Turning Danger into Safety: The Origin, Research Context and Theoretical Framework of Organizational Resilience

RUIJUN CHEN (Member, IEEE), YINGQI LIU (Member, IEEE), AND FEI ZHOU (Member, IEEE)

School of Economics and Management, Beijing Jiaotong University, Beijing 100044, China

Corresponding authors: Yingqi Liu (liuyq2021@163.com) and Fei Zhou (19113079@bjtu.edu.cn)

This work was supported in part by the National Social Science Fund of China, under Grant 16AGL004, and in part by the Research on Green Development of Electric Vehicles in Beijing, Tianjin and Hebei, through the Context of Platform Opening, under Grant 19GLB030.

ABSTRACT The importance of organizational resilience as an effective means to cope with crises and achieve sustainable growth in crisis situations is gradually gaining attention from both theoretical and practical circles. Based on the review of existing research on organizational resilience, this study uses the scientific knowledge mapping method from the macro perspective and the literature analysis method from the micro level to review the development of organizational resilience research during 1984-2021, and analyzes 108 representative papers on organizational resilience. Finally, this study proposes future research directions based on the existing studies, such as enriching the influence factors of organizational resilience, strengthening the study of the mechanism of organizational resilience and strengthening the study of the effect of organizational resilience. This paper not only provides a reference for domestic scholars to construct an overall framework for organizational resilience research, but also provides theoretical and practical guidelines for enterprises to achieve rebound survival and then sustainable growth in the face of adversity.

INDEX TERMS Organizational resilience, research context, theoretical framework, future prospects.

I. INTRODUCTION

With the advancement of globalization and internationalization of business activities, the business environment of enterprises has gradually become increasingly complex and volatile [1], and corporate crises seem to have become a probable event in the development of organizations [2], posing a challenge to their survival and development [3]. In the face of crises, some companies are able to turn crises into safety and achieve sustained growth, while others are driven to extinction by crises [4], [5]. So, why are some organizations better able to cope with adverse environmental conditions than others? Empirical and theoretical research suggests that resilient organizations remain flexible, adaptive, and creative enough to survive in a highly competitive and chaotic business environment [6]. Currently, the study of resilience has become increasingly important as a concept critical to organizational survival in turbulent, chaotic, and unpredictable environments has become a hot topic of scholarly attention [7]. Thus, the study of organizational crisis around organizational resilience is of great importance, not only providing new perspectives and useful supplements to relevant studies on crisis management in theory, but also potentially providing ideas for crisis resolution for organizations in deep crisis in practice.

A review of the literature on organizational resilience reveals that studies on organizational resilience have focused on the content of organizational resilience connotations, influencing factors and mechanisms of action. However, the research on organizational resilience has the following research limitations: first, the study of resilience originated in the field of physics, which refers to the ability of a system to return to its original shape after a disturbance. Subsequently, resilience was developed in the fields of ecology [8], psychology [9], and strategic management [10], and it was only in the late 1990s that the concept of resilience was introduced into the organizational field [11]. The reason for this stems mainly from the differences in disciplinary
classifications, and scholars have not been able to assimilate organizational resilience well into the field of management. Secondly, organizational resilience lacks systematic research and is characterized by fragmentation. Due to the differences in research fields and disciplinary classifications, scholars have different understandings of the connotation of organizational resilience, resulting in no mature and authoritative assertions on organizational resilience in terms of dimensions and measurements. At the level of influencing factors, both studies have fragmentedly explored the effects of self-esteem [4]. At the level of influencing factors, some studies have sporadically explored the effects of organizational communication [12] and organizational resources [13] on organizational resilience, but no scholars have systematically summarized and analyzed the influencing factors of organizational resilience and the relationships among the influencing factors; at the level of mechanism of action and effect, some studies have explored the effects of organizational resilience on organizational In terms of mechanisms of action and effects, some studies have explored the effects of organizational resilience on organizational competence [14], organizational evolution [6], and corporate success [15], but few studies have revealed the mechanisms of action of organizational resilience from a systemic perspective.

Based on this, this study attempts to answer the following research questions through a systematic review and analysis of organizational resilience literature: What is organizational resilience? What aspects of organizational resilience have scholars studied and what results have they achieved? What are the future research directions? At the theoretical level, this study constructs a theoretical research framework for organizational resilience and proposes future research directions for organizational resilience: (1) the concept of organizational resilience, scale development and empirical research should be improved in the future; (2) the research on organizational resilience should be expanded at three levels: influencing factors, mechanisms and effects. At the practical level, this study provides theoretical and practical guidelines for organizations in deep crisis, and provides useful references to promote more enterprises and organizations to survive the crisis.

II. ORIGIN AND CONNOTATION OF ORGANIZATIONAL RESILIENCE

Although scholars have generally described organizational resilience, it is not easy to clearly clarify what organizational resilience is, and more consideration needs to be given to the origins of organizational resilience.

A. ORIGIN AND CONNOTATION OF RESILIENCE

The study of resilience originated in the late 1960s/early 1970s from the fields of ecology, engineering, and positive psychology, and refers to the ability of the system to cope with change [16]. The concept of resilience was first introduced to the study of ecological environment by Holling (1973) [17] in the article “Resilience and stability of ecological systems”, which considered resilience as the ability of an ecosystem to return to its original equilibrium state after being damaged. With the rapid changes in the economic environment and the increasing competition, management scholars introduced the concept of resilience into the field of management and proposed the topic of “organizational resilience”, which refers to the ability of individuals to withstand and bounce back from crises [18]. However, it was not until the late 1990s that the application of resilience in organizations became popular.

B. THE CONNOTATION OF ORGANIZATIONAL RESILIENCE

Existing research on organizational resilience started late, and there is no unified conclusion from the academic community on what organizational resilience is [20]. Through sorting and summarizing the literature, we found that organizational resilience is a multidimensional and cross-level concept [6], and the connotation of organizational resilience can be interpreted mainly from the capability perspective, functional perspective, process perspective, and outcome perspective. Among them, scholars from the dynamic perspective advocate defining organizational resilience from the capability perspective and the process perspective, which consider organizational resilience as a dynamic or developmental process; scholars from the static perspective advocate defining organizational resilience from the outcome and functional perspective, which consider organizational resilience as a result or a function achieved by the organization. Among them, the process-based perspective considers organizational resilience as a dynamic and progressive process of organizations in response to crises, involving identity management, improvisational response, etc. [21], [22]. The capability-based perspective considers organizational resilience as a combination of numerous capabilities such as adaptive capacity and predictive capacity demonstrated by the organization in response to a crisis [1], [23], [14]. The outcome-based perspective views organizational resilience as the state of good adaptation maintained by an organization in the process of coping with a crisis, thus enabling the organization to survive from the crisis [24], [25]. The functional-based perspective considers organizational resilience as a function of an organization’s ability to adapt to its environment in a dynamic environment [26], [27].

In summary, scholars have interpreted the connotation of organizational resilience from different perspectives and viewpoints, and there are both focuses and commonalities among them. Among them, the dynamic view of organizational resilience indicates that organizational resilience can be grown and improved through long-term exercise, while the static view of organizational resilience indicates that only organizations with resilience genes can maintain a positive adaptive state in crises. From the perspective of the study of organizational resilience, their common feature is that organizational resilience does not only represent organizational recovery, but also includes organizational flexibility and adaptability, etc. Their differences lie in the focus of different perspectives are different, such as the capability view of organizational resilience that organizational resilience is
### III. STRUCTURE AND MEASUREMENT OF ORGANIZATIONAL RESILIENCE

Scholars generally consider organizational resilience as a multidimensional structure [31] and have developed related measurement measures (as shown in Table 2 below). McManus et al. (2008) [27] considered organizational resilience to include planning capacity and adaptive capacity and developed 13 measurement questions. Subsequently, Umoh et al. (2014) [31] incorporated organizational learning into organizational resilience based on McManus et al. and argued that organizational resilience includes organizational learning capacity, adaptive capacity, and dynamic capacity, and developed 15 measurement questions. In recent years, more scholars consider organizational resilience as a four-dimensional construct, and Wicker et al. (2013) [26] considered organizational resilience as including robustness, redundancy, adequacy, and rapidity from the characteristics of organizational resilience [33], [34], and developed 21 measurement questions [35]. Şengül et al. (2019) [32] focused

| Perspectives | Representative Scholars | Concept Connotation | Viewpoint |
|--------------|-------------------------|---------------------|-----------|
| Capability Perspective | Chen et al. (2021) [28] | Organizational resilience is the ability of an organization to reconfigure organizational resources, optimize organizational processes and reshape organizational relationships in a crisis, recover quickly from the crisis, and use the crisis to achieve counter-trend growth. | Dynamic View |
| | Duchek et al. (2020) [1] | Organizational resilience is the ability to anticipate potential threats, respond effectively to unexpected events, and learn from those events, resulting in a dynamic ability to facilitate organizational change. | |
| | Ma et al. (2018) [23] | Organizational resilience is an organizational capability that enables organizations to survive, adapt, recover and even thrive in the face of unexpected and sometimes catastrophic events and more broadly defined turbulent environments. | |
| | Koronis & Ponis (2018) [29] | Organizational resilience is the ability to recognize and adapt to unexpected changes. | |
| Process Perspective | Ishak & Williams (2018) [21] | Organizational resilience is a dynamic structure of an organization that contains both quantitative and typological dimensions and covers behavioral processes such as identity management, reintegration, and emotional labor. | |
| | McCarty et al. (2017) [22] | Organizational resilience can be viewed as an evolutionary process in which an organization adjusts its configuration to respond to its external changes. | |
| | Lengnick-Hall & Beck (2009) [30] | Organizational resilience capability is defined as a unique blend of cognitive, behavioral and situational attributes that enhances an organization's ability to understand current situations and develop customized responses that reflect that understanding. | |
| Functional Perspective | Wicker et al. (2013) [26] | Organizational resilience is conceptualized as robust, redundant, adequate, and fast-functioning. | |
| | McManus et al. (2008) [27] | Organizational resilience is a function of an organization's awareness of the overall situation, management of critical weaknesses, and ability to adapt in a complex, dynamic, and interdependent environment. | |
| Results Perspective | Sahebjamnia et al. (2018) [24] | An organization is considered organizationally resilient if it is able to continue its critical functions at least at the minimum business continuity goal level for the maximum tolerable outage period following any disruption. | Static View |
| | Sincorá et al. (2018) [25] | Organizational resilience relates to how organizations recover and survive chaotic changes and unexpected events, and encompasses three dimensions: anticipation, adaptation, and response. | |
| | Gittell et al. (2006) [5] | Organizational resilience enables relationship reserves to be maintained as a result of relationship reserves and financial reserves. | |
TABLE 2. Dimensional components and related measures of organizational resilience.

| Structure Type | Research Area (Business Type) | Dimensional Composition | Source of Measurements | Representative Literature |
|----------------|-------------------------------|-------------------------|------------------------|--------------------------|
| Two factors    | New Zealand (tourism)         | Planning ability        | McManus et al. (2008)  [27] | Jones (2015) [38]         |
|                |                               | Adaptability            |                        |                          |
|                |                               | Planning                | Lee et al. (2013)      [37] | Girish et al. (2018) [39] |
| Three factors  | Nigeria (manufacture)          | Organizational Adaptation| Valikangas (2010)      [40]| Godwin & Amah (2013) [11] |
|                |                               | Organizational resources| Marsick et al. (2002)  [41]|                          |
|                |                               | Organizational learning |                        |                          |
|                | Nigeria (manufacture)          | Organizational learning ability | Marsick & Watkins (2000) [42]|                      |
|                |                               | Adaptable               | Folke et al. (2003) [33] | Umoh et al. (2014) [31] |
|                |                               | Dynamic ability         | Tice et al. (1997)     [44] |                          |
| Four factors   | Australia (Community Club)     | Robustness              | Vogus & Sutcliffe (2007) [35] | Wicker et al. (2013) [26] |
|                |                               | Redundancy sufficiency  |                        |                          |
|                | Turkey (Technology-based      | Agility                  | Jeong et al. (2017)   [45] | Şengül et al. (2019) [32] |
|                | companies)                    | Expected competencies   |                        |                          |
|                |                               | Adaptive culture        |                        |                          |
|                |                               | Network competency      |                        |                          |
|                |                               | Organizational learning |                        |                          |

on the learning capacity, networking capacity and adaptive capacity of organizational resilience and developed a 19-item scale for measuring organizational resilience. In addition, Chen et al. (2021) [28] argued that organizational resilience includes five dimensions of capital resilience, strategic resilience, cultural resilience, relationship resilience, and learning resilience based on the use of exploratory case study method, and developed 20 measurement questions.

In summary, it can be seen that the measurement scale of organizational resilience has laid the foundation for subsequent research, but, in general, the research on organizational resilience still has the following shortcomings: first, the measurement of organizational resilience is more based on western cultural scenarios, and there are few organizational resilience measurements based on Chinese cultural contexts, even though Chinese scholars Chen et al. (2021) [28] developed a measurement scale of organizational resilience but it is also based on western case studies; secondly, scholars have different perceptions of organizational resilience, and there is still a lack of a more unified organizational resilience measurement scale. Therefore, further exploration of the connotation and structure of organizational resilience is needed in the future.

IV. RESEARCH LINEAGE OF ORGANIZATIONAL RESILIENCE

A. RESEARCH METHODOLOGY

This study uses CiteSpace and Gephi software to analyze the literature on organizational resilience by keyword co-occurrence, topic word clustering, and literature co-citation, so as to show the origin, research lineage, and research trends of organizational resilience more clearly. This research method helps to systematize the research on organizational resilience under the current conditions of fragmentation of organizational resilience research.

B. DATA SOURCES AND SEARCH METHODS

To ensure the comprehensiveness and authority of the data, the data sources for this study were obtained from the Web of Science (WOS) database, including the Social Sciences Citation Index (SSCI), the Citation Index to Proceedings of Social Sciences and Humanities (CPCI-S), the Arts and Humanities Citation Index (A&HCI), the Emerging Channels Citation Index (ESCI), and two chemical databases. The WOS database is the world’s largest and most comprehensive data resource platform covering the largest number of disciplines, and contains a large amount of high-level literature, which laid a solid foundation for the data collection in this study. First, this paper follows the following steps for data collection: data collection needs to determine the exact search terms for data retrieval, and this study searches for “organizational resilience” and “organization + resilience” through extensive literature reading and top international journal literature related to the field of organizational resilience. First, this paper follows the following steps for data collection: data collection needs to determine the exact search terms for data retrieval, and this study searches for “organizational resilience” and
R. Chen et al.: Turning Danger into Safety: The Origin, Research Context and Theoretical Framework

TABLE 3. Web of Science data retrieval process.

| Retrieval of set subjects | Search for set contents and results |
|---------------------------|------------------------------------|
| Database                  | WOS Core Data Collection           |
| Search Type               | TS=((organization* OR organize) AND (resilience OR resiliency)) |
| Type of Literature        | Article                            |
| Language Type             | English                            |
| Time span                 | All years (1984 - 2021)            |
| Search time               | March 20, 2021                     |
| Number of citations       | 6231 articles                      |

Note: TS indicates search subject terms, including literature title, abstract, and keywords.

FIGURE 1. Publication trends in organizational resilience research literature between 1984 and 2021.

“organization + resilience” through extensive literature reading and top international journal literature related to the field of organizational resilience. “The search expressions were determined as follows: search terms related to “organization” + search terms related to “resilience”, i.e. (organization* OR organize) AND (resilience OR resiliency). Second, the data were selected according to the following rules: ① The data source of this paper was obtained from the WOS core collection database, which can ensure that the mainstream journal literature in the field of organizational resilience research is included. ② The literature retrieved in this paper spans from January 1, 1984 to March 20, 2021 (retrieved on March 20, 2021), including all the literature on organizational resilience in the WOS database, for a total of 37 years. ③ Therefore, based on the criteria of “whether it belongs to the field of organizational resilience research” and “whether it is a research object of organizational resilience”, we further read the titles and abstracts of the literature to remove the irrelevant literature. ④ The final selected literature was imported into CiteSpace software for de-duplication, and 197 valid papers from 1984-2021 were retained. The specific search was conducted as shown in Table 3 below.

C. DESCRIPTIVE RESULTS

The analysis of the publication trend of the literature revealed that, firstly, in terms of publication time, the earliest literature on organizational resilience was published in 1984, while very little literature on organizational resilience was published until 2005, and then it gradually increased and reached a peak of 41 articles in 2020 (see Figure 1). Second, in terms of the distribution of published journals, there are 31 journals with 2 or more publications of research-related literature, and the total number of their publications is 85, accounting for 38.48% of the total literature related to organizational resilience research. Thirdly, in terms of impact factor, h-index and total citation frequency of journals, the impact factor of Sustainability, which has the most publications, reached 2.576, and the h-index of 6 journals exceeded 50, indicating that the research results in the field of organizational resilience research are of high quality. Fourth, in terms of research fields, the research results of organizational resilience cover the fields of management, behavioral science, sociology, economics, etc. From the above analysis, it is clear that the academic research on organizational resilience has yet achieved good research results.

D. THE RESEARCH LINEAGE OF ORGANIZATIONAL RESILIENCE SHOWS FOUR DEVELOPMENT STAGES

In order to show the research lineage of organizational resilience more clearly, this study analyzes the keywords of the topic in the field of organizational resilience. By screening the keywords in the field of organizational resilience research
during 1984-2021 and forming a knowledge network, this paper finally obtained a time zone map of keywords in organizational resilience research (as shown in Figure 2 below), where the size of the node circles represents the number of occurrences of the keywords, and the larger the circle indicates the more occurrences.

As can be seen in Figure 2, the nascent stage of organizational resilience was prior to 2005, during which scholars explored which variables influenced organizational resilience. For example, Rioli & Savicki (2003) [47] constructed an integrated model of individual and organizational factors affecting organizational resilience in an information system environment by examining the relationship between stress and resilience in the field of information systems, pointing out the influence of organizational competence, organizational communication, and organizational commitment on organizational resilience at the organizational level. In general, the number of literature in the nascent stage is relatively sparse and the research perspective is relatively homogeneous, but it lays the foundation for subsequent studies.

From 2006 to 2010, the developmental stage of organizational resilience research has not only included the research on “factors influencing organizational resilience” in the nascent stage, but also went further into the study of indicators of organizational resilience and the impact on organizational performance. For example, Cutter et al. (2008) [48] developed criteria and indicators for measuring resilience from the perspective of global change, and constructed a model of local resilience, which includes social, economic, infrastructural, ecological, and community capacity indicators. In addition, scholars in this period began to focus on the role of organizational resilience in influencing organizational performance. For example, Huber et al. (2009) [49] studied the safety audit of resilience engineering in chemical companies, internalized the dynamic capability of the organization as the organization’s resilience, and through on-site research and interviews, the results showed that the dynamic capability of the organization determined the high safety performance. In conclusion, this phase further continues and develops the research of scholars in the budding stage on the factors influencing organizational resilience, and academics begin to focus on the assessment of organizational resilience and the study of the impact on organizational performance, which lays the foundation for subsequent research.

The boom phase of organizational resilience was from 2011-2015, and the main line of research in this phase continued the research hotspots of the previous phase, where scholars used different indicators and methods to assess organizational resilience. For example, Lee et al. (2013) [37] developed a tool to assess resilience strategies based on McManus et al. (2008) [27] organizational resilience indicators in order to demonstrate the progress of organizations in resilience and linking the improvement of organizational resilience to competitiveness, adding resilience spirit, which is considered to be composed of four factors: resilience spirit, situational awareness, critical weakness management, and adaptability. Ayala & Manzano (2014) [15], through a study of the Spanish tourism industry, showed that the results indicated that resilience, resourcefulness and optimism are the constituent dimensions of resilience and that resilience helps explain entrepreneurial success and that adequacy is a key predictor of entrepreneurial success. In summary, in the
prosperity phase, scholars have used different methods to conduct in-depth research on the assessment indicators of organizational resilience from different perspectives, laying the foundation for subsequent research on the paths that open up organizational resilience.

The period 2016-2021 is the expansion phase of organizational resilience research, in which both scholars continue to explore the research themes of the first three phases in depth and some scholars expand new research themes - the study of pathways to enhance organizational resilience. For example, Huang et al. (2016) [50] extended the job demand resource model through a survey and analysis of 697 employees of foreign-invested retail stores, noting that organizational resilience can be improved through human resource management practices that improve individual employees’ well-being and ability to cope with adversity. Prayag et al. (2020) [51] through a study of small tourism enterprises in New Zealand explored how psychological capital affects organizational resilience in a post-earthquake environment and found that problem-focused and emotion-focused coping mechanisms can activate the psychological capital of organizational members, which can enhance organizational resilience. In summary, in the extension phase, some scholars continued the research content of the above phase, while others expanded new research directions and extended the research to the aspect of pathways to enhance organizational resilience; the research content not only enriched the study of organizational resilience from the theoretical level, but also had guiding significance for future business practice.

E. THREE MAJOR HOTSPOTS HAVE BEEN FORMED IN ORGANIZATIONAL RESILIENCE RESEARCH

In order to present the research hotspots in the field of organizational resilience more clearly, this paper clusters the high-frequency words in this field and obtains the clustering mapping in Figure 3 below, from which we can see three major hotspot studies in the field of organizational resilience research: the study of the influencing factors of organizational resilience, the study of the indicators of organizational resilience and the impact on organizational performance, and the study of the path to enhance organizational resilience.

As can be seen from the figure above, cluster 1 is a study of the factors influencing organizational resilience. This cluster is dominated by green nodes, in which the theme word “organizational resilience” is the core, and also includes the theme words “organizational learning”, “employee engagement”, and “environmental turbulence”. The core of this node is the theme term “organizational resilience”, which also includes the theme terms “organizational learning”, “employee engagement”, and “environmental turbulence”. Currently, the field is exploring the role of organizational learning, business continuity, and employee engagement in influencing organizational resilience. Cluster II is a study of the measurement of organizational resilience and its impact: catagories
on organizational performance. This cluster contains mainly blue nodes with “resilience” and “performance” as the core terms, and also includes “resource”, “organizational performance”, and “organizational performance”. resource”, “organizational ability”, “organizational resilience factor” and other hot topic terms. The impact of organizational resilience on an organization is not only reflected in the organization’s response to external environmental uncertainty, but also at the level of organizational performance. Cluster III is a study of pathways to enhance organizational resilience. This cluster is dominated by orange nodes, mainly “affective commitment” and “organizational culture”, and also includes psychological resilience”, “job satisfaction”, “positive emotion” and other hot topics. The terms “psychological resilience”, “job satisfaction”, “positive emotion” and other hot topics are also included.

In summary, organizational resilience research in general shows a growing number of related studies, diversified research themes and contents, and diversified research perspectives and research methods. In terms of research on the paths to enhance organizational resilience, scholars have opened up effective paths to enhance organizational resilience from emotional and cultural perspectives. However, on the other hand, the existing studies have only explored the paths to enhance organizational resilience from a qualitative approach, without empirical testing of large samples; on the other hand, the existing studies on the paths to enhance organizational resilience have not yet formed a systematic research framework.

V. THEORETICAL FRAMEWORK OF ORGANIZATIONAL RESILIENCE RESEARCH

The knowledge mapping analysis of the organizational resilience research field allows us to explore the research lineages of organizational resilience at the macro level. In order to analyze the research content and frontier issues of organizational resilience in more detail at the micro level, this study further analyzes the literature on organizational resilience systematically. The literature selection rules of this study are as follows: First, 30 key nodes with citation frequency ≥ 5 were selected based on node literature. Second, 25 representative literatures of scholars with citation frequencies ≥ 5 were selected by author co-citation analysis. Thirdly, 61 frontier papers under organizational resilience clustering were selected. Fourth, this paper focuses on selecting journals in the fields of management, organizational behavior, and psychology, while appropriately adding the following journals with high impact factors that focus on other fields of organizational resilience, and finally selecting 35 authoritative journals to obtain 203 papers. After screening out the duplicates, the downloaded literature was read and further screened. Based on the balance of authoritativeness, cutting-edge and comprehensiveness of the literature, 108 literatures on organizational resilience were finally selected.

Through combing and analyzing the literature on organizational resilience, we found that although the research results on organizational resilience are relatively abundant, they are rather scattered. Therefore, this paper integrates the research framework of organizational resilience from four aspects: theoretical foundation, influencing factors, role mechanism and impact effect of organizational resilience, and provides reference and reference for more in-depth exploration of organizational resilience in the future (as shown in Figure 4 below).

A. THEORETICAL FOUNDATIONS OF ORGANIZATIONAL RESILIENCE RESEARCH

Organizational resilience research has increasingly become a hot topic in organizational behavior research, but a systematic theoretical foundation has not yet been formed. The main theories of organizational resilience research include system resilience theory, power change theory, and dynamic capability theory.

1) SYSTEM RESILIENCE THEORY

According to the difference of scholars’ definition of stable state, system resilience theory can be mainly divided into ecological resilience and mechanical resilience. Pimm (1984) [52] pointed out that mechanical resilience refers to the time for a system to return to equilibrium after a disturbance, focusing on stability, predictability and efficiency. Subsequently, scholars built on it by proposing ecological resilience [53], which is considered as the total amount of disturbance that an organization can absorb before the system’s function remains unchanged, and it focuses on change, sustainability and unpredictability, emphasizing the conditions under which the system loses its equilibrium state. Thus, resilience is the degree of disturbance that a system can withstand before changing its structure and function. Ecological resilience is based on multistability, whereas mechanical resilience focuses on a single state of homeostasis. However, more scholars focus on ecological resilience as a theoretical basis for organizational resilience because of the complex nature of social-ecological systems with multistability.

2) CONTINGENCY THEORY

The power-change theory attempts to combine the closed-system logic of traditional theoretical models with an open-system approach that recognizes the influence of external factors, arguing that organizational structure depends on current environmental conditions. The assumptions of the power-change theory are based on: (i) changes in organizational structure are related to changes in the environment; (ii) the effectiveness of the organization depends on the goodness of fit between structural and environmental variables [54]; and (iii) the best way to organize depends on the nature of the environment in which the organization is located [55]. Paul et al. (1967) [56] proposed the power-change theory. They argued that different environments place different requirements on the organizations that survive in them, and by studying the relationship between the organization and the environment and assessing the internal structure
of the organization, they found that uncertain and rapidly changing environments require flexibility and dynamism in the organizational structure, while stable environments allow for greater centralization and formal organizational forms. In addition, they argue that each subunit of the organization should be adapted to deal with the stability or uncertainty of its own environment. Thus, the perspective of power-change theory is highly relevant to the study of organizational adaptation during crises. Although many power-change theories usually consider the external environment as gradual and permanent, intermittent, short-lived crises can have an impact on organizations even if the environment returns to its previous state. Thus, power-change theories are important for explaining organizational responses in crisis environments.

3) DYNAMIC CAPABILITY THEORY
Dynamic capabilities are the ability that firms have to systematically solve problems, perceive threats and opportunities, make timely decisions, and get their resource base changed [57]. The established dynamic capability theory research is based on evolutionary economics and the resource base view [58]. Among them, the resource base view considers the firm as a collection of all resources, and the source of achieving the firm’s competitive advantage lies in the valuable, scarce, and irreducible resources that the firm possesses [59], however, the shortcoming of the resource base view is that it only points out the source of the firm’s competitive advantage, but not how the firm maintains its competitive advantage in a rapidly changing environment. Therefore, Teece et al. (1997) [44] proposed the dynamic capability of the firm, and they believed that the ability to establish and reconfigure the internal and external resources of the firm, and the integration of the firm is the source of competitive advantage of the organization in the turbulent and rapidly changing environment, therefore, the dynamic capability theory is the supplement and sublimation of the resource-based view. At the same time, Zollo & Winter (2002) [60] also point out that dynamic capabilities are not static, but evolve with the changing environment, and learning plays an important role.

B. RESEARCH ON THE INFLUENCING FACTORS OF ORGANIZATIONAL RESILIENCE
From the existing research, the research on the influencing factors of organizational resilience has become a hot topic, but the related research is still in the theoretical stage, and the related empirical research is yet to be developed. In general, the influencing factors of organizational resilience can be revealed mainly from three levels: individual, organizational, and environmental.

1) INDIVIDUAL LEVEL
The influencing factors of organizational resilience at the individual level mainly focus on individual behaviors, such as stakeholders, self-esteem, and leadership behaviors. First, the construction of stakeholder and external network relationships is conducive to enhancing organizational resilience. Studies have shown that positive interpersonal relationships enable organizations to overcome difficulties and resume operations more easily [5], and as Lv et al. (2019) [61] point out, organizations enhance relationships with external stakeholders facilitate higher performance growth and weaken financial vulnerability, thus gaining organizational resilience. Gittell et al. (2006) [5] found that organizational resilience comes from positive social relationships in a study of 10 post-9/11 airlines. They found that positive internal
relationships help organizations recover from crises and that positive relationships generate lower costs, making it easier to respond to external shocks without breaking commitments.

Second, scholars produce different opinions regarding the relationship between self-esteem and resilience. Hoffri-Hofstetter & Mannheim (1999) [4] stated that self-esteem as a personality trait has a strong influence on coping behavior in a stressful context, and individuals with high self-esteem are willing to invest more energy in the organization because they believe in their ability to change the organizational status quo. However, some scholars argue that organizational resilience is an antecedent of self-esteem, as Gardner (2019) [62] states that organizational resilience increases an individual's experience of success, and this experience develops into an individual's self-perception of competence, which leads to the development of self-esteem.

Third, the leadership behavior of organizational leaders has a tremendous impact on organizational resilience. Teo et al. (2017) [63] proposed a relational activation model of resilience from a network relationship perspective, using the case of a hospital in Singapore during the SARS crisis as a study to explain how leaders use relationships to activate resilience during a crisis, and found that leaders engage in conscious communication through network relationships to promote positive emotional connections among organizational members, and this network of relationships can serve as a social, emotional, and cognitive resource for organizational resilience. Leadership is considered to be an important aspect of enhancing organizational resilience and adaptability. Harland et al. (2005) [64] used total leadership theory to explore subordinate resilience and found that individual leadership is an important influence on resilience and that a shared leadership style enables teams to handle unexpected events more effectively and enhances organizational resilience [65].

2) ORGANIZATIONAL LEVEL
Organizational-level influences can be explored from the perspectives of organizational resources, organizational behavior, and organizational traits.

First, the organizational resource perspective mainly includes organizational members and organizational relationships. Organizational members are one of the important resources for firms to emerge from adversity [66], and flexibility among organizational members by changing organizational strategies, structures, and thus keeping the organization balanced in the face of uncertain situations [67]. Some organizations lay off employees to facilitate the recovery of the firm after the crisis, but evidence suggests that post-crisis layoffs are closely related to inadequate financial reserves and the lack of a viable business model prior to the crisis, which itself depends on the relationship of organizational members, and although layoffs reduce costs in the short term, they inhibit firm growth in the four years following the crisis [5]. Positive interpersonal relationships improve individual and organizational outcomes [68] and are a key resource for coping with crises. Carmeli et al. (2013) [69] found that relationships among members of the top management team play an important role in facilitating strategic decision making and fostering team resilience.

Second, the organizational behavior perspective mainly includes organizational communication and organizational change. Schraeder & Hoover (2010) [12] state that intra-organizational communication facilitates knowledge sharing among organizational members, eliminates conflict among organizational members, and enhances organizational cohesion, thereby improving the organization’s ability to cope with crises. Lengnick-Hall et al. (2011) [14] state that in a volatile, ever-changing marketplace, only flexible and changing organizations can thrive, and that organizational change facilitates organizations to maintain positive alignment under challenging conditions and customer service severe reconciliation, thus enhancing the organization’s ability to respond to crises, while at the same time, organizational learning facilitates the development of dynamic capabilities that promote organizational change [70].

Third, the organizational trait perspective mainly includes organizational culture and organizational diversity. Christine et al. (1993) [71] explored the role of culture in preventing or reducing organizational disasters, and they argued that organizational culture may be an important factor in causing organizational crises, therefore, creating a resilient corporate culture can help enhance organizational resilience and lay the foundation for effective corporate recovery and sustainability. Diversity as the distribution of personal attributes among interdependent members of an organization [72], research has shown that diversity within work units has an impact on organizational outcomes (e.g., performance.) Oh & Teo (2006) [73] found that organizational diversity has a positive effect on enhancing organizational resilience through a survey of 125 networked retail organizations.

3) ENVIRONMENTAL LEVEL
The uniqueness of the organization’s context also affects the level of organizational resilience. The environmental level influences can be explored mainly from the internal and external environment of the organization. A volatile environment means that the organization urgently needs to change to cope with the crisis, which also puts stress on the organization members, and a safe and supportive internal organizational environment facilitates the organization members to manage the stress, therefore, an internal environment characterized by support and care is conducive to enhance organizational resilience, thus enabling the organization to better cope with the threats and changing environment [6]. In addition, external political factors are factors that cannot be ignored in the process of business development, and researchers have pointed out that government strategies (e.g., government support) will inject new energy and resources into the company, helping it to emerge from the crisis and enhance its resilience [74]; economic factors affect the development strategy and direction of the company, and scholars have pointed
out that the economic crisis caused by brought about by the financial crisis can reduce the level of organizational resilience [75].

C. MECHANISMS OF ORGANIZATIONAL RESILIENCE
Currently, scholars are still exploring the mechanism of organizational resilience, and they have mainly explored the mechanism of organizational resilience from the perspectives of cognition, coping, and learning.

1) COGNITIVE SITUATION
Cognitive context serves as the basis for organizational response to crises. Although it is difficult for organizations to translate and effectively use all the information conveyed by the environment in a limited time, timely and effective corresponding external information helps to enhance the situational awareness of the organization. In essence, the process of cognizing the environment is a process of balancing and interacting risk and protective factors at the individual level and at the organizational level, which is an important stage of organizational stress. The main characteristics that influence organizational stressful behavior are the perception of reality and the management of critical vulnerability to itself, its stakeholders and to the organization’s internal and external environment, as expressed by the impact on critical vulnerabilities and potential. These two behavioral characteristics contribute to the organization’s effective perception and assessment of irritant behaviors and of the organization’s ability to respond, providing guidance and laying the foundation for organizational response. According to Kantur & Iseri-Say’s (2012) [6] organizational resilience integration framework, position perception, situational integration, and strategy development and implementation together constitute the process of organizational resilience in action, where position perception emphasizes the organization’s self-perception in a given situation and is the basis for critical vulnerability management by the organization.

2) ORGANIZATIONAL RESPONSE
Through cognition and assessment of the organizational situation, organizations translate cognition into action to effectively manage change or crisis and achieve organizational continuity [6]. Organizational response to a crisis requires organizational members to recover from trauma and return to their previous state physically and psychologically, thus enhancing organizational resilience. At the same time, the fast-moving business environment provides ample opportunities for organizational renewal, and resilience achieves organizational continuity by achieving organizational evolvability when turbulence leads to organizational disruption. In addition, organizational resources serve as a guarantee for organizational response, and the adaptable and agile application of internal and external resources of the organization is conducive to enhancing organizational adaptation and resilience, thus creating a favorable atmosphere to cope with external stimuli.

3) ORGANIZATIONAL LEARNING
Organizational learning helps convert organizational coping experiences into organizational knowledge, which in turn leads to organizational capabilities to meet future challenges. By perceiving the external environment, the organization enhances its position perception and stimulates organizational learning motivation, which in turn helps the organization to identify the external variable environment and develop new organizational strategies. Organizational coping helps to aid organizational learning and innovation so that it can quickly respond to the stimulus factors of the external environment. Weick & Sutcliffe (2011) [76] argue that resilient organizations encourage mutual learning and experience sharing among organizational members, which in turn enhances organizational resilience to better cope with crises.

D. IMPACT EFFECTS OF ORGANIZATIONAL RESILIENCE
There is less exploration about the impact effect of organizational resilience research, and by sorting out the existing organizational resilience research, the impact effect for organizational resilience can be summarized into the following three aspects.

1) SURVIVAL AND ADAPTATION
In the current turbulent environment, resilience becomes the driving force for organizational survival and development, and companies also need to always cultivate organizational resilience so as to turn crisis into safety in adversity. In today’s digital era, digital change brings opportunities to enterprises, but also brings a high degree of uncertainty, and the theme of business development of enterprises gradually turns to survival and adaptation. Organizational resilience, as a source of strength for both offensive and defensive organizations [77], can ensure the ability of organizations to adapt to different external environments and ensure their survival in development. At the same time, as situations change, resilient organizations are able to respond with appropriate responses to adapt to the environment they are in and undergo positive transformations and defuse crises [78].

2) ORGANIZATIONAL PERFORMANCE
Organizational resilience directly or indirectly affects organizational performance [78]. Oh & Teo (2006) [73] state that resilient organizations can become more agile and thus seize market opportunities and enhance corporate competitiveness, which is more beneficial for organizations in a rapidly changing competitive landscape. Boin & Eeten (2013) [79] state that resilient organizations are able to maintain high levels of performance despite rising environmental pressures and increased uncertainty.

3) ORGANIZATIONAL GROWTH
Resilience helps organizations to make effective choices between facing environmental threats and high growth
VI. RESEARCH CONCLUSIONS AND FUTURE RESEARCH OUTLOOK

A. RESEARCH CONCLUSION

This study finally constructs a research framework for organizational resilience by conducting an econometric analysis of the literature on organizational resilience at the macro level using CiteSpace software and Gephi software, and sorting out the research content of the organizational resilience literature at the micro level. Specifically, this paper has the following three main conclusions.

(1) The connotation and dimensional aspects of organizational resilience. Regarding the concept of organizational resilience, scholars have mainly interpreted it from the capability perspective, functional perspective, process perspective, and outcome perspective, each of which has a different focus, but the interpretation of organizational resilience from the capability perspective and outcome perspective has been more widely accepted by scholars. Regarding the dimensional aspects of organizational resilience, scholars generally agree that organizational resilience is a multidimensional concept, and scholars have proposed two-factor, three-factor, and four-factor structural types, and its measurement items have also appeared to be diversified. Overall, the connotation of organizational resilience needs to be further enriched and the measurement of organizational resilience needs to be further explored.

(2) Research vein level. According to the time zone diagram of the co-citation network, the evolution of the field of organizational resilience research is divided into four main stages: 1984-2005 is the nascent stage of the field, which mainly focuses on the study of the impact factors of organizational resilience; 2006-2010 is the development stage of the field, which not only focuses on the nascent stage of scholars’ research on “organizational resilience impact factors”. At the same time, the research further delved into the study of the indicators of organizational resilience and the impact on organizational performance; 2011-2015 was the prosperous phase of the field, which continued the research hotspots of the previous phase, and scholars used different indicators and methods to assess organizational resilience; 2016-2021 was the expansion phase, in which both scholars continue to explore the research themes of the first three phases in depth and some scholars expand a new research theme - the study of paths to enhance organizational resilience. Three major knowledge clusters have been developed in organizational resilience research: the study of factors influencing organizational resilience represented by scholars such as Pal et al. (2014) [81]; secondly, the study of measurement of organizational resilience represented by scholars such as Aleksic et al. (2013) [82]; and thirdly, the study of the effects of organizational resilience represented by scholars such as Ali et al. (2014) [80].

(3) Organizational resilience theoretical framework level. The theories of organizational resilience research include system resilience theory, weight change theory and dynamic capability theory. Research on organizational resilience can be summarized as the study of the influencing factors of organizational resilience, the study of the mechanism of action of organizational resilience, and the study of the effect of organizational resilience.

B. FUTURE RESEARCH OUTLOOK

Through quantitative analysis and research of foreign organizational resilience literature for more than 30 years, this paper analyzes the connotation and dimensions of organizational resilience, general overview, research hotspots, and evolutionary lineage, and dynamically demonstrates the evolutionary trends and development of organizational resilience research. However, although organizational resilience research has received attention from scholars in the present era, theoretical research is still immature, which also brings opportunities for academics to continue to explore organizational resilience research in depth, and future research is mainly reflected in the following aspects.

1) FURTHER REFINEMENT OF THE CONCEPT

Organizational resilience is a multidimensional and cross-level concept, with different dimensions and levels showing intertwining and mutual expansion. Organizational resilience is the ability to respond quickly to external environmental information and to allocate organizational resources flexibly; the former involves the organization’s cognitive ability to the external environment, and the latter involves the organization’s ability to act; cognition, as a prerequisite for action, has also been paid attention to by scholars [14]. However, established studies have failed to empirically test the relationship. Although richer than earlier studies on organizational resilience, the disciplinary base is weaker and still does not reflect the connotative nature of organizational resilience more clearly. Therefore, it is necessary to further strengthen the exploration of the connotative study of organizational resilience in the future.

2) FURTHER VALIDATION OF THE MEASUREMENT STRUCTURE

The existing studies on the measurement of organizational resilience have not yet formed a consistent conclusion, and based on the existing studies, it is known that the structure of organizational resilience contains multiple dimensions such as two-dimensional, three-dimensional and four-dimensional. Therefore, future research on the measurement of organizational resilience should be further validated.
and contextual factors should be fully considered in the scale design to more effectively guide organizational development.

3) EXPLORING NEW ANTECEDENT AND CONSEQUENCE VARIABLES AND MECHANISMS OF INFLUENCE

Research on antecedent variables of organizational resilience. The influencing factors of organizational resilience are the key to the level of organizational resilience, and therefore, exploring its influencing factors has been the focus of scholars, such as organizational membership, organizational communication, and organizational learning. However, as the external environment in which organizations operate is changing with the times and the environment, future research should further explore the factors influencing organizational resilience. For example, the level of organizational management, the degree of organizational informatization, and the characteristics of organizational communication channels, etc., the impact of these factors on organizational resilience needs to be further explored. Meanwhile, organizational environment as a key component, for example, the competitive environment in which the organization is located (including the degree of competition, competitors, and competitive behavior) also has an impact on organizational resilience, and in addition, the impact of internal organizational characteristics, such as organizational leader characteristics, on organizational resilience also needs to be explored.

In-depth analysis of outcome variables. The outcome variable of existing research on organizational resilience is organizational performance, and future research can conduct specific analysis for different outcomes generated by different dimensions of organizational resilience and enrich the research on the outcome variable of organizational resilience. For example, the impact of organizational resilience on organizational structure is explored, and whether organizational resilience can maintain the stability of organizational structure is analyzed. In addition, the impact and mechanism of organizational resilience on organizational performance and organizational competitiveness are more from qualitative research, while empirical research needs to be further explored.

Enrichment of research on mediating and moderating variables. In terms of mediating mechanisms, most studies explain the process of enhancing organizational resilience, such as transformational leadership behavior, organizational culture, and human resource management, while research on other mediating variables is relatively sparse, and research on mediating variables of organizational resilience should be enriched in the future. In terms of moderating variables, for example, cognitive-emotional regulation ability may be a moderator between stress and resilience, and people with high cognitive-emotional regulation ability may show greater resilience under stress compared to those with low cognitive-emotional regulation ability. In addition, organizational culture is likely to be a moderating variable of organizational resilience, and the effect of a relaxed organizational culture and a rigorous organizational culture on organizational resilience may differ.

4) INTEGRATION OF SOCIAL CULTURE

In the study of organizational resilience, researchers have already noticed the role of organizational culture on organizational resilience, however, the theory of organizational resilience is proposed in the context of Western culture, and the adaptability of the theory in the context of Chinese culture, whether its structure and connotation are consistent with the results of Western studies in the context of Chinese culture, and whether it will have other structures and characteristics in the context of Chinese culture, the existing studies have failed to well. This research should be supplemented and enriched in the future.

In conclusion, the above research topics and possible future research directions contain possible breakthroughs in the field of organizational resilience for domestic and foreign scholars. In the future, with the expansion of domestic organizational resilience research and the enrichment of research methods, research paradigms, and research contents, the deepening of organizational resilience and its theoretical research will help lay the foundation for organizational resilience research. In addition, the limitations of this paper are that the research sample is drawn from the WOS core dataset and fails to involve research in other languages; therefore, the conclusions drawn in this paper may not be comprehensive and precise. Future research languages and literature sources should be expanded so as to lay the foundation for in-depth exploration of organizational resilience research.

ACKNOWLEDGMENT

The authors would like to thank the reviewers for their constructive comments, which have helped to improve the quality of the paper. They would like to thank Prof. Yingqi Liu for her guidance during the writing and revision of the paper and Dr. Fei Zhou for her contribution to the writing and graphing of the paper.

REFERENCES

[1] S. Duchek, S. Raetze, and I. Scheuch, “The role of diversity in organizational resilience: A theoretical framework,” Bus. Res., vol. 13, no. 2, pp. 387–423, Jul. 2020.
[2] A. Ouedraogo and M. Boyer, “Firm governance and organizational resiliency in a crisis context: A case study of a small research-based venture enterprise,” Int. Bus. Res., vol. 5, no. 12, pp. 119–121, Dec. 2012.
[3] A. Annarelli and F. Nonino, “Strategic and operational management of organizational resilience: Current state of research and future directions,” Omega, vol. 62, pp. 1–18, Jul. 2016.
[4] H. Hoffi-Hofstetter and B. Mannheim, “Managers’ coping resources, perceived organizational patterns, and responses during organizational recovery from decline,” J. Organ. Behav., vol. 20, no. 5, pp. 665–685, Sep. 1999.
[5] J. H. Gitterl, K. Cameron, S. Lim, and V. Rivas, “Relationships, layoffs, and organizational resilience: Airline industry responses to September 11,” J. Appl. Behav. Sci., vol. 42, no. 3, pp. 300–329, Sep. 2006.
[6] D. Kantur and A. Isleri-Say, “Organizational resilience: A conceptual integrative framework,” J. Manage. Org., vol. 18, no. 6, pp. 762–773, Nov. 2012.
[7] J. F. Home and J. E. Orr, “Assessing behaviors that create resilient organizations,” Employment Relations Today, vol. 24, no. 4, pp. 29–39, Dec. 1997.
[8] B. Walker, S. Carpenter, J. Anderies, N. Abel, G. Cumming, M. Janssen, L. Lebel, J. Norberg, G. D. Peterson, and R. Pritchard, “Resilience management in social-ecological systems: A working hypothesis for a participatory approach,” Conservation Ecol., vol. 6, no. 1, pp. 14–31, 2002.

[9] F. Luthans, G. R. Vogelgesang, and P. B. Lester, “Developing the psychological capital of resiliency,” Hum. Resour. Dev. Rev., vol. 5, no. 1, pp. 25–44, Mar. 2006.

[10] G. Hamel and L. Valikangas, “The quest for resilience,” Revista Icade. Revista de las Facultades de Derecho y Ciencias Economicas y Empresariales, vol. 62, pp. 355–358, 2004.

[11] I. Godwin and E. Amah, “Knowledge management and organizational resilience in Nigerian manufacturing organizations,” Developing Country Stud., vol. 3, no. 9, pp. 104–120, 2013.

[12] M. Schraeder and D. J. Howard, “Enhancing organizational recovery in tough times: A pragmatic perspective,” Develop. Learn. Org., Int. J., vol. 24, no. 2, pp. 11–13, Feb. 2010.

[13] M. K. Linnenluecke, A. Griffiths, and M. Winn, “Extreme weather events and the critical importance of anticipatory adaptation and organizational resilience in responding to impacts,” Bus. Strategy Environ., vol. 21, no. 1, pp. 17–32, Jan. 2012.

[14] C. A. Lengnick-Hall and T. E. Beck, and M. L. Lengnick-Hall, “Developing a capacity for organizational resilience through strategic human resource management,” Hum. Resour. Manage. Rev., vol. 21, no. 3, pp. 243–255, Sep. 2011.

[15] J. C. Ayala and G. Manzano, “The resilience of the entrepreneur. Influence on the success of the business. A longitudinal analysis,” J. Econ. Psychol., vol. 42, pp. 126–135, Jun. 2014.

[16] Z. Drak, “Politics and Patromony of the croatian revolution,” in Proc. Inst. Anal. Develop. Mini-Conf., 2002, pp. 1–22.

[17] C. S. Holling, “Resilience and stability of ecological systems,” Annu. Rev. Ecol. Syst., vol. 4, no. 1, pp. 1–23, Nov. 1973.

[18] F. Walsh, “The concept of family resilience: Crisis and challenge,” Family Process, vol. 35, no. 3, pp. 261–281, Sep. 1996.

[19] A. B. Wildavsky, Searching for Safety, Piscataway, NJ, USA: Transaction Publishers, 1988.

[20] I. P. McCarthy, M. Collard, and M. Johnson, “Adaptive organizational resilience: A working hypothesis for a participatory approach,” Int. J. Hum. Resour. Manage., vol. 30, no. 8, pp. 1–19, 2016.

[21] G. I. Umoh, E. Amah, and H. I. Wokocha, “Management development and the critical importance of anticipatory adaptation and organizational resilience in responding to impacts,” Disaster Prevention Manage., Int. J., vol. 24, no. 1, pp. 4–20, Feb. 2015.

[22] T. J. Vogus and K. M. Sutcliffe, “Organizational resilience: Towards a theory and research agenda,” in Proc. IEEE Int. Conf. Syst. Man Cybern., Oct. 2007, pp. 3418–3422.

[23] J. Vargo and A. V. Stephenson, “Measuring organizational resilience,” in World Conf. Disaster Manage., 2010, pp. 44–51.

[24] A. V. Lee, J. Vargo, and E. Seville, “Developing a tool to measure and compare organizations’ resilience,” Natural Hazards Rev., vol. 14, no. 1, pp. 29–41, Feb. 2013.

[25] B. A. Jones, “Benchmarking organizational resilience: A cross-sectional comparative research study,” New Jersey City Univ., Jersey City, NJ, USA, Tech. Rep., 2015.

[26] G. Prayag, M. Chowdhury, S. Spector, and C. Orchiston, “Organizational resilience and financial performance,” Ann. Tourism Res., vol. 73, pp. 193–196, Nov. 2018.

[27] L. Valikangas, The Resilient Organization: How Adaptive Cultures Thrive Even When Strategy Fails. New York, NY, USA: McGraw-Hill, 2010.

[28] V. J. Marsick, K. E. Watkins, and J. A. Wilson, “Informal and incidental learning in the new millennium: The challenge of being rapid and/or being accurate,” in Individual Differences and Development in Organizations, Jan. 2002, pp. 249–266.

[29] V. J. Marsick and K. E. Watkins, “Learning organizations,” in From the Learning Organization to Learning Communities Toward a Learning Society, 2000, pp. 5–19.

[30] C. Folke, J. Colding, and F. Berkes, “Synthesis: Building resilience and adaptive capacity in social-ecological systems,” Navigating Social-Ecol. Syst., Building Resilience Complex Change, vol. 9, no. 1, pp. 352–387, 2003.

[31] D. J. Teece, G. Pisano, and A. Shuen, “Dynamic capabilities and strategic management,” Strategic Manage. J., vol. 18, no. 7, pp. 509–533, Aug. 1997.

[32] M. Jeong, B.-I. Kim, and K. Kang, “Competition, product line length, and firm survival: Evidence from the US printer industry,” Technol. Anal. Strategic Manage., vol. 29, no. 7, pp. 762–774, Aug. 2017.

[33] D. P. Costanza, N. Blacksmith, M. R. Coats, J. B. Severt, and A. H. DeCostanza, “The effect of adaptive organizational culture on long-term survival,” J. Bus. Psychol., vol. 31, no. 3, pp. 361–381, Sep. 2016.

[34] L. Riolli and V. Savicki, “Information system organizational resilience,” Org. Stud., vol. 13, no. 2, pp. 227–233, Jun. 2003.

[35] S. Huber, I. van Wijgerden, A. De Witt, and S. W. A. Dekker, “Learning from organizational incidents: Resilience engineering for high-risk process environments,” Process Saf. Prog., vol. 28, no. 1, pp. 90–95, Mar. 2009.

[36] Q. Huang, Y. Xing, and J. Gamble, “Job demands-resources: A gender perspective on employee well-being and resilience in retail stores in China,” Int. J. Hum. Resour. Manage., vol. 30, no. 8, pp. 1–19, 2016.

[37] G. Prayag, L. K. Ozanne, and H. de Vries, “Psychological capital, coping mechanisms and organizational resilience: Insights from the 2016 Kaikoura earthquake, New Zealand,” Tourism Manage. Perspect., vol. 34, pp. 1–13, Apr. 2020.

[38] S. L. Pimm, “The complexity and stability of ecosystems,” Nature, vol. 307, no. 5949, pp. 321–326, 1984.

[39] M. F. Price, “Panarchy: Understanding transformations in human and natural systems,” Biol. Conservation, vol. 114, no. 2, pp. 308–309, Dec. 2003.

[40] J. M. Pennings, “Structural contingency theory: A re-appraisal,” Org. Behav., vol. 5, no. 2, pp. 267–309, 1992.

[41] A. Scott and M. Storper, “Regions, globalization, development,” Regional Stud., vol. 37, nos. 6–7, pp. 579–593, 2003.

[42] P. R. Lawrence and W. J. Lorsch, Organization and Environment: Managing Differentiation and Integration. Boston, MA, USA: Harvard Business School Press, 1967.

[43] I. Barreto, “Dynamic capabilities: A review of past research and an agenda for the future,” J. Manage., vol. 36, no. 1, pp. 256–280, Jan. 2010.

[44] A. Davies and T. Brady, “Explicating the dynamics of project capabilities,” Int. J. Project Manage., vol. 34, no. 2, pp. 314–327, Feb. 2016.
[59] J. Barney, “Firm resources and sustained competitive advantage,” J. Manage., vol. 17, no. 1, pp. 99–120, Mar. 1991.

[60] M. Zollo and S. G. Winter, “Deliberate learning and the evolution of dynamic capabilities,” Org. Sci., vol. 13, no. 3, pp. 339–351, Jun. 2002.

[61] W. Lv, Y. Wei, X. Li, and L. Lin, “What dimension of CSR matters to organizational resilience? Evidence from China,” Sustainability, vol. 11, no. 6, pp. 1561–1584, 2019.

[62] D. G. Gardner, “The importance of being resilient: Psychological well-being, job autonomy, and self-esteem of organization managers,” Personality Individual Differences, vol. 155, pp. 1–6, Mar. 2019.

[63] W. L. Teo, M. Lee, and W.-S. Lim, “The relational activation of resilience model: How leadership activates resilience in an organizational crisis,” J. Contingencies Crisis Manage., vol. 25, no. 3, pp. 136–147, Sep. 2017.

[64] L. Harland, W. Harrison, J. R. Jones, and R. Reiter-Palmon, “Leadership behaviors and subordinate resilience,” J. Leadership Org. Stud., vol. 11, no. 2, pp. 2–14, Jan. 2005.

[65] C. S. Burke, K. C. Stagl, E. Salas, L. Pierce, and D. Kendall, “Understanding team adaptation: A conceptual analysis and model,” J. Appl. Psychol., vol. 91, no. 6, pp. 1189–1207, Nov. 2006.

[66] R. H. Waterman, The Renewal Factor. Bantam, 1988.

[67] C. A. Gibson and M. Tarrant, “A conceptual models’ approach to organizational resilience,” Austral. J. Emergency Manage., vol. 25, no. 2, pp. 6–12, 2010.

[68] J. E. Dutton, M. A. Glynn, and G. Spreitzer, Positive Organizational Scholarship. San Francisco, CA, USA, 2005.

[69] R. H. Waterman, The Renewal Factor. Bantam, 1988.

[70] C. A. Gibson and M. Tarrant, “A conceptual models’ approach to organizational resilience,” Austral. J. Emergency Manage., vol. 25, no. 2, pp. 6–12, 2010.

[71] J. B. Oh and H. H. Teo, “The impacts of information technology and managerial proactivity in building net-enabled organizational resilience,” in Proc. IFIP Int. Working Conf. Transf. Diffusion Inf. Technol. Org. Resilience, 2006, pp. 33–50.

[72] F. Bouaziz and Z. S. Hachicha, “Strategic human resource management practices and organizational resilience,” J. Manage. Develop., vol. 37, no. 7, pp. 537–551, Aug. 2018.

[73] M. DesJardine, P. Bansal, and Y. Yang, “Bouncing back: Building resilience through social and environmental practices in the context of the 2008 global financial crisis,” J. Manage., vol. 45, no. 4, pp. 1434–1460, Apr. 2019.

[74] K. E. Weick and K. M. Sutcliffe, Managing the Unexpected: Resilient Decision Making. Hoboken, NJ, USA: Wiley, 2011.

[75] P. M. Darkow, “Beyond ‘bouncing back’: Towards an integral, capability-based understanding of organizational resilience,” J. Contingencies Crisis Manage., vol. 27, no. 2, pp. 145–156, 2019.

[76] C. M. Youssef and F. Luthans, “Positive organizational behavior in the workplace: The impact of hope, optimism, and resilience,” J. Manage., vol. 33, no. 5, pp. 774–800, Oct. 2007.

[77] A. Boin and M. J. G. Van Eeten, “The resilient organization,” Public Manage. Rev., vol. 15, no. 3, pp. 429–445, 2013.

[78] A. V. Akgün and H. Keskin, “Organisational resilience capacity and firm product innovativeness and performance,” Int. J. Prod. Res., vol. 52, no. 23, pp. 6918–6937, Dec. 2014.

[79] R. Pal, H. Torstenson, and H. Mattila, “Antecedents of organizational resilience in economic crises—An empirical study of Swedish textile and clothing SMEs,” Int. J. Prod. Econ., vol. 147, pp. 410–428, Jan. 2014.

[80] A. Aleksic, M. Stefanovic, S. Arsovski, and D. Tadic, “An assessment of organizational resilience potential in SMEs of process industry, the fuzzy approach,” J. Loss Prevention Process Ind., vol. 26, no. 6, pp. 1238–1245, 2013.

FEI ZHOU (Member, IEEE) is currently pursuing the Ph.D. degree in business administration with the School of Economics and Management, Beijing Jiaotong University, China. She has presided over and participated in more than ten projects of the China National Social Science Foundation, provincial and ministerial level projects and various enterprise projects, most of which are related to technological innovation and business model innovation of emerging industries. Her main research interests include industrial innovation, technological innovation and policy innovation of autonomous vehicles and new energy vehicles. The expert proposal Research Suggestions on Unmanned Delivery in the Field of Transportation was approved by the Vice Minister of the Ministry of Transport of China.