

MEASURING ORGANISATIONAL RESILIENCE: COMBINING STRATEGIC AND OPERATIONAL DIMENSIONS

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ABSTRACT

Topicality: Research on measuring organisational resilience is gaining in popularity due to rising uncertainty in the business environment. Studies researching organisational resilience are aimed at various industries, using different methodological approaches and resulting in varied outcomes. Moreover, these lack a shared understanding of organisational resilience; publications exhibit vast differences in measuring approaches and outcomes of organisational resilience. Therefore, understanding organisational resilience as the combination of strategic and operational resilience might lead to a better quantifiability of the overarching construct.

Research aim: This paper will conduct a systematic literature review to analyse the different approaches to measuring organisational resilience in leading publications in business and management studies. Furthermore, a combined methodology for measuring organisational resilience from these studies is introduced.

Methodology: This literature review explores the leading publications in the business and management field from the Scopus scientific database using a Boolean search with ‘organisational resilience’, ‘measure’, ‘indicator’, ‘scale’, and ‘survey’ as the search terms.

Findings: An increasing number of publications study how to measure organisational resilience. Nevertheless, a common understanding of the concept is still difficult to capture. Splitting organisational resilience into strategic and operational resilience could improve the fit of the models, creating a shared understanding of its measurement and determining the influence of resilience on crisis.

Novelty: Current research directions regarding capturing the concept of organisational resilience and its measurement are widely fractured. This research synthesises the existing methodologies and provides a combined approach for measuring organisational resilience by splitting indicators into operational and strategic resilience dimensions to enhance the understanding of each part contributing to overall organisational resilience.

Keywords: resilience, organisational resilience, strategic resilience, operational resilience, uncertainty, measurement.

Type of paper: conceptual paper

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INTRODUCTION

Over the last twenty years, research on organisational resilience (OR) has increased in waves. Many different adversities have led to more uncertainty in the business world, which has increased the research in the field of resilience to deal with this uncertainty (Hillmann and Guenther, 2021; Linnenluecke, 2017). In particular, the COVID-19 pandemic and the war in Ukraine have led to a rising interest in resilience, culminating in research about bouncing back from a health crisis (Hughes *et al.*, 2020; Neise *et al.*, 2021) and tackling supply chain disruptions and inflation (Gebhardt *et al.*, 2022; Longo *et al.*, 2023; Özdemir *et al.*, 2022). Nevertheless, all these publications introduce different understandings of OR and how to measure it in detail (Duchek, 2019). Various methodologies and survey questions have been introduced (Lee *et al.*, 2013; Kantur and İşeri-Say, 2015; Sincorá *et al.*, 2018) to take on OR to find an answer to why some companies thrive and some fail during uncertain times and in challenging conditions (Somers, 2009). However, a standard definition of OR is still missing, so the ingenuity of the concept of resilience still escapes being conceptualised (Välikangas and Lewin, 2022). This paper aims to bring forward a combined approach from a literature review to discuss different measurements of OR and introduce a synthesis of the different methodologies to enhance the understanding of what makes a company fit for crisis or not.

OR originates from research on the resilience of individuals in psychology (Richtner and Löfsten, 2014) and has been transferred to business and management. At first, OR was about returning from a crisis or rebounding to the starting point (Sutcliffe and Vogus, 2003). However, it has been redefined and conceptualised further in recent years to include more than just rebounding from a crisis as the operational part of resilience (Annarelli and Nonino, 2016; Hillmann and Guenther, 2021). Duchek (2019) defines OR as “[...] an organization’s ability to anticipate potential threats, to cope effectively with adverse events, and to adapt to changing conditions” (p. 200) and introduces a forward-looking part to OR. This can also be found in other publications as the strategic part of resilience (Morais-Storz *et al.*, 2018; Välikangas and Merlyn, 2005) and can determine what resources and capabilities are needed before a crisis has struck to strengthen the company against uncertainty utilising exploration (Lengnick-Hall *et al.*, 2011; Ortiz-de-Mandojana and Bansal, 2015; Välikangas, 2016). The flip side of strategic resilience, namely operational resilience, is the resources and capabilities needed after a crisis strikes (Hepfer and Lawrence, 2022; Ruiz-Martin *et al.*, 2018). As resilience is complex to measure as a hypothetical construct (Collis and Hussey, 2021), several approaches are investigated to find a solution to measure this abstract idea systematically.

Research on measuring OR has risen in popularity within the last few years, where uncertainty has increasingly become the new normal of the business environment (Hillmann and Guenther, 2021; Linnenluecke, 2017). However, there has yet to be a common understanding of measuring OR, and many articles confuse the forward and backward-looking parts of OR. As a result, this review tries to summarise the ongoing debate in the OR field about how OR can be measured. In the end, separating measures for strategic and operational resilience can lead to greater rigour in research to stop confusing forward and backward-looking OR measures. A standard measurement of OR can then be used to solidify the research in this area, sorting influential factors of OR into strategic and operational resilience. This review aims to identify these discrepancies in the OR literature, compare the existing measurement scales, state the most influential ones, and split them into operational or strategic

resilience. To satisfy these objectives, a structured literature review is needed to identify the existing measurement scales for OR. Ultimately, OR might be a source of sustained competitive advantage (Bhamra *et al.*, 2011; Ismail *et al.*, 2011) to distinguish between companies fit for uncertainty and companies destined to struggle during challenging times. Figuring out the influence of OR on companies from this measurement scale is a future research direction following this conceptualisation. Furthermore, this discussion strengthens and synthesises the OR approach and adds the distinction between operational and strategic resilience in theory for a more precise measurement of the concept of OR.

After this introduction, the second section continues with the theoretical background of OR and how it can be split into operational and strategic resilience. The literature review methodology is introduced in the third section of this paper. Next, the findings of the literature review for measuring OR are discussed, and a harmonised measurement scale using operational and strategic resilience is introduced in the fifth section. Finally, the paper ends with conclusions.

THEORETICAL BACKGROUND

OR stems from resilience, rooted in psychology (Kantur and İşeri-Say, 2015) and ecology (DesJardine *et al.*, 2017). Resilience encompasses the idea of ensuring a rebounding from some event in a positive way (Iborra *et al.*, 2020) and mainly includes a backward-looking notion. Annarelli and Nonino (2016) define the concept in general as “The ability to resist and respond to a shock (internal or external) and recover once it has occurred [...]” (p. 2). Handling internal and external shocks is a crucial capability in business, so the concept of resilience was transferred to organisations and consequently named OR. However, OR is relatively new, and a standard definition has not yet been found (He *et al.*, 2022; Richtnér and Löfsten, 2014).

OR is discussed in different crises and from different perspectives. Differences stem from measuring it on an organisational (Duchek, 2019; Hepfer and Lawrence, 2022), individual (Lengnick-Hall *et al.*, 2011; Sutcliffe and Vogus, 2003), or team level (Raetze *et al.*, 2021; Vogus and Sutcliffe, 2007). Furthermore, researchers define OR as an outcome (Ilseven and Puranam, 2021), capability (Williams *et al.*, 2017) or process (Duchek, 2019; Elshaer and Saad, 2022). The definition and measurements of these different understandings of OR vary so that no common understanding can be extracted from the literature. Nevertheless, in most publications, the least common denominator is seeing OR as the ability of organisations to survive and thrive in challenging times (Linnenluecke, 2017).

Besides surviving in uncertain times, Linnenluecke (2017) includes how companies can prepare for uncertainty. Morais-Storz and Nguyen (2017) and Välikangas and Romme (2013) elaborate on this, including resilience not only as a reactionary part but also as a strategic view of preparation and transformation. Duchek (2019) summarises this in their definition by including a defensive response (resistance and/or recovery) and an offensive response (adaptation) for OR. This is like the idea of a reactive (persist, regenerate, and recover) or proactive (anticipating and adaptive) understanding of resilience (Colberg, 2022; Denyer, 2017), which includes an operative part, in this case as bouncing back from a crisis, and strategic part, as preparing for uncertainty, of OR (Välikangas, 2016). This

differentiation can be seen in Figure 1, with operational and strategic resilience as defining parts of OR and the input from exploration and exploitation of organisational ambidexterity.



Figure 1 **Organisational resilience framework**

Source: developed by the author

Besides OR, organisational ambidexterity also deals with uncertainty (O'Reilly and Tushman, 2013), including survival and innovation when appropriate resources are available. Aligning this with OR, ambidexterity creates performance through growth by exploration and exploitation and enhancing the company's profitability (Junni *et al.*, 2013). Exploration correlates with the ability of a company to foresee challenges and be proactive about uncertainty, like strategic resilience (Välakangas, 2016). High exploration leads to high strategic resilience in a company. On the other hand, exploitation of existing resources and capabilities is needed after a crisis strikes to react and recover from adversity. Operational resilience, as the reactive part of resilience, constitutes high exploitation in a company (Allen, 2011). They combine both high exploration and exploitation results in OR. A company's lack of both leads to fragility (McCann *et al.*, 2009).

In the end, resilience can lead to competitive advantages (Hillmann, 2020; Lee *et al.*, 2013) for a company in its market. However, the question of measuring this competitive advantage arising from OR remains. Measurement scales often focus on the operational part of resilience, even if this is not usually referred to as such since many publications do not differentiate between the two ideas but only identify OR as a reactive ability (Giezen *et al.*, 2015; Iborra *et al.*, 2020). Operational and strategic measurement scales are sometimes included (Annarelli and Nonino, 2016; Williams *et al.*, 2017) but have yet to be separated. Publications solely focusing on strategic resilience are rare, like the overall usage of proactive resilience (Colberg, 2022). Nevertheless, a differentiation appears reasonable due to the different skill sets needed for both. To sum up, no standard measurement has been found, but conceptualisations are available, and some have even been applied for many years, which will be discussed in the following chapters.

METHODOLOGY

To evaluate how to measure OR, this article conducts a systematic literature review to search for approaches other researchers developed to measure this phenomenon. This review utilises the Scopus scientific database to find the most influential publications for measuring OR. Scopus was selected as a database because it interconnects many other databases like Emerald, Wiley, or ScienceDirect. To create a thorough literature review, a Boolean search was performed with the search terms ‘organisational resilience’ for the general concept and ‘measure’, ‘indicator’, ‘survey’ and ‘scale’ for capturing publications which measure OR. As a restriction for the review, only English-speaking publications from the last 20 years were included with a cut-off date of 15.05.2023 within the business and economics field.

The literature selection process for this literature review was structured in three stages: identification, eligibility, and selection. This process is visualised in Figure 2.

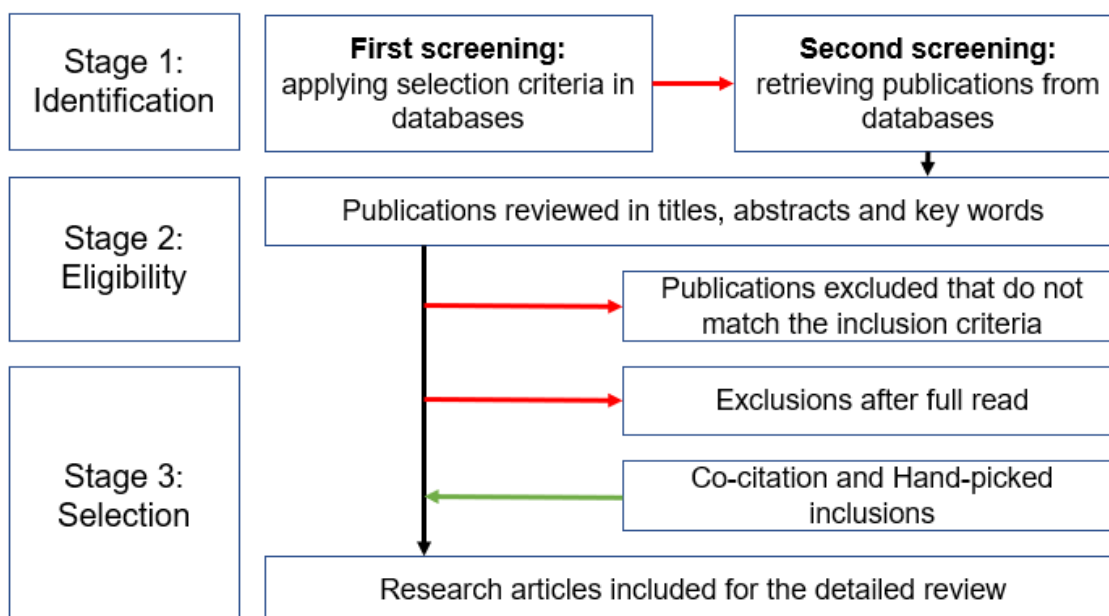


Figure 2 Literature selection process

Source: developed by the author

In Stage 1, the first and second screenings of the database to extract publications for analysis were performed. In the first screening, the selection criteria described were applied with a result of 126 publications. In the second screening, eight articles were excluded due to inaccessibility, for example, Romig (2021). Stage 2 encompassed an eligibility test, where the abstracts, titles, and keywords of the remaining 118 publications were reviewed. After this screening, 61 further publications were excluded. Excluded articles predominantly used OR in general terms or did not centre on this concept. Furthermore, several articles included the idea of OR but did not include a measurement of the construct. Examples of these exclusions are Branicki *et al.* (2016) and Munoz *et al.* (2022), discussing OR but focusing on inductively theorising the concept rather than introducing a measurement scale. After the screening process in Stage 2, 57 articles remained for closer analysis in Stage 3.

After selecting publications for the review, a closer analysis of the remaining articles with a full read was performed. In this first part of Stage 3, further articles were excluded, like Manab *et al.* (2017), where measures are given but have not been discussed or displayed sufficiently for further analysis. In total, seven publications were excluded in this step. After reading the remaining publications, three publications that were not found with the literature selection criteria, but were referenced various times, were added to this analysis. These three publications can strengthen this analysis and might have been missed because the title, abstract, or keywords of these three articles does not include the search phrases of this research. Furthermore, these additions might not be indexed in these databases or might be in different categories. These additions expose a limitation for this research due to the lack of conformity of naming conventions for measurement scales. With four search terms, some articles with measurement scales using different expressions might be missed for this review. All four additions, Duchek (2019), Kantur and İşeri-Say (2012), Lee *et al.* (2013) and Akgün and Keskin (2014), were cited as the basis for other publications. Duchek (2019) is the most cited article in the analysis and, therefore, greatly influences the development of the measurement scale. Likewise, Lee *et al.* (2013) is a basis for many measurement scales in other publications, so inclusion is worthwhile. At the end of Stage 3, 53 publications remained to analyse how OR is measured in influential publications.

All 53 publications were then analysed regarding their structure and how they introduce and use measures for OR. First of all, the design of the papers regarding their research was analysed. For this, the level of analysis for each publication and the methodology in use was extracted. Differences in the level of analysis (Raetze *et al.*, 2021) were characterised at the individual, team and organisational level. Next, the research methodology was extracted to provide an extensive overview of the construction of the measurements. Furthermore, the trigger for researching the need for resilience and the type of adversity in the respective research were analysed. Next, each article was interpreted regarding the scale of how it measures OR, first differentiating the kind of construct and then looking into the items to measure OR and how many items or questions are used for the measurement. Furthermore, some constructs included antecedents for OR, which were classified into the input to OR. Based on the concepts and differentiation introduced in the theoretical background, the publications were clustered into operational, strategic or organisational resilience for a more straightforward analysis and understanding of the measures. This was done by analysing the measurement items and how the publication defined OR. Some definitions overlap or are not precise, so the most common consensus was used for this classification. Based on this analysis, a table was created, and the findings and results were summarised to determine how OR is measured in research and how these measures can be combined to bring the discussion forward.

FINDINGS

Filling the gap of a standard measuring scale for OR, the 53 analysed publications included in this research range from 2009 to 2023, with a cut-off date of May 15th, 2023. Interestingly, the number of publications in 2023 (9) is already around half of that of the previous year (16), which is also the year with the most publications. Figure 3 shows that research into measuring OR centres around three significant crises in this timeframe, with a general uptrend in recent years.

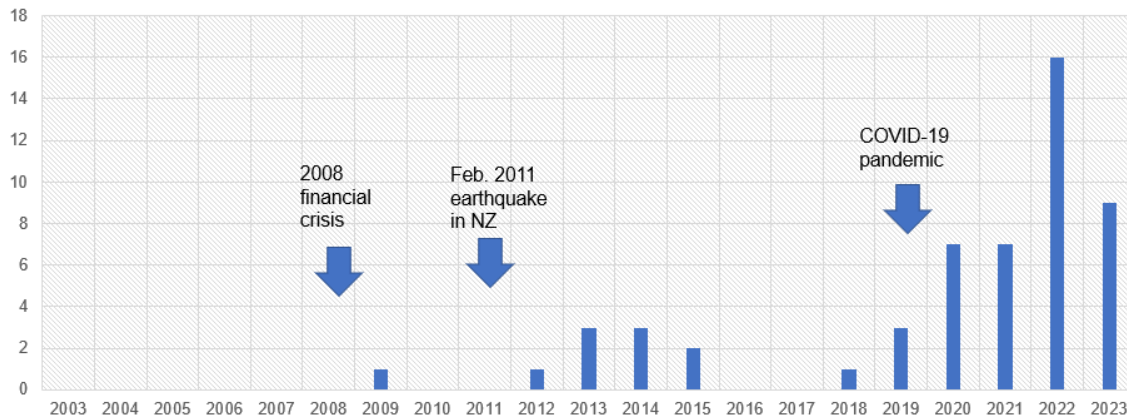


Figure 3 Publications per year

Source: developed by the author with data from Scopus

The first major crisis in the last 20 years can be defined as the 2008 financial crisis. Only one publication by Somers (2009) lies in this timeframe. However, Somers's (2009) publication dealt with uncertainty in general and did not focus on one adversity in particular. He created a tool – the Organizational Resilience Potential Scale – for measuring latent resilience in organisations and grounded his work on Mallak (1998), often referred to as an early article on OR. Research into the existence of resilience in the financial crisis appeared later in the works of Pal *et al.* (2014) and Akgün and Keskin (2014). This lack of publications after the financial crisis for measuring OR might be due to the lack of publications in the organisational resilient field due to its infancy (Conz and Magnani, 2020; Linnenluecke, 2017).

Publications from 2012 to 2015 can be sorted into a second group following the New Zealand (NZ) earthquake in Christchurch in 2011. One group of researchers is especially prominent in this period. The Resilient Organisations Research Programme in NZ focuses on natural disasters and how to assess and strengthen organisations' resilience (Chowdhury *et al.*, 2019). This group includes John Vargo and Erica Seville from the Lee *et al.* (2013) publication about the Benchmark Resilience Tool (BRT), which influenced many measurement scales and articles in the following years. In the same year, Whitman *et al.* (2013) created a short version of the BRT with the same statistical outcome by reducing the number of questions needed from 53 to 13. Furthermore, in this group, an influential publication came from Richtnér and Löfsten (2014), introducing structural, cognitive, relational and emotional resources as antecedents for individual resilience in organisations. Kantur and İşeri-Say (2015), as well as Wicker *et al.* (2013), research robustness, redundancy, resourcefulness and rapidity as indicators for OR, while Akgün and Keskin (2014) look at usage of cognitive, behavioural and contextual dimensions as an OR capacity. Both Akgün and Keskin (2014) and Richtnér and Löfsten (2014) rely on groundbreaking research by Lengnick-Hall *et al.* (2011) on introducing a capacity for OR in human resource management. Nevertheless, Lengnick-Hall *et al.* (2011), as a paper, is not included in the dataset for this research due to its lack of a measurement scale.

After the second group of publications, two years without publications occur. From 2018 onwards, a steady increase of interest in the area can be observed. Sincorá *et al.* (2018) examined the connection between organisational analytic capacities, business process management maturity and OR. This was followed by two publications (Al-Ayed, 2019; Chowdhury *et al.*, 2019) and later Beuren *et al.* (2022),

all basing their measurement on the concept introduced by Lengnick-Hall *et al.* (2011) with a focus on individual resilience. Nevertheless, Chowdhury *et al.* (2019) use the Lee *et al.* (2013) measurement scale for adaptive resilience by again focusing on the Christchurch earthquake. In summary, from 2003 to 2019, 14 publications about measuring OR were published. From 2020 onwards, the COVID-19 pandemic influenced this research field heavily, expanding the amount of research done by 39 publications.

This last and most significant group of publications came out from 2020 to 2023. The influx of new researchers and articles led to various approaches to measuring OR. This means that a greater variety of measurements was introduced and tested; however, less confirmability and usage of previously developed scales are also noticeable. This variety ranges from publications measuring OR more from the perspective of financial performance indicators (Ilseven and Puranam, 2021; Ma and Liu, 2022; Neise *et al.*, 2021) to those employing the Connor–Davidson Resilience Scale from 2003 (Elshaer and Saad, 2022; Marcazzan *et al.*, 2022) and those measuring anticipation, adaptability, and recovery (Sincorá *et al.*, 2023); adaptability and agility (Akpan *et al.*, 2022); and agility, ability flexibility and adaptability (Sinniah *et al.*, 2022). Furthermore, some publications introduce one-dimensional questionnaires with situation-specific questions (Baral *et al.*, 2022; Biedenbach *et al.*, 2022; Bürgel *et al.*, 2023; Forliano *et al.*, 2023; Nyaupane *et al.*, 2020; Santoro *et al.*, 2021) or several multi-dimensional constructs (Matysek-Jędrych *et al.*, 2022; Rahman *et al.*, 2022; Sweya *et al.*, 2020).

Besides new conceptualisations of measuring resilience after the COVID-19 pandemic, researchers still use the approaches from the second group from 2013–2015. Based on Kantur and İşeri-Say's (2015) expanded measurement for OR, Tagliazucchi *et al.* (2023) and Su *et al.* (2023) apply the robustness, agility and integrity scale of 9 items. Furthermore, the conceptualisation and measurement scale of the BRT was used on different topics like tourism firms in NZ after an earthquake (Prayag *et al.*, 2019), service firms and how strategic learning processes and digital platforms influence resilience (Liu *et al.*, 2023), event professionals' risk and crisis management with resilience (Liu-Lastres and Cahyanto, 2023), hotel performance during COVID-19 (Hamsal *et al.*, 2022), organisational learning and unlearning (Orth and Schuldis, 2021) and collective mindfulness (Limphaibool *et al.*, 2022). Besides the conceptualisation from Lee *et al.* (2013), researchers (He *et al.*, 2022; Robertson *et al.*, 2022) also apply the methodology of the concept the BRT is based on from McManus *et al.* (2008), focusing on situation awareness, adaptive capacity, and management of keystone vulnerabilities. In summary, the research was fractured by the occurrence of the COVID-19 pandemic, but still, some research focuses on the methodologies introduced before 2019.

Besides the year of publication, other factors also differentiate the papers analysed. Table 1 in the appendix presents the analysis findings and the articles reviewed, displaying their level of analysis: individual (9 papers), team, organisational (33 papers) or a mixture of the three (11 papers), as introduced by Raetze *et al.* (2021). Next, the methodology used to obtain the data for measuring OR is shown: a questionnaire (45 papers), structured interviews (3 papers) or other methods (5 papers). Furthermore, the type of adversity in the publication and whether the publication connects its research to specific adversity is given. Many publications state that there is no direct source of uncertainty and investigate OR in a generally uncertain environment (22 papers) or use specific disruption sources like earthquakes, natural disasters, or financial crises (12 papers). The most described adversity is COVID-19, with 19 papers. These 19 papers constructed their scale from the operational (6 papers),

strategic (8 papers) and organisational (5 papers) resilience perspective. However, most of these 19 used the organisational level of analysis and applied the questionnaire method. Regarding the measurement of OR, the following is reviewed: which concepts are used, how many and which items are used to measure OR and which type of construct is used. The type of construct is sectioned into: one- (13 papers), two- (10 papers) or multi-dimensional (30 papers). The items for measurement and how they can be clustered and sorted into operational, strategic or organisational resilience is discussed in the next chapter. The kind of construct also influences whether there is input to OR from other concepts like organisational control systems (Serfontein and Govender, 2021), sales capacity, market orientation, social capital and the individual approach of the entrepreneur (Martinelli and Tagliazucchi, 2019), or assets, resourcefulness, dynamic competitiveness and learning culture (Pal *et al.*, 2014). Lastly, the sources the questions are based on are displayed, and a classification of the questions regarding their focus on operational, strategic or a combined approach as OR is given, which is also discussed in the next chapter.

In summary, this literature review led to several outcomes, which are discussed in depth in the following section. Concentrating on the publications analysed, a trend towards increasing publications that try to measure OR can be seen. After the first surge in interest in 2013, the COVID-19 pandemic increased interest in this field. It can be noted that various researchers use different constructs, inputs, levels, analyses, and dimensions of the construct of OR. Some base their measurement on tested scales, while others introduce new ones. This is why a harmonised understanding of measuring resilience is rare. Therefore, the next chapter sorts the scales into operational, strategic, and OR, discusses their measurement items to strengthen and synthesise the OR approach, and discusses the distinction between operational and strategic resilience for a more precise measurement of the concept of OR.

DISCUSSION

The findings of this review show that there is no common understanding of measuring resources and capabilities needed for OR. Nevertheless, distinct waves of interest are recognisably clustered by years, and some conceptualisations are more influential than others. In terms of the most used conceptualisation, the work of the Resilient Organisations team, including several publications (Lee *et al.*, 2013; McManus *et al.*, 2008; Whitman *et al.*, 2013), is the basis for many publications and has also been adapted to the COVID-19 pandemic (Liu *et al.*, 2023). Moreover, the conceptualisation by Kantur and İşeri-Say (2015) has been used several times, as has the model by Lengnick-Hall *et al.* (2011), with a stronger focus on individual resilience. In summary, there are influential conceptualisations but many discrepancies between them. This becomes clear by taking a closer look at the different usages of the conceptualisation by Lee *et al.* (2013). Liu-Lastres and Cahyanto (2023) trimmed down the number of items from the original conceptualisations for their research. In contrast, Chowdhury *et al.* (2019) only used the adaptive resilience part and left out planning resilience. Lastly, Liu *et al.* (2023) transform the questions into COVID-19-related questions and spin the general meaning of the concept by Lee *et al.* (2013) into a more reaction-based one.

To unravel these discrepancies in measuring OR, the results from the systematic literature review are included in Table 1, which separates the conceptualisations into operational, strategic, and organisational resilience. Each publication was sorted into one of these categories based on how the

questions and theoretical background of each paper were constructed to introduce a comparison of the existing measurement scales. Operational resilience is defined as bouncing back from adversities (DesJardine *et al.*, 2017), so all publications that use questions or measurements mainly addressing situations to deal with imminent crises or how to return from this adversity are clustered into this category. In total, 16 papers focus more on operational resilience. The identified measures of these papers can be clustered into four papers using single questions without a construct, seven papers with varied conceptualisations, and five centred around the Bruneau *et al.* (2003) scale, utilising robustness, redundancy, resourcefulness and rapidity to measure the resources and capabilities needed for resilience. The Bruneau *et al.* (2003) scale was used in Kim *et al.* (2021) and Wicker *et al.* (2013). Similarly to this, the Kantur and İşeri-Say (2015) scale of robustness, agility and integrity is applied (Martinelli and Tagliazucchi, 2019; Su *et al.*, 2023; Tagliazucchi *et al.*, 2023) for dealing with coming back after a crisis on the organisational and individual level.

Compared to operational resilience, 22 publications were sorted into the strategic resilience category. All publications using a measurement scale or focusing their questions mostly on reviewing the resources and capabilities in the company to prepare for crisis and create adaptability and flexibility in the company to deal with uncertainty are sorted into strategic resilience. Many publications focus their theoretical part on a more operational view but do not phrase their questions with direct crisis-related wording. So they deal with a more strategic resilience view in the measurement but focus on the theoretical part of a crisis-related view (Robertson *et al.*, 2022; Sinniah *et al.*, 2022). Influential scales for strategic resilience are found in Lengnick-Hall *et al.* (2011), McManus *et al.* (2008), Lee *et al.* (2013) and Connor and Davidson (2003). Connor and Davidson (2003) and Lengnick-Hall *et al.* (2011) methodologies are applied on an individual level in four papers, encompassing the preparedness in strategic resilience of employees and entrepreneurs for uncertainty. Lengnick-Hall *et al.* (2011) summarise the capabilities and resources for strategic resilience in a cognitive, behavioural, and contextual dimension. In comparison, the conceptualisation by Lee *et al.* (2013) focuses on the organisational view, using planned and adaptive resilience to measure OR. This conceptualisation also concentrates mainly on a strategic perspective by applying the measure of adaptive capacity in nine papers, mainly on an organisational level. Similarly to this, the basis for the Lee *et al.* (2013) conceptualisation from McManus *et al.* (2008) focuses on mindfulness/situational awareness, management of keystone vulnerabilities and adaptive capacity, which was later reduced to the 53 questions from Lee *et al.* (2013) in the Benchmark Resilience Tool (BRT).

OR in Table 1 includes publications with questions utilising operational and strategic resilience. In total, 15 publications fulfil these criteria. Within these, publications applying the BRT in an adapted form (Chowdhury *et al.*, 2019; Hamsal *et al.*, 2022; Limphaibool *et al.*, 2022) and using a methodology from Pettit *et al.* (2013) measuring anticipation, adaptability and recovery (Sincorá *et al.*, 2018; Sincorá *et al.*, 2023) can be found. Furthermore, Duchek (2019) introduces a holistic view of OR encompassing exploration and exploitation without applying a measurement scale. Summarising all three of these views, Figure 4 presents a combined methodology as theoretical implications from this review for measuring OR and splitting the concept into measurements for operational, strategic and organisational resilience. With this combined approach, a more detailed analysis of the prevailing resources and capabilities in a company can be performed to identify the strengths and weaknesses of a company to achieve a sustained competitive advantage.

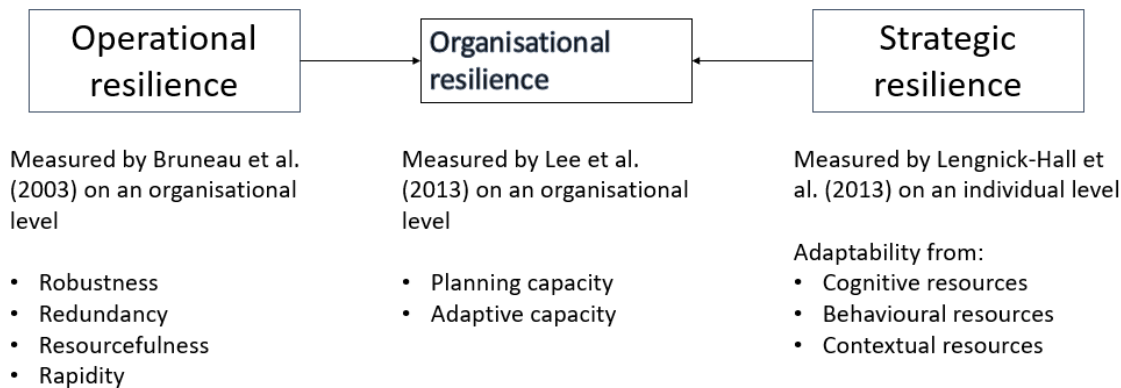


Figure 4 **Methodology for measuring organisational resilience**

Source: developed by the author based on literature studies

The synthesis from this review in Figure 4 consists mainly of three concepts. First, explaining operational resilience from the conceptualisation from Bruneau *et al.* (2003). This methodology splits operational resilience into four parts: robustness (“strength, or the ability of elements, systems, and other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function” (p. 737)), redundancy (“the extent to which elements, systems, or other units of analysis exist that are substitutable, i.e., capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality” (p. 737)), resourcefulness (“the capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, or other unit of analysis; resourcefulness can be further conceptualized as consisting of the ability to apply material (i.e., monetary, physical, technological, and informational) and human resources to meet established priorities and achieve goals“ (p. 737f.)) and rapidity (“the capacity to meet priorities and achieve goals in a timely manner in order to contain losses and avoid future disruption” (p. 738)). All these four resources are needed to rebound from adversities to measure the operational part of resilience.

Next, the strategic resilience part is measured using the perspective of Lengnick-Hall *et al.* (2011), which focuses on a human resource point of view and, therefore, a more individual-centric approach. The conceptualisation was recently applied and elaborated by Al-Ayed (2019) and Beuren *et al.* (2022). Three elements are introduced by their study: cognitive (a positive, constructive conceptual orientation and constructive sense-making), behavioural (learned resourcefulness, counterintuitive actions, beneficial habits and behavioural preparedness) and contextual (psychological safety, deep social capital, diffused power and accountability and access to broad resource networks) parts of OR for preparing for uncertainty, hence enforcing the strategic part of resilience.

Lastly, the BRT from Lee *et al.* (2013) combines a reactive and proactive approach. This is the most used tool to measure resilience in the reviewed publications and provides a tested method from the Resilient Organisations Team. This measurement includes two parts. The first is adaptive capacity with eight indicators (minimisation of silos, internal resources, staff engagement and involvement, information and knowledge, leadership, innovation and creativity, decision making and situation monitoring and reporting), describing the ability to adapt to changing conditions and balance between stability and change. The second is planning capacity, which consists of five indicators (planning

strategies, participation in exercises, proactive posture, external resources, and recovery priorities). It encompasses the central theme of resilience in planning vs adaptation and contains the preparational part of resilience. The model by Lee *et al.* (2013) included 53 items for measuring resilience, which was later cut down to 13 by Whitman *et al.* (2013). In conclusion, using these three distinct approaches, operational, strategic, and organisational resilience measures can be identified to form theoretical implications from this research and close the gap between the mixed conceptualisations of forward and backward-looking measures of OR. Furthermore, practical implications derive from identifying resources and capabilities needed for OR in a company to achieve a competitive advantage through utilising its strategic measures for individual exploration and operational measures for company-wide exploitation in case of a crisis.

CONCLUSIONS AND RECOMMENDATIONS

Research dealing with uncertainty by embracing OR has steadily increased in recent years. Due to the COVID-19 crisis, many companies have found it challenging to survive. Nevertheless, a concept to measure OR is still missing in research, so many scales are used and introduced with each publication. This review tackled this gap and created a novel synthesis for measuring OR, splitting it into operational, strategic, and organisational resilience to assess the impact of the subparts of OR on OR in general and companies' competitive advantage. This approach enhances the clarity of OR and splits it into strategic and operational dimensions by defining measures of resources and capabilities involved in OR to streamline the research in this field.

In summary, this paper focuses on (1) how resilience can be measured, concentrating on forward and backward-looking measures of OR. This review (2) of 53 publications across the last 20 years presents a comprehensive overview of how the construct of OR is measured in influential publications. However, across these 53 publications, (3) there is no straightforward concept which is unanimously accepted. The conceptualisation by Lee *et al.* (2013), the Benchmark Resilience Tool, comes closest. Splitting (4) the overall concept into subparts might be helpful to steer the discussion toward a standard definition and measurement scale. Nevertheless, to introduce a standard methodology, this paper (5) proposes measuring OR and its subparts strategic and operational resilience by combining the most influential approaches from Bruneau *et al.* (2003), Lee *et al.* (2013) and Lengnick-Hall *et al.* (2011) into one framework.

As for future research directions, the conceptualisation presented in this paper could facilitate more directed research into the influence of OR and its subparts on sustained competitive advantage or other key performance indicators. Further research on measurements of OR and their application could be worthwhile by focusing on whether strategic or operational resilience leads to higher overall OR and whether both must be present to achieve a resilient state or if one of these two dominates. This could be strengthened further by applying this measurement in several industries and determining if there are differences in the importance of strategic or operational resilience.

In conclusion, this article achieved the following aims: an overview of the topic of OR and how it can be measured, a comprehensive review of the different approaches of influential measurement scales, and a discussion on how the rigour in this field can be increased by splitting OR into operational and strategic resilience.

Declarations. The manuscript has not been previously published, submitted or uploaded to any archive or pre-print server. I have not plagiarised or self-plagiarised any previous sources. Any tables or figures displayed in the manuscript are of my own creation, and I hold the copyright for these materials. The author has no relevant financial or non-financial interests to disclose.

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APPENDIX

Author and year	Level of analysis	Methodology	Type of adversity	Type of construct	Measurement (#items)	Input to OR	Based on	Operational resilience	Strategic resilience	Organisational resilience
Akgün and Keskin 2014	Organisational	Questionnaire	2008 financial crisis and 2001 Turkey crisis	Multi-dimensional	Conceptual orientation (4 items) Constructive sense-making (6 items) Learned resourcefulness (2 items) Original/unscripted agility (4 items) Practical habits (5 items) Behavioural preparedness (4 items) Psychological safety (4 items) Deep social capital (6 items) Diffused power and accountability (4 items) Broad resource networks (4 items)	-	Lengnick-Hall and Beck (2005); Lengnick-Hall <i>et al.</i> (2011)		X	
Akpan, Johnny and Sylva 2022	Organisational	Questionnaire	Continuous—no sudden adversity	Two-dimensional	Adaptability (4 items) Agility (8 items)	Sensing capacity, reconfiguration capability	Sylva and Ojiabo (2018)	X		
Al-Ayed 2019	Individual	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Cognitive dimension (3 items) Behavioural dimension (3 items) Contextual dimension (3 items)	Strategic human resource management	Lengnick-Hall <i>et al.</i> (2011)		X	
Baral <i>et al.</i> 2022	Organisational	Questionnaire	COVID-19	One-dimensional	4 questions	Flexibility, digitalization, risk management culture, collaboration	Zhang and Qi (2021)	X		
Barbhuiya and Chatterjee 2023	Individual	Questionnaire	COVID-19	One-dimensional	Organisational resilience (7 items)	-	Various (e.g., Filimonau <i>et al.</i> , 2020)			X
Beuren, dos Santos and Theiss 2022	Individual	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Cognitive skills and behavioural traits (15 items) Contextual conditions (6 items) Contextual condition related to workplace Perception of risk-taking (4 items)	-	Lengnick-Hall <i>et al.</i> (2011)		X	
Biedenbach <i>et al.</i> 2022	Individual	Questionnaire	Continuous—no sudden adversity	One-dimensional	4 questions	-	Mu and Butler (2009)	X		
Bürgel, Hiebl and Pielsticker 2023	Organisational	Questionnaire	COVID-19	One-dimensional	Crisis resilience (4 items)	Digitalization	Becker <i>et al.</i> (2016)	X		

Chowdhury <i>et al.</i> 2019	Organisational and individual	Questionnaire	Earthquake	One-dimensional	Adaptive resilience (5 items)	Social capital (individual resilience) -relational capital -cognitive capital -structural capital	Lee <i>et al.</i> (2013); Orchiston <i>et al.</i> (2016); Lengnick-Hall <i>et al.</i> (2011)			X
Dhoopar <i>et al.</i> 2022	Organisational and individual	Questionnaire	COVID-19	Multi-dimensional	Organizational capability and adaptability (3 items) Resilient organizational culture (3 items) Organizational crises policy (3 items) Employee empowerment initiatives (3 items)	-	Various (e.g., Mallak (1998); Pal <i>et al.</i> (2014); Kantur and İşeri-Say (2012))			X
Duchek 2019	Organisational	Conceptual study	Continuous—no sudden adversity	Multi-dimensional	Resource availability Social resources Power and responsibility	Knowledge base	Various			X
Elshaer and Saad 2022	Individual	Questionnaire	COVID-19	One-dimensional	Hardiness (9 items) Resourcefulness (7 items) Optimism (9 items)	-	Connor and Davidson (2003)	X		
Fietz, Hillmann and Guenther 2021	Organisation, individual and team	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Organizational resilience (17 items) Team resilience (17 items) Individual resilience (17 items)	-	McCann <i>et al.</i> (2009);	X		
Filimonau and De Coteau 2020	Organisational	Semi-structured interviews	Natural disasters	-	Understanding resilience (5 items) Understanding DiR and OR (6 items) Role in building DiR and OR (5 items) Contributing factors in building DiR and OR (8 items)	-	Various (e.g., Lee <i>et al.</i> (2013); McManus <i>et al.</i> (2008); Sawalha (2015); Seville <i>et al.</i> (2006); Specht (2008))			X
Forliano <i>et al.</i> 2023	Organisational	Questionnaire	COVID-19	One-dimensional	4 questions	Technological orientation, digital maturity of strategy	Ambulkar <i>et al.</i> (2015)	X		
Hamsal <i>et al.</i> 2022	Organisational	Questionnaire	COVID-19	Multi-dimensional	Planned resilience (5 items) Adaptive resilience (5 items)	Environmental turbulence, dynamic capabilities	Lee <i>et al.</i> (2013); Prayag <i>et al.</i> (2019); Orchiston <i>et al.</i> (2016)			X
He <i>et al.</i> 2022	Organisational and individual	Questionnaire	Continuous—no sudden adversity	Two-dimensional	Individual contribution situation awareness (6 items) Adaptive capacity (4 items) Systematic contribution management of keystone vulnerabilities (4 items)	Transformation management intensity, digital intensity	McManus <i>et al.</i> (2008); Lee <i>et al.</i> (2013)	X		

Ilseven and Puranam 2021	Holistic	Time series analysis	Continuous —no sudden adversity	-	The magnitude and the rate of the drop in performance The magnitude and the rate of recovery in performance after the adverse event	-	Ayyub (2014)	X		
Kantur and İseri-Say 2012	Organisational	Conceptual study	Continuous —no sudden adversity	One-dimensional	Robustness Redundancy Resourcefulness Rapidity	Perceptual stance, contextual integrity, strategic capacity, strategic acting	Tierney (2003)	X		
Kim, Andrew and Jung 2021	Organisational	Questionnaire	Continuous —no sudden adversity	One-dimensional	Robustness (1 item) Rapidity (1 item) Resourcefulness (1 item) Redundancy (1 item)	Closeness centrality, betweenness centrality	Bruneau <i>et al.</i> (2003)	X		
Lee, Vargo and Seville 2013	Organisational	Questionnaire	Earthquake	Multi-dimensional	Adaptive capacity (8) Planning (5)	-	Mallak (1998); Somers (2009); McManus (2008)		X	
Limphaibool <i>et al.</i> 2022	Individual	Questionnaire	High reliability organizations	Two-dimensional	Planning (3 items) Adaptive capacity (3 items)	Collective mindfulness	Whitman <i>et al.</i> (2013) (BRT)			X
Liu, Long and Liu 2023	Organisational	Questionnaire	COVID-19	Two-dimensional	Planning (5 items) Adaptive capacity (7 items)	Digital platform capacity, legal inefficiency, legal incompleteness, strategic learning	Lee <i>et al.</i> (2013)	X		
Liu-Lastres and Cahyanto 2023	Organisational	Semi-structured interviews	COVID-19	Two-dimensional	Planned resilience (2 items) Adaptive capacity (4 items)	-	Lee <i>et al.</i> (2013)		X	
Ma and Liu 2022	Organisational	Qualitative comparative analysis	COVID-19	One-dimensional	Long-term growth (revenue)	CSR, firm size, nature of property rights	Ortiz-de-Mandojana and Bansal (2015)		X	
Marcazzan, Campagnolo and Gianecchini 2022	Individual	Interviews	Continuous —no sudden adversity	One-dimensional	Connor–Davidson Resilience Scale (10 items)	-	Campbell-Sills and Stein (2007); Connor and Davidson (2003)		X	
Martinelli and	Individual	Questionnaire	Earthquake	One-dimensional	7 questions	Sales capacity, market orientation, social capital, the individual	Kantur and İseri-Say (2015)	X		

Tagliacruzchi 2019						approach of the entrepreneur				
Matysek-Jędrych, Mroczek-Dąbrowska and Kania 2022	Organisational and individual	Questionnaire + interviews	COVID-19	Multi-dimensional	Access to financial resources (16 items) Access to human capital (14 items) Digitisation level (12 items) SC collaboration (10 items) Company's size (8 items) SC responsiveness (6 items) SC redundancy (4 items) Clients' portfolio redundancy (2 items)	-	Various (e.g., Özdemir <i>et al.</i> (2022); Almeida <i>et al.</i> (2020))			X
Melián-Alzola, Fernández-Monroy and Hidalgo-Peñate 2020	Organisational	Questionnaire	COVID-19	Two-dimensional	Hotel resilience (3 items)	Strategy, change	Various (e.g., Bhamra <i>et al.</i> (2011); Lee <i>et al.</i> (2013); Ruiz-Martin <i>et al.</i> (2018); Seville <i>et al.</i> (2008))			X
Neise, Verfürth and Franz 2021	Organisational	Questionnaire	COVID-19	Multi-dimensional	Problems before COVID-19 pandemic (4 items) Response during COVID-19 pandemic (3 items)	-	DEHOGA (2019)	X		
Nyaupane <i>et al.</i> 2020	Individual	Questionnaire	COVID-19	One-dimensional	Confidence in the organization's ability to adapt to change (1 item)	Employees' perceived skillset, organisational traits	Biggs (2011)		X	
Orth and Schuldis 2021	Organisational	Questionnaire	COVID-19	Two-dimensional	Planning (3 items) Adaptive capacity (5 items)	Organisational learning, organisational unlearning	Stephenson (2010); Duchek (2019)		X	
Pal, Torstensson and Mattila 2014	Organisational	Questionnaire + interviews	Swedish crash in textile industry	Multi-dimensional	Assets and resourcefulness + dynamic Competitiveness + learning culture	-	Various (e.g., Sheffi (2007); Vargo and Seville (2011); Coutu (2002))			X
Prayag <i>et al.</i> 2019	Organisational and individual	Questionnaire	Earthquake	Two-dimensional	Planned (5 items) Adaptive resilience (5 items)	Individual resilience, subjective well-being	Lee <i>et al.</i> (2013); Orchiston <i>et al.</i> (2016)		X	
Rahman <i>et al.</i> 2022	Organisational	Questionnaire / best worst method (BWM)	Continuous —no sudden adversity	Multi-dimensional	Leadership Teamwork Awareness Innovation and creativity Monitoring and reporting	-	Various (e.g., Youssef and Luthans (2007); Brown <i>et al.</i> (2017); Lee <i>et al.</i>		X	

					Planning and decision-making Internal resources		(2013); Tadić <i>et al.</i> (2014))			
Richtnér and Löfsten 2014	Individual	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Structural, cognitive, relational, and emotional resources (14 items)	-	Sutcliffe and Vogus (2003); Richtnér and Södergren (2008); Lengnick-Hall <i>et al.</i> (2011)		X	
Robertson <i>et al.</i> 2022	Organisational	Questionnaire + interviews	COVID-19	Multi-dimensional	Mindfulness/situational awareness (5 items) Management of keystone vulnerabilities (10 items) Adaptive capacity (14 items)	Digital maturity	McManus <i>et al.</i> (2008); Lee <i>et al.</i> (2013)		X	
Santoro, Messeni-Petruzzelli and Del Giudice 2021	Individual	Questionnaire	Continuous—no sudden adversity	One-dimensional	Entrepreneur resilience (4 items)	Employee-level resilience -cognitive -behavioural -contextual	Sinclair and Wallston (2004)		X	
Sawalha 2015	Organisational	Questionnaire + interviews	Continuous—no sudden adversity	Multi-dimensional	Future uncertainty (3 items) Hazards and stresses (5 items) Livelihoods (5 items) Governance (4 items)	-	Pasteur (2011)		X	
Serfontein and Govender 2021	Organisational	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Strategic management and company culture (5 items) Monitoring and awareness (6 items) Exposure management (8 items) Responsive adaptation (7 items)	Organisational control systems	Serfontein and Govender (2021)			X
Sihag and Dhoopar 2022	Organisational and individual	Questionnaire	COVID-19	Multi-dimensional	Strategic management and vision sharing Resilient leadership Resilient organizational culture Organizational crisis policy Employee empowerment initiatives	-	Various (e.g., Seville <i>et al.</i> (2006))		X	
Sincorá <i>et al.</i> 2018	Organisational	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Anticipation (4 items) Adaptability (4 items) Recovery (4 items)	Organizational analytical capabilities, business process management maturity	Pettit <i>et al.</i> (2013)			X
Sincorá <i>et al.</i> 2023	Organisational	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Anticipation (4 items) Adaptability (4 items) Recovery (4 items)	Business process management maturity	Pettit <i>et al.</i> (2013)			X
Sinniah <i>et al.</i> 2022	Organisational		COVID-19	Multi-dimensional	Agility (6 items) Ability (6 items)	-	Chu (2015)		X	

					Flexibility (5 items) Adaptability (4 items)					
Somers 2009	Individual and team	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Goal-directed solution seeking Risk avoidance Critical situation understanding Ability to fill multiple roles Reliance on information sources Access to resources	-	Mallak (1998)			X
Su, Baird and Munir 2023	Individual	Questionnaire	COVID-19	Multi-dimensional	Robustness, agility, integrity (9 items)	Culture dimensions, organizational life cycle	Kantur and İşeri-Say (2015)	X		
Sweya <i>et al.</i> 2020	Organisational and individual	Delphi	Floods	Multi-dimensional	Change readiness (5 items) Leadership and culture (5 items) Legal framework and institutional setup (2 items) Networks and relationships (4 items)	-	Various (e.g., McManus (2008); Lee <i>et al.</i> (2013))		X	
Tagliazucchi, De Canio and Martinelli 2023	Organisational and individual	Questionnaire	Natural disasters	Multi-dimensional	Robustness, agility, integrity (9 items)	Entrepreneurs' psychological resilience from Connor and Davidson (2003)	Kantur and İşeri-Say (2015)	X		
Teng-Calleja <i>et al.</i> 2020	Individual	Questionnaire + interviews	Natural disasters	Multi-dimensional	Resistance (8 items) Resilience (4 items) Recovery (3 items)	Resilience building programmes	Nucifora <i>et al.</i> (2007)	X		
Wang, Xue and Yang 2022	Organisational	Questionnaire	Continuous—no sudden adversity	Two-dimensional	Precursor resilience (5 items) Improvisation resilience (5 items)	Proactive boundary-spanning search	Bode and Macdonald (2017); Ji <i>et al.</i> (2020)	X		
Whitman <i>et al.</i> 2013	Organisational	Questionnaire	Continuous—no sudden adversity	Two-dimensional	Planning (5 items) Adaptive capacity (8 items)	-	Lee <i>et al.</i> (2013)		X	
Wicker, Filo and Cuskelly 2013	Organisational	Questionnaire	Natural disasters	Multi-dimensional	Robustness (5 items) Redundancy (5 items) Resourcefulness (6 items) Rapidly (5 items)	-	Bruneau <i>et al.</i> (2003)	X		
Yilmaz-Börekçi, İşeri-Say and Rofcanin 2015	Organisational	Questionnaire	Continuous—no sudden adversity	Multi-dimensional	Structural reliance (redundancy) (7 items) Organizational capability (requisite variety) (4 items) Processual continuity (resources) (4 items)	-	Glassop (2007)			X

Source: developed by the author