly influence the development of organizations, but how is decision making influenced by organizational constraints? Future research should focus on more details of the decision-making process such as the critical points of organizational constraints, various risks due to organizational constraints, and intermediate effects in the relationships between organizational constraints and organizational development.

Second, from the perspective of “supply chain and sustainability”, the supply chain involving material, information, capital, and other flows cannot be ignored by organizations. The mechanisms that mediate these effects are unclear although some studies have considered the relationships between organizational constraints and the supply chain, thus more attention should be paid to the theoretical foundation and pathways that mediate various effects. In addition, the research on organizational slackness (the opposite of “organizational constraints”) should be attached great importance as both constraints and slackness can result in negative effects on organizational development. It is necessary to explore the critical point between organizational constraint and organizational slackness in order to maintain the sustainability of organizations, which is generally regarded as the optimal situation for organizations. Hence, how can organizations determine the critical point? This is a very interesting question. A gaming model should be constructed between organizational constraints and organizational development. The optimal settings can then be determined by using simulations in order to realize sustainable development in different organizational situations.

Third, from the perspective of “human system and performance”, more attention should be paid to the effects of organizational constraints on human systems (e.g., physical change, attitudes, emotions, and behaviors) as people are driving forces that affect the sustainability of organizations. Whether employees act as mediators between organizational constraints and organizational development is a very interesting question, and this is also an important issue due to the increasing competition among organizations. In addition, organizational development is closely related to individual performance and organizational performance, which can be influenced by multiple constraints, thus more methods should be adopted to deeply analyze the influences of multiple constraints on individual performance and organizational performance in different situations.

Fourth, from the perspective of “culture and relations”, culture should be given great attention as organizational sustainability can be influenced unconsciously by culture, thus the co-integration test, Granger causality test, regression analysis, and other methods should be employed to study the relationships between organizational constraints and culture. Relations can also be regarded as networks that can influence and be influenced by organizations, thus the relations among organizations and individuals should be quantitatively analyzed in depth based on interviews or questionnaire surveys. It should be notable that culture and relations are intangible, so it would be very interesting to explore their phenomena. Further research should pay more attention to the causes of organizational constraints in order to control organizational constraints in the initial stage.

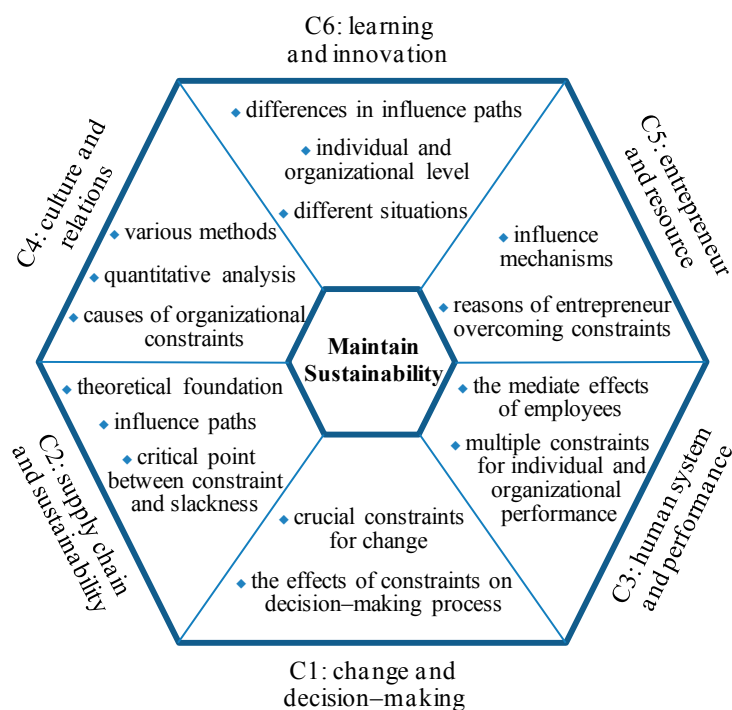
Fifth, from the perspective of “entrepreneur and resource”, entrepreneur seemingly cannot be restricted by some constraints as they have a dominant role in the process of organizational development. However, can entrepreneurs be free of all constraints and what are the constraints that cannot hinder entrepreneurs? Further investigations need to be conducted to determine the reasons why entrepreneurs can overcome organizational constraints, and the relationships between entrepreneurship and the formation of constraints. In addition, resource constraints are more widespread or severe, as they have been discussed in many studies. In fact, resource constraints are generally inevitable for all organizations, and thus it is necessary to explore the influence mechanisms



of resource constraints on organizations in depth in order to provide suggestions for organizations to avoid resource constraints to the greatest extent.

Sixth, from the perspective of “learning and innovation”, learning and innovation are the driving forces of organizational development, and they have been proven to be negatively related to organizational constraints, but some issues need further exploration. For instance, what are the constraints that can influence individual learning and innovation? What are the constraints that can influence organizational learning and innovation? Are the influence paths of organizational constraints on individual learning (innovation) the same as those that on organizational learning (innovation)? Can employees mediate the relationships between organizational constraints and organizational learning (innovation)? Therefore, further research should consider the influence mechanisms of multiple constraints on individual learning (innovation) and organizational learning (innovation) via various methods in different situations. Additionally, endogenous problems cannot be ignored when conducting empirical analysis.

In conclusion, extensive studies need to be conducted in the future. To visually illustrate the research trends, some core phrases that could be considered in further studies to maintain organizational sustainability are summarized in Figure 3.



**Figure 3.** Core phrases that could be considered in further studies for maintaining organizational sustainability.

## 6. Conclusions

In this study, the research status and trends of organizational constraints were studied with bibliometric methods in order to maintain the sustainability of organizations. The main conclusions are outlined as follows.

- (1) There were 1138 articles and reviews related to organizational constraints for the period 1980–2016. The publication activities showed that research into organizational constraints has been growing in recent years, where the most productive university is the University of California (43 articles), while “Organization Science” has published the most articles about organizational constraints (62 articles), and the USA is the largest contributor with 574 research articles by the end of 2016.

- (2) There were 52 high-frequency keywords of organizational constraints, such as institution, knowledge, innovation, learning, behavior, constraints, change, performance, strategy, entrepreneur, culture, human resource management, technology, gender, information, career, and so forth.
- (3) The research cores related to organizational constraints issues were “constraints”, “learning”, “institution”, and “behavior” in the co-occurrence network of high-frequency keywords, and “constraints” played the most significant role.
- (4) The high-frequency keywords were divided into six clusters comprising “change and decision-making”, “supply chain and sustainability”, “human system and performance”, “culture and relations”, “entrepreneur and resource”, and “learning and innovation”, which were all potential research areas related to organizational constraints.
- (5) The state of the art in organizational constraints was analyzed in depth in order to present a comprehensive picture of the research into organizational constraints, as well as to provide valuable references for organizations to reduce organizational constraints and maintain sustainable development. The indicators of organizational development (e.g., organizational change, innovation, supply chain, decision-making, learning, performance, sustainability, and employees behaviors) were found to be significantly hindered by organizational constraints based on the state of the art of organizational constraints.
- (6) Research trends were proposed for each cluster in order to provide an informative route map for further research, which may benefit the development of organizational constraints as a discipline.

**Acknowledgments:** This work was financially supported by the National Natural Science Foundation of China (Nos. 71473248, 71673271, 71273258, and 71603255), the Major Project of the National Social Science Foundation of China (No. 16ZDA056), the Social Science Foundation Base Project of Jiangsu Province (No. 14JD026), 333 Project of Training High-level Talents (2016), the Research and Practice on the Graduate Educational Teaching Reform in Jiangsu Province (No. JGZZ16\_078), the Program of Innovation Team Supported by China University of Mining and Technology (No. 2015ZY003), Jiangsu Philosophy and Social Sciences Excellent Innovation Cultivation Team (2017), and the “13th Five Year” Brand Discipline Construction Funding Project of China University of Mining and Technology (2017).

**Author Contributions:** Hong Chen and Ruyin Long conceived and designed the study; Daoyan Guo collected the data; Daoyan Guo and Hui Lu analyzed the data; Qianyi Long contributed analysis tools; and Daoyan Guo wrote and revised the paper.

**Conflicts of Interest:** The authors declare no conflict of interest.

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