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The role of dynamic capabilities for resilience in pursuing business continuity: an empirical study

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The unprecedented systemic disruptions that occurred in the last years are highlighting a structural lack of resilience in most organisations. In this context, there is an increasing scholars' interest in understanding to what extent capabilities to anticipate, respond and thrive in unprecedented situations represent a strategic lever for business continuity management in most sectors of activity. To contribute to this debate, this research adopts a dynamic capabilities perspective to investigate the specific capabilities that organisations build in the pursuit of business continuity.

Based on multi-sectoral primary data collected in 2021 from HR professionals of 419 organisations operating in Italy, the outcomes of our quantitative study show that the business continuity requirements expressed by ISO22301 are perceived as interrelated and indivisible. Furthermore, our results suggest that the ambition to fulfil the business continuity requirements depends on the organisational capabilities to improvise and coordinate the use of its assets (i.e. people, technologies, premises, information) in the face of disruptions.

Besides the managerial implications concerning how to build favourable organisational conditions to reduce the vulnerability to external risks, the research contributes to the literature by building new measurement scales to assess business continuity and disentangling the rationale behind the related dynamic capabilities framework.

Keywords: Dynamic Capabilities; Organisational Resilience; Business Continuity; ISO 22301; CB-SEM

1. Introduction

Geopolitical disorders, lack of resources, social inequalities, massive migration, ecological degradation and climate change are some of the determinants of a new normality made of instability and uncertainty that challenge contemporary management (Malik & Sanders, 2021), which extends business continuity (BC) issues above the technical dimension.

The inability to deal with the 'unexpected' (Nachbagauer & Schirl-Boeck, 2019) has brought severe consequences for the BC of entire value chains (Linnenluecke, 2017; Smith & Elliott, 2006). Thus, to prevent future disruptions from provoking failures and damages of the same magnitude, organisations should improve their ability to cope with and flourish through uncertainty (Business Continuity Institute [BCI], 2020), placing organisational resilience (OR) and BC at the core of their strategy (European Commission, 2020; McKinsey, 2020). Investing in organisational capabilities and management tools that support the development of a resilience capacity is key to ensuring operational continuity despite adverse conditions (International organisation for Standardization [ISO]).

In a context where unforeseeable disruptions and uncertainty become the norm, it is reasonable that organisations perceived as more resilient are also more likely to be

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considered reliable and, therefore, attractive for collaborations, alliances and talents looking for employment (BCI, 2020). Thus, getting prepared to act (Grandori, 2020) by increasing the capability to anticipate, respond and thrive in unprecedented situations is becoming a key asset for contemporary management (van der Vegt & Peter Essens, 2015), and BC management (BCM) is moving from its traditional operational role within the organisation to a profoundly strategic one (Galbusera et al., 2021) in most sectors of activity (Frikha et al., 2021).

However, while burgeoning literature investigates the benefits and life-cycle phases of BCM (Frikha et al., 2021), little attention is paid to its enabling factors. Specifically, there are notable gaps in understanding how BCM relates to organisational factors (Herbane, 2010; Herbane et al., 2004). Theoretical explanations are absent, and rigorous academic research that offers tangible empirical evidence is scant (Azadegan et al., 2020). Quantitative assessments and operationalisation of technical BC facets are frequent in process engineering studies (e.g. McManus, 2007; Lee et al., 2013), where BC practices are mainly investigated as measures to prevent major accidents in single industries, e.g. the chemical or pharmaceutical/biotechnology ones (Watkins et al., 2008). Instead, research on organisational drivers of BC is predominantly conceptual or qualitative (e.g. Herbane, 2010; Taarup-Esbensen, 2021) and, to the extent of our knowledge, lacks the adoption of a cross-industry perspective to examine the similarities in BCM among companies that cope with everyday threats (Rebmann et al., 2013).

To start bridging the gap between the BCM literature and the studies on the organisational structures and resources to cope with turbulent and tough business environments (Bakar et al., 2015), this study adopts a Dynamic Capabilities (DCs) view on the organisational responses to volatile and unstable market conditions (Teece & Pisano, 1994; Teece et al., 1997). Initially, this theoretical perspective grew in the field of strategic management and innovation before being successfully adapted to other fields, including OR, in the wake of disruptive events (Hamel & Välikangas, 2003; Lengnick-Hall et al., 2011; Weaven et al., 2021; Dominguez Gonzalez, 2022). These theoretical trajectories encouraged us to investigate whether a bundle of DCs selected from the OR literature may act as BC antecedents.

To investigate BC and OR from an integrative perspective, which builds on the recent contributions showing that investigating the ‘hardware’ and the ‘software’ capabilities of the organisation is necessary to understand where BC and OR originate (Ciasullo et al., 2022), we adopted an exploratory quantitative approach to develop and empirically test (i) a measurement model to assess DCs for OR, (ii) an original BC scale based on the ISO 22301 standard (ISO, 2019), and (iii) the structural effects of the presence of different levels of firm’s DCs on the tension towards BC. Moreover, the study (iv) confirms the systemic nature of BCM and DCs through supplemental analysis.

The study uses primary data collected from a survey of Italian HR managers who are members of the AIDP network (Associazione Italiana Direzione del Personale – the Italian association of HR managers). To the extent of the authors’ knowledge, this research is the first that focuses on this family of informants, who have a privileged perspective on employees’ abilities, attitudes and behavioural outcomes, to investigate BC under uniform conditions. In fact, the unfortunate setting of the Covid-19 pandemic represented a significant disruption that applied equally to different industries in the same period. The resulting sample of 419 single responses, collected between September 2020 and February 2021, is the largest used in a study based in Italy on this topic.

The following section analyses the theoretical frameworks that interrelate the BC and DCs concepts and presents a conceptual model that depicts the relations between the

different resilience phases – namely anticipation, coping, and adaptation – and their underlying capabilities. Hypotheses are formulated consequently.

In the method section, (i) we motivated the choice of Italian HR managers as the research setting, (ii) described the LinkedIn-based data collection process, and (iii) reported the analytical procedures to test the study hypotheses (i.e. EFA, CFA, CB-SEM, Cluster Analysis, ANOVA). Subsequently, we presented the results that show a significant relation between DCs for resilience and BCM of Italian firms. In the discussion section, we provided arguments for generalising the findings to other settings, e.g. climate change. Finally, we formulated practical implications for empowering and preparing organisations to face uncertainty, together with suggestions and directions for future research in BC and OR.

2. Theoretical framework

2.1. BCM requirements

The peculiarities of twenty-first-century crises – greater scale, speed, and hyper-complexity (Lagadec, 2009; Winn et al., 2011) – make BCM a fundamental process that requires capabilities that organisations in every sector should amid to develop. BCM allows organisations to continue delivering products and services within acceptable time frames at a predefined capacity during a disruption, safeguarding the interests of key stakeholders, reputation, brand and value-creating activities (ISO 22301, 2019).

The increasing popularity and managerial relevance of BCM contributed to the fact that it is nowadays formalised into standards and norms (ISO 22301, 2019). According to ISO 22301, BCM is defined as a system of ‘documented procedures that guide organisations to respond, recover, resume, and restore to a pre-defined level of operation following a disruption.’ Scholars and practitioners define BCM as a ‘holistic management program’ (Herbane, 2013; Frikha et al., 2021; Fischbacher-Smith, 2017) for identifying risks that could impact operations’ continuity. Therefore, BCM consists of an operational framework with interdependencies with capabilities to pursue effective mitigation and response to disruptions (Azadegan et al., 2020). BCM is holistic in that it tackles uncertainties involving the organisation (Hiles, 2014). Consequently, BCM requires high levels of integration of practices and processes across structures, activities and departments (Kato & Charoenrat, 2018). Findings from previous research support this interpretation (Herbane, 2020; Karim, 2011). On the one hand, BC is typically determined by the co-occurrence of a series of factors, such as human resources empowerment and participation of people in BCM processes (Ghandour, 2014; Bakar et al., 2015). On the other hand, successful BCM practices require awareness-raising activities, training and constant communication, and management commitment (Herbane et al., 2004). Senior managers should thus promote stable and responsive management support throughout the BCM process (Chow, 2000). In this regard, even though different approaches to BCM are possible, some fundamental requirements are cornerstones of BCM standards (Taarup-Esbensen, 2021; BS EN ISO 22301, 2019). According to ISO 22301, these requirements refer to leadership, planning, support, operation and performance evaluation. Given the systematic nature of BCM, none of these requirements can be omitted. Thus, we expect that organisations present homogeneous levels of implementation among different BC requirements, which implies the possibility of grouping the requirements into a single measure of BCM.

Therefore, we propose the following hypothesis:

H1: Organisations conceive BC as a systematic implementation of an indivisible set of inter-related requirements

2.2. *DCs for resilience*

DCs are capabilities that allow organisations to thrive in turbulent environments (Teece et al., 1997) by determining the capacity of a firm to purposefully extend or modify its resource base (Helfat, 2007; Wang & Ahmed, 2007). In fact, DCs emerged as a conceptual extension of the resource-based view (RBV, Barney, 1991) that explains firms' ability to flourish despite extreme modifications in evolutive business environments by altering, redeploying, and building unique bundles of resources (Teece, 2007).

Teece (2007, 2012) classified DCs into three groups of activities and adjustments: (1) identification, interpretation and evaluation of an opportunity or threat (sensing); (2) deployment of resources to address an opportunity or to respond to a threat and to create value from doing so (seizing opportunities or responding to threats); and (3) reconfiguration, integration and renewal of resources and organisational structures as market conditions change (reconfiguring).

DCs are fit to investigate phenomena in several fields of management and organisational studies – from strategic management to sustainability research (Buzzao & Rizzi, 2020). DCs are also fit to understand OR in the wake of disruptive events (Hamel & Välikangas, 2003).

OR is the property that enables organisations to 'bounce forward' aftershocks (Grandori, 2020; Song, 2022). The resilience concept is relatively new in social sciences, but its roots can be traced back to the field of ecology (Holling, 1973). In its broader meaning, resilience refers to the 'intrinsic ability to dynamically maintain or regain equilibrium, preserving viability after a major mishap and in the presence of continuous stress' (La Sala et al., 2022). The concept of resilience can be framed at different scales, as it can be interpreted as the 'capacity of a system to absorb disturbance and reorganise so as to retain essentially the same function and structure' (Walker & Salt, 2012). In the context of management and organisational studies, this concept is well disentangled in Ducheck's (2020) seminal work, which offers an operationalisable framework for OR. The author defines it as the combination of anticipation, coping and adaptation phases. According to her, OR encompasses the ability to anticipate the occurrence of a disruption, absorb the challenges faced to cope with it, and change by adapting and transforming meanwhile learning (Folke, 2006; Folke et al., 2010) to continue to thrive and flourish (Annarelli & Nonino, 2016; Barasa et al., 2018).

The DCs view is particularly accurate in interpreting and reflecting the epistemological nature of OR phenomena, as they deal with assumptions of environmental dynamism, uncertainty and chaotic systems (Duchek, 2020), which resonates with a promising stream of literature that interprets OR as the capability of a system to learn, adjust, adapt and transform throughout environmental uncertainty, error or failure (Sahebjamnia et al., 2018; Kennedy & Linnenluecke, 2022; Ciasullo et al., 2022). This perspective shares ontological elements with what Wang and Ahmed (2007) defined as the 'essence' of DCs – the 'firm's orientation in the adaptation, renewal, reconfiguration and re-creation of resources, capabilities and core capabilities responding to external changes.' Following this theoretical understanding, existing literature has applied DCs to investigate OR in different settings, e.g. supply chain (Mirtsch et al., 2022; Chowdhury & Quaddus, 2017; Eltantawy, 2016); tourism (Jiang et al., 2019); human resources (Lengnick-Hall et al., 2011); and sustainability management (Souza et al., 2017). These

studies analyse different facets of the relations between DCs and OR. As an example, Ahn et al. (2018) use higher-order routine-change of DCs as enablers of business resilience and find that they positively affect the firm performance of UK-based companies facing the 2008 financial crisis. In the setting of the same crisis, Fainshmidt (2014) examines the relationship between DCs and the firm performance of Israeli organisations under extreme environmental conditions, using DCs as a proxy for OR. Using Chinese cross-sectional data, Yu et al. (2019) use DCs to explain the relationship between supply chain resilience and financial performance. Finally, Jiang et al. (2019) find positive evidence of DCs' role in helping organisations to become resilient in an increasingly turbulent environment.

All these studies agree on the possibility of modelling DCs for resilience as specific sets of a firm's abilities to anticipate, survive and thrive in unexpected, sometimes disastrous events and, in a broader sense, turbulent environments. Drawing on Ducheck's OR conceptualisation (Ducheck, 2020) and mirroring the original and more general Teece's configuration of DCs (i.e. Sensing, Seizing and Reconfiguring) (Teece, 2007), it is thus possible to refer to Anticipating, Coping and Adapting capabilities as the main sets of DCs for resilience that lead to OR.

2.2.1. Anticipation, coping, adaptation

Anticipation consists of interlaced routines and capabilities to spot, interpret, prepare, or avoid environmental risks and threats, which reflect risk management capabilities (Pavlou & El Sawy, 2011). Instead of passively 'wait and see', organisations need to enact anticipation capabilities throughout the organisation, which requires to some extent work autonomy, to avoid threatening situations or, at least, minimise potential negative consequences (Madni & Jackson, 2009). Diffused organisational abilities and capacities to detect potential threats and critical developments – whether internal or external – before they happen or irremediably escalate (Boin & van Eeten, 2013) are necessary for OR (Morales et al., 2019; Tisch & Galbreath, 2018). However, anticipation capabilities are not a sufficient condition for achieving OR (Herbane, 2020) as they only build the foundation – 'latent resilience' (Somers, 2009) – for effective responses to critical situations.

Once dangers have become manifest, resilient organisations need to be able to cope with them. In fact, consequential to threats partially or fully spotted in the anticipation stage, the coping stage of resilience refers to the effective handling of unexpected events to resist destruction (Ducheck, 2020). Coping capacities are defined as the means and abilities by which organisations orchestrate available resources and skills and purposefully improvise their recombination to face and manage adverse conditions, emergencies or disasters (IPCC, 2012; UNISDR, 2009). According to this definition, coping capabilities provide short-term remedies to ensure survival, as well as protection and conservation of essential operating systems in extreme events (Madni & Jackson, 2009; Vogel & O'Brien, 2004; Karman, 2020).

Besides anticipation and coping, organisations that face disruptions also need adaptation capabilities, such as adjusting and transforming to direct change toward organisational advancement (Limnios et al., 2014). Adaptation is a form of the continuous, long-term transformation and learning process that increases a firm's knowledge base and shapes future behaviour (Madni & Jackson, 2009). Sarta et al., (2021) define the adaptation phase of resilience as intentional decision-making to reduce the distance between an organisation and its environment. Current literature sees OR's adaptation stage as the combination of organisations' capabilities to reflect and learn from challenging situations and, consequently, to enable organisational change (Ducheck, 2020; Karman, 2020).

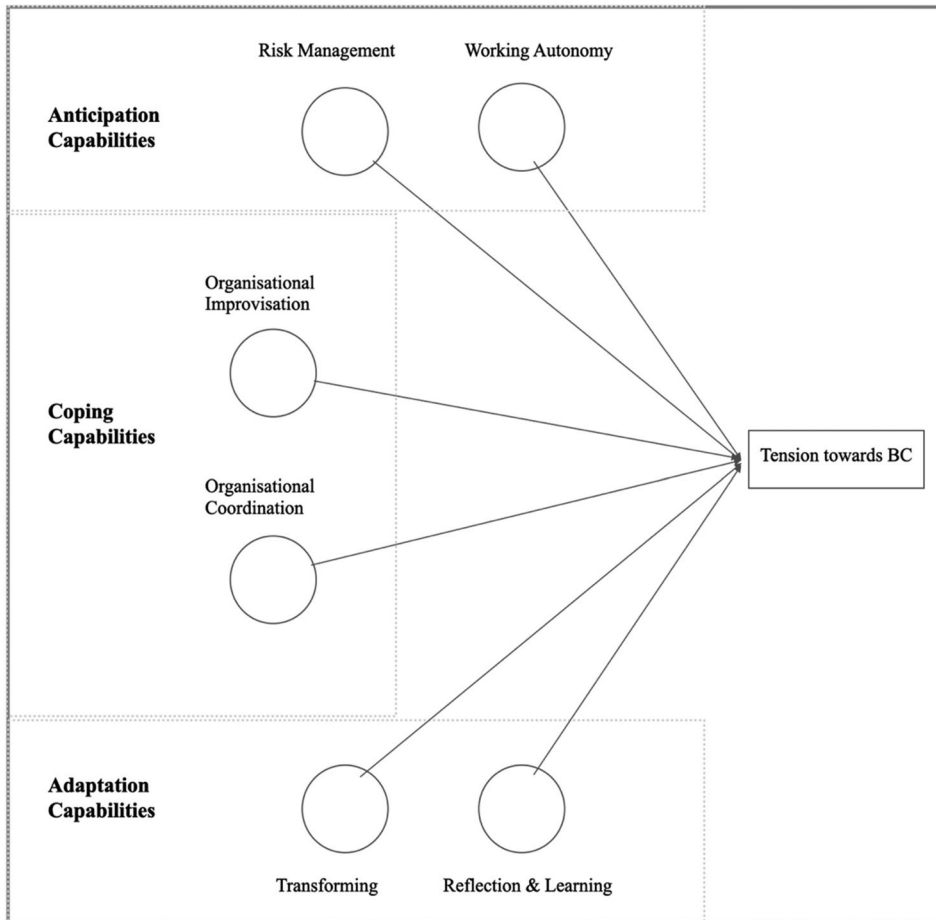


Figure 1. Conceptual model of the study.

Despite being logically distinct and ontologically independent, the three sets of DCs for resilience and their sub-components (see Figure 1) are expected to present the same potential cascading dynamics of the Teece's Sensing-Seizing-Reconfiguring (Kump et al., 2018). Consequently, the underlying capabilities are assumed to be distinct but inter-related, which allows hypothesising moderate subscale intercorrelations:

H2: DCs for resilience (Anticipation, Coping and Adaptation) and their sub-scales are distinct but moderately correlated

2.3. BCM and DCs for resilience

According to the first British Standard on Business Continuity (BS EN ISO 25999, 2006), later substituted by the 'Security and resilience – Business continuity management systems – Requirements' (BS EN ISO 22301, 2019), BC represents a strategic objective (Herbane, 2015) associated with OR (Musgrave & Woodman, 2013; Sahebjamnia et al., 2015; Sahebjamnia et al., 2018). The rationale for this association is articulated. Depending on the researchers' beliefs and definitions of OR and BC, their nomological

collocations in causal models vary between one being the condition for or the consequence of the other (Margherita & Heikkilä, 2021).

According to some scholars, BC is the framework for building resilience (Torabi et al., 2014; Torabi et al., 2016). For instance, Azadegan et al. (2020) find a positive effect of BCM on supply chain resilience, and Păunescu and Argatu (2020) identify the necessary functions of BCM to maintain essential business operations and OR in case of disruptive incidents. Other authors, instead, consider BC as a ‘natural outcome’ of OR (Herbane et al., 2004; BCI, 2020). For instance, Herbane (2020) found that the performance dimension of OR is associated with improved BC alongside reduced operational downtime in the event of a crisis. Other studies integrate the two concepts and propose BC as a feature of operational resilience that contributes to proper organisational preparedness in facing a crisis (Niemimaa et al., 2019; Somers, 2009).

Seminal works from Barreto (2010) and Ambrosini and Bowman (2009) suggest that DCs might represent the link that connects BC to OR regardless of the supposed direction of causation. Barreto (2010) argues that DCs reveal the potential of an organisation to ‘solve problems systematically’ (Winter, 2003), which favours the emergence of management practices that present higher levels of performance. Similarly, Ambrosini and Bowman (2009) find that the more organisations invest in deploying DCs, the more they become aware of the need to be open to organisational change (Kurtz & Varvakis, 2016). In light of this, and building on recent empirical studies, e.g. Weaven et al. (2021) or Neise and Revilla Diez (2019) that argue that DCs are a good predictor of firm survival and continuity in the face of adverse conditions, it is reasonable to expect that all the DCs for resilience grow together with the internalisation of BCM. We thus hypothesise that:

H3a: There is a positive association between each DC for resilience and the tension toward improving the implementation of BC practices

Since organisations may have different inclinations towards the specific DCs for resilience, and the above-mentioned literature tends to consider their aggregated effect on BCM, it is possible to assume that the more manifest DCs might compensate for the lack of the less manifest ones. Thus, to further inspect the dependence of the tension toward BCM on the available stocks of DCs for resilience, we hypothesise also that:

H3b: The focus on target BC outcomes increases with the total amount of DCs for resilience.

3. Method

3.1. Data collection

We performed hypothesis testing in the empirical context of Italian companies. The choice of the setting is motivated by two rationales. First, we chose Italy as it was the first western country dramatically hit by the Covid-19 pandemic, which offered an important setting for investigating companies’ ability to deal with uncertainties (Margherita & Heikkilä, 2021). Whether it was an overnight switch to remote working, a need to adapt to unreliable supply chains, or drastically increased or reduced demand for products or services, almost no organisation was untouched by the pandemic (Remko, 2020). Furthermore, as data collection occurred straight after the first pandemic wave, Italian respondents were equally pressured by BC-related issues. Second, Italian companies are an appropriate setting to study the relevance of DCs for resilience and BC because of their exposure to environmental risks. In fact, Italy is historically among the most impacted European regions by natural hazards and climate change and is one of the major hotspots in future climate change projections (Todaro et al.,

2021). As such, Italian organisations are not new to BC issues as they have already faced various regional disruptions in the past (Giorgi & Lionello, 2008).

To the aims of the analysis, a self-administered online questionnaire allowed the collection of cross-sectional, categorical-ordinal, and primary data. First, we built a sample of 2000 HR professionals as the primary source for data collection by randomly extracting HR professionals among AIDP members (Italian HR Professionals Association) and retrieving their email contacts from the AIDP LinkedIn group (as of today, the group counts more than 22300 qualified subscriptions – <https://www.linkedin.com/groups/2006141/>). Then, we uploaded the questionnaire on an online survey platform and sent via email an invitation containing the link to complete the questionnaire. The email provided potential respondents with detailed information and instructions regarding the investigation's scope and modalities. Among the others, it delivered information on the study's anonymity, confidentiality, and independence (Chung & Monroe, 2003).

We designed the questionnaire adopting procedural remedies to prevent typical survey-based research problems, including common method and social desirability bias. We formulated questions using a register that kept the wordings simple, concise, and specific (King & Bruner, 2000; Podsakoff et al., 2003).

Moreover, we interviewed four senior HR managers and AIDP representatives to prevent ambiguity or vagueness. Furthermore, we tested possible distortions using Harman's post hoc single factor test. This test showed that the factor with the greatest weight accounted for 38.81% of the total variance, lower than the 50% criterion referred to in the literature (Podsakoff & Organ, 1986). Finally, before the final submission of the questionnaire, we ran pre-tests and modified some sentences to eliminate ambiguities.

The final version of the questionnaire was structured in three main parts. The first section consisted of questions useful to collect information regarding the respondents' professional profile and their organisations main characteristics (see section 3.2). The second one comprised 23 closed questions on DCs for resilience. Finally, the third section contained 15 closed questions on BC.

The questionnaire was accessible on a digital platform from September 2020 to the end of February 2021. During this period, we sent reminders every three weeks. At the end of the data collection, respondents correctly registered 521 valid questionnaires on the platform. After excluding questionnaires containing missing values, we retained 419 completed responses for further analysis. The response rate amounts to 26,05%, which is satisfactory since managers often express initial reluctance to participate in studies dealing with BC because the subject under discussion is highly sensitive (Herbane et al., 2004). The high response rate – especially considering that we obtained it during a significant crisis – might depend on the fact that AIDP patronaged the study and allowed us to use the association logo in the email and the survey introduction.

Finally, to ensure that the number of observations surpassed the level required to perform hypothesis testing and analyses, G*Power was used to calculate the minimum sample size based on power analysis (Faul et al., 2009; Hair et al., 2017). The results suggest that the minimum sample size required (to achieve a power of 0.95) was 218. Our sample significantly exceeds this threshold.

3.2. Sample characteristics

The study applies a key informant approach for data collection and solely includes the responses of HR professionals in the final dataset. We chose HR professionals to have a

Table 1. Sample breakdown in terms of informants' HR title and years of seniority.

HR title	% of informants
HR Executive	8
HR Manager	11
HR Specialist	10
HR Generalist	3
HR Supervisor	3
HR Director	28
Chief HR Officer	4
Other	33
Years in the position	% of informants
< 2 years	18
2–5 years	33
> 5 years	49

privileged viewpoint on the investigated hypotheses. In fact, on the one hand, they have an accurate understanding of the stage of development of organisational capabilities and the competencies and skills of the working teams. Conversely, they're transversally involved in diverse BC issues (Rebmann et al., 2013). Previous studies have successfully used HR professionals to study BC. For example, Rebmann et al. (2013) use HR professionals' risk perceptions, and BCM perceived importance to evaluate the preparedness of US businesses to respond to a disaster, focusing on preparedness for disasters such as bioterrorism, pandemics, and outbreaks of emerging infectious diseases.

Table 1 reports a sample breakdown regarding informants' HR title and years of seniority.

We adopted the list of HR titles from a taxonomy elaborated by AIDP and practitioners confirmed its relevance during interviews. HR directors represent the more diffused title amongst the informants. This descriptive statistic is in line with the fact that most respondents have relevant experience in their current position, as only 18% have less than two years of experience within the current company.

In addition to that, HR professionals were chosen as informants to collect data evaluating the organisation as a whole, working groups and top management capabilities and actions, without performing any self-evaluation with regards to their abilities, behaviours and operations (Ried et al., 2021). This procedural remedy, which intervened in the research design phase, mitigated the effects of an eventual social desirability bias.

Table 2 instead reports a sample breakdown regarding the sector of activity and organisation size. In line with the characteristics of the national economy, most respondents were employed in organisations in the service sector in small-medium enterprises.

3.3. Measures

The measures reflect the perceptions of the key informants (Altay et al., 2018), who answer questions through a 1–5 Likert scale (agree/disagree). Perceptual measures are often used in the empirical management literature and are considered adequate to satisfy reliability and validity requirements (Ketokivi & Schroeder, 2004).

DCs for resilience were operationalised as a multidimensional reflective construct linked to six conceptually independent but interrelated capacities underlying the

Table 2. Sample breakdown in terms of sector of activity and organisations size.

Sector of activity	% of organisations
Service	46
Manufacturing	34
Other	20
Size	% of organisations
< 200 employees	33
201 - 500 employees	39
> 500 employees	28

Anticipation, Coping and Adaptation stages of resilience. The survey measures consist of adaptations of existing scales.

The two BC dependent variables were assessed by building new scales as no previous operationalisations in the extant literature reflect BCM requirements. To this end, we followed a three-step procedure: item-generation, scale purification and scale confirmation (Kump et al., 2018).

We asked informants to evaluate how much they believe their organisation should improve the ability to respond to the Covid-19 pandemic to target an ideal but feasible situation, e.g. by comparing ‘bests in class’ in their business sector. We built the questions and the survey items of the scales using a generic formulation to ensure their applicability to all organisations regardless of type, size and nature.

The detail of the measure chosen to assess the independent and the dependent variables is reported in *Table 3*, while *Table 4* reports the main indicators of reliability and validity. Finally, the complete questionnaire is available in the Annex.

4. Results

4.1. Measurement model assessment

As the first step of this evaluation process, we performed a principal-component exploratory factor analysis (EFA) using a varimax rotation to assess the internal validity of the measurement model. A significant Bartlett’s Test of Sphericity ($p < 0.000$) and the Kaiser–Meyer–Olkin measure of global sampling adequacy (KMO value above 0.5) ensured sampling adequacy to proceed with the analysis of selected variables (Dziuban & Shirkey, 1974).

Table 4 demonstrates that the results of the EFA sustain the initial assumptions on the measurement model because seven distinct factors had eigenvalues > 1 . Furthermore, all the items used to construct the latent variables confirmed satisfactory indicator reliability, with loadings remarkably above the recommended threshold of 0.40 (Hair et al., 2013) and indicator uniqueness lower than 0.5.

As a second step, we investigated the unidimensionality of the constructs through confirmatory factor analysis (CFA) on all the items. Further validity and robustness checks corroborate the good fit of the model: the comparative fit index (CFI = 0.959) and the Tucker–Lewis index (TLI = 0.953) are above the acceptability threshold value of 0.90. The root-mean-square error of approximation (RMSEA) is equal to 0.042, well below the acceptability threshold values of 0.08 (Xia & Yang, 2019).

Table 3. Detail of the measures used to assess the study variables.

Concepts to measure	Measure selected	Previous attempts
Anticipation capabilities		
Measures assess (i) the ability to observe and identify internal and external critical developments and potential threats for the organisation and (ii) the ability to be ready to face the unexpected at the working group level	(i) Risk Management Capability (Brustbauer, 2016; Subramaniam et al., 2011)	Brustbauer (2016) uses the construct to assess the ability of Tyrolean (Austrian) SMEs to spot, assess and monitor external risks. Results show that organisations with higher degrees of this capability are more likely to be strategically oriented towards competitiveness and resilience.
	(ii) Working team Autonomy Vera et al. (2016)	Organisations where employees are free to experiment and autonomously search for solutions, i.e. without the intermediation and approval of their superiors, are more prepared to anticipate crises (Vera et al., 2016). Vera et al. (2016) validate this capability (alpha = 0.89) and find that working groups from organisations that emphasise autonomy are more likely to go beyond their formal roles and build on their experience to improvise and find solutions to unexpected situations.
Coping capabilities		
Measures assess (iii) the ability to improvise by finding or designing solutions to concrete threats and (iv) the ability to coordinate and implement these temporary solutions	(iii) Improvisation capability Vera et al. (2016)	Improvisation occurs when the design and execution of novel activities converge in the face of unforeseen situations (Bernstein & Barrett, 2011; Hadida & Tarvainen, 2015). Winter (Winter, 2003) identifies improvisation as a DC and defines it as a 'a fund of micro-patterns that are recombined and sequenced in creative ways'. The construct adapted from Vera et al. (2016) presents good levels of reliability in their study (alpha = 0.83).
	(iv) Coordination capability Pavlou and El Sawy (2011)	The basic routines of coordination also draw upon the DCs literature. They encompass assigning resources to tasks (Helfat & Peteraf, 2003), appointing the right person to the right task (Elliott et al., 1999), identifying complementarities and synergies among tasks and resources (Eisenhardt & Galunic, 2000), and orchestrating collective activities (Henderson, 1994). Pavlou and El Sawy (2011) report adequate construct reliability (alpha > 0.7) and find that the capability positively contributes to higher levels of organisational performance in hyper-turbulent contexts.

(Continued)

Table 3. Continued.

Concepts to measure	Measure selected	Previous attempts
Adaptation capabilities		
Measures assess (v) the ability to reflect on past, current or future phenomena (such as decisions, actions, processes and events) and to incorporate the resulting insights into the existing knowledge base through the ongoing process of learning and (vi) the ability to act on previously generated knowledge and produce organisational change related to facets that are critical to resilience.	(v) Reflection and learning capability Oertel and Antoni (2014) (vi) Transforming capability Kump et al. (2018)	Learning is an ‘ongoing process of reflection and action characterised by asking questions, seeking feedback, experimenting and discussing errors or unexpected outcomes of actions’ (Edmondson, 1999). Oertel and Antoni (2014) use Reflection and Learning capability (alpha = 0.82) in a longitudinal setting and find that it contributes to improved team adaptation during interfering events. According to Teece (2007), Transforming capacity includes ‘enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise’s intangible and tangible assets’. The renewal comes into being only through implementation, which requires capabilities to act on previously generated knowledge and produce organisational change; otherwise, new information and ideas remain theoretical inputs and potential changes (Kump et al., 2018). In Kump et al. (2018) the scale shows high reliability and validity (alpha = 0.87) and transforming is found a solid predictor of business innovation performance.
Business Continuity		
Measures are elaborated starting from BS EN ISO 22301:2019 – ‘Security and resilience – Business continuity management systems – Requirements’, which reports a widely agreed set of crucial requirements for systemic BCM.	(vii) Improvement of BC practices (BS EN ISO 22301:2019) (viii) Focus on target BC outcomes (BS EN ISO 22301:2019)	The measure contains survey items elaborated from the requirements of (i) Clause 5 – ‘Leadership’, which summarises specifics to the management’s role; (ii) Clause 7 – ‘Support’, which focuses on the provision of resources needed for the establishment, implementation, maintenance, and continual improvement of BCM (BS EN ISO 22301:2019) The measure reflects Clause 1 ‘Scope’, which introduces the requirements necessary to represent the organisational context of the BCM in terms of needs, ambitions, and scope (BS EN ISO 22301:2019).

Table 4. Results of exploratory and confirmatory factor analysis.

Latent Variable	Items	Mean (SD)	EFA factor loadings							Unique variance	CFA loadings
			1	2	3	4	5	6	7		
Anticipation Capabilities											
Risk Management CR = 0.898	risk1	3.93 (0.96)				0.71				0.32	0.78***
	risk2	3.72 (1.16)				0.84				0.21	0.83***
	risk3	3.56 (1.13)				0.85				0.22	0.81***
	risk4	3.77 (1.01)				0.81				0.20	0.89***
Work Groups Autonomy CR = 0.874	auto1	2.68 (1.14)					0.81			0.26	0.77***
	auto2	2.83 (1.19)					0.89			0.16	0.92***
	auto3	3.05 (1.16)					0.84			0.24	0.81***
Coping Capabilities											
Organisational Improvisation CR = 0.841	impro1	3.99 (0.89)							0.83	0.23	0.82***
	impro2	3.89 (0.90)							0.84	0.22	0.84***
	impro3	3.78 (1.00)							0.77	0.29	0.75***
Organisational Coordination CR = 0.864	coord1	3.39 (0.99)							0.61	0.34	0.76***
	coord2	3.37 (0.99)							0.65	0.32	0.77***
	coord4	3.68 (0.96)							0.70	0.28	0.79***
	coord4	3.67 (0.97)							0.74	0.24	0.81***
Adaptation Capabilities											
Transforming CR = 0.886	transf1	3.60 (0.95)		0.61						0.33	0.81***
	transf2	3.45 (0.94)		0.73						0.28	0.81***
	transf3	3.51 (0.94)		0.70						0.32	0.77***
	transf4	3.92 (0.92)		0.70						0.34	0.75***
	transf5	3.78 (0.92)		0.69						0.31	0.75***
Reflection and Learning CR = 0.893	reflear1	3.57 (0.96)			0.78					0.22	0.83***
	reflear2	3.74 (0.91)			0.80					0.20	0.86***

(Continued)

Table 4. Continued.

Latent Variable	Items	Mean (SD)	EFA factor loadings							Unique variance	CFA loadings
			1	2	3	4	5	6	7		
BCM Improvement of BC practices CR = 0.921	reflear3	3.77 (0.86)			0.76					0.25	0.80***
	reflear4	3.74 (0.91)			0.75					0.28	0.79***
	BCP1	3.99 (0.89)	0.66							0.52	0.65***
	BCP2	3.97 (0.85)	0.70							0.46	0.69***
	BCP3	4.09 (0.87)	0.79							0.34	0.78***
	BCP4	4.14 (0.85)	0.79							0.32	0.80***
	BCP5	3.98 (0.96)	0.64							0.50	0.68***
	BCP6	4.12 (0.86)	0.75							0.38	0.76***
	BCP7	4.08 (0.95)	0.71							0.43	0.73***
	BCP8	3.96 (0.89)	0.69							0.43	0.76***
	BCP9	4.14 (0.83)	0.75							0.28	0.61***
BCP10	4.13 (0.88)	0.74							0.34	0.73***	
BCP11	4.23 (0.89)	0.77							0.33	0.71***	

Legend: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

The significance of the standardised regression coefficients ($p < 0.000$) between each item and the related latent construct confirms the convergent validity of the measurement model, which has also a good fit. In addition, we calculated Raykov's reliability coefficients and Cronbach's alpha, which supported high levels of internal consistency for each construct as all coefficients are higher than the recommended value of 0.7 for all constructs. Furthermore, we computed the average variance extracted (AVE) to check the amount of total variance explained by every single construct (*Table 5*). AVE is a summary indicator of convergence calculated from the variance extracted for all items loading on a single construct (Hair Jr et al., 2016; Pérez et al., 2017). Since all the AVE values are > 0.50 , which means that the construct scores hold more than half of the indicator variance (Acock, 2013), all the constructs have convergent validity.

Finally, we compared the AVE values with the squared pairwise correlations between latent variables to assess discriminant validity, which refers to the fact that latent variables that should represent distinct theoretical concepts are statistically sufficiently different (Benitez et al., 2020; Schubert et al., 2020). Results indicate that the observed variables that do not belong to the same construct are weakly correlated, ensuring discriminant validity. Together with the conclusions concerning the convergent validity, these results support the construct validity of the measures.

4.2. Hypothesis testing

4.2.1. Testing Hypotheses 1, 2

Results from the measurement model assessment allowed us to test hypotheses 1 and 2 (see *Table 4*).

The 11 items used to measure the tensions towards improving BC practices loaded on a single factor (eigenvalue $\lambda = 11.69$), with factor loadings above the 0.4 threshold (0.64–0.79). Additionally, item variance uniqueness is satisfactory for all the indicators as the values are below the 0.5 thresholds except for BCP1, which is slightly above (0.52) but still acceptable given the nature of the study and the origin of the construct.

Overall, the exploratory scale well reflects the unique concept of the systemic nature of BCM, which thus reveals the perceived need to orchestrate the underlying practices and goals instead of pursuing their partial implementation. To the extent of our knowledge, this is the first time that a study provides quantitative evidence on the perceived interdependence among the multiple facets of BCM. It is worth noting that using data concerning tensions towards BCM instead of self-reported achievements, which might come with self-assessment bias, added design robustness to this evidence. Hypothesis 1 is therefore supported.

Results from the EFA also provided elements for testing hypothesis 2. Eigenvalues above 1 for all the DCs for resilience confirmed the existence of 6 different factors. In addition, item variance uniqueness, which was well below the threshold, and the absence of item cross-loadings provided additional support to the possibility of measuring DCs for resilience through the proposed scales. In line with the theoretical predictions, the squared pairwise correlations between latent variables used to confirm discriminant validity during the measurement model assessment (see *Table 5*) revealed moderate to strong correlations between the constructs. Overall, these results demonstrate that it is possible to model the DCs for resilience through six independent dimensions that reflect the theory-driven concepts of Anticipation, Coping and Adaptation capabilities. The positive and prevalently weak/moderate correlations between these capabilities support the theoretical prediction of their cascading nature. In other words, these results confirm

Table 5. Results of discriminant and convergent validity analysis.

Variable	Riskman	Work Groups Autonomy	Improvisation	Coordination	Transforming	RefLearn	Improvement of BC practices	AVE
Riskman	1							0.688
Work Groups Autonomy	0.071	1						0.696
Improvisation	0.137	0.161	1					0.645
Coordination	0.322	0.132	0.14	1				0.615
Transforming	0.34	0.124	0.175	0.606	1			0.608
RefLearn	0.227	0.088	0.159	0.522	0.537	1		0.676
Improvement of BC practices	0.132	0.041	0.102	0.192	0.189	0.154	1	0.518

that the organisations that develop DCs for resilience do not specialise in single-sided strategies. Thus, hypothesis 2 is supported.

4.2.2. Testing Hypotheses 3a

We tested Hypotheses 3a using a covariance-based structural equation model (SEM) (Fornell & Larcker, 1981). The model exhibits a good fit: the CFI is 0.959, the TLI is 0.954, and the RMSEA is 0.042. Furthermore, the χ^2/df ratio is 1.73, lower than the threshold value of 3 (Todaro et al., 2021). Results of the SEM (Figure 2) indicate that there is a significant positive relation between Improvisation Capability (IMPRO) and the tension towards the improvement of BC practices (standardised coefficient $\beta = 0.17$,

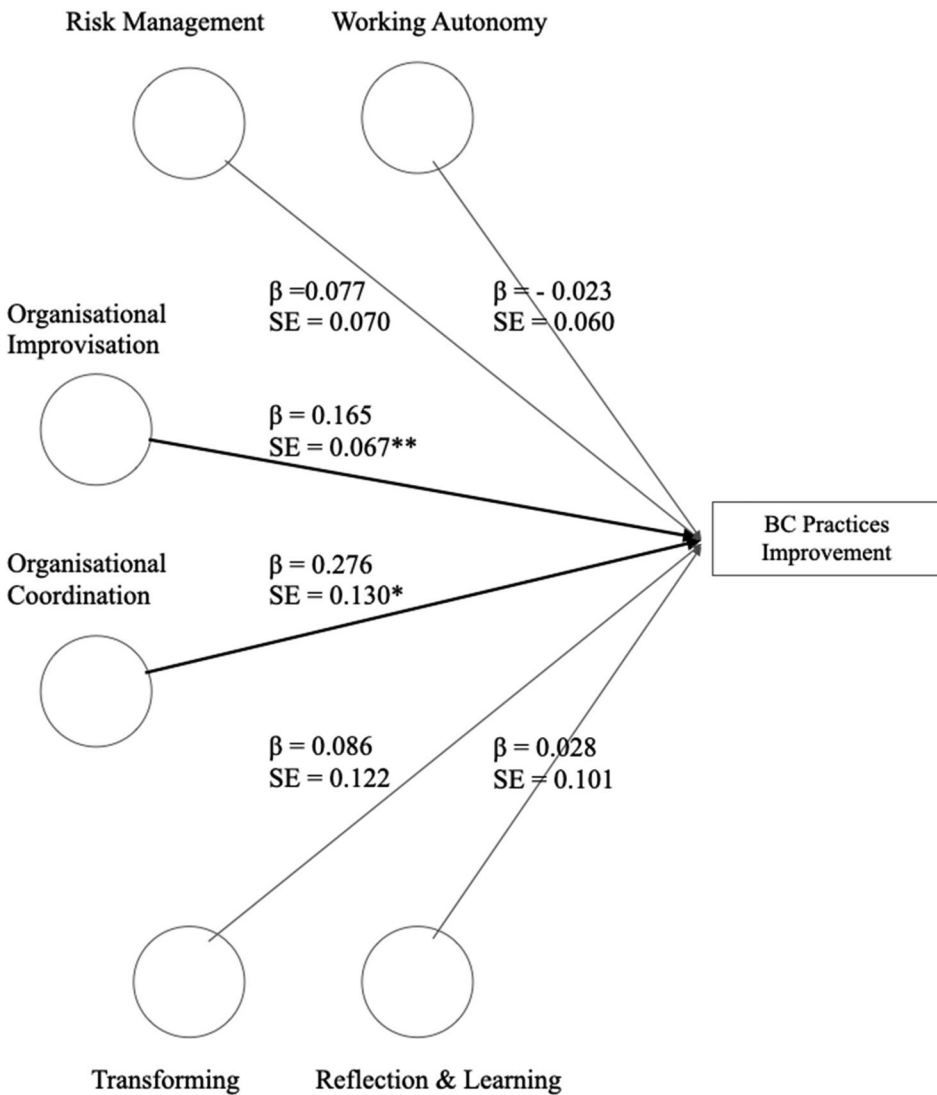


Figure 2. Results of SEM analyses. Paths in bold are significant. Legend: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 6. Robustness checks via model comparison.

Models	Paths	χ^2	df	χ^2/df	CFI	TLI	RMSEA
Original	BCP < - RISKMAN AUTO IMPRO COORD TRANSF REFLEAR	848.390***	490	1.731	0.959	0.954	0.042
Alternative1	BCP -> RISKMAN AUTO IMPRO COORD TRANSF REFLEAR	1410.364***	505	2.793	0.898	0.886	0.065
Alternative2	RISKMAN -> IMPRO COORD TRANSF REFLEAR AUTO -> IMPRO COORD TRANSF REFLEAR BCP < - IMPRO COORD TRANSF REFLEAR	1132.220***	498	2.274	0.928	0.919	0.055
Alternative3	RISKMAN -> TRANSF REFLEAR AUTO -> TRANSF REFLEAR IMPRO -> TRANSF REFLEAR COORD -> TRANSF REFLEAR BCP < - TRANSF REFLEAR	876.045***	495	1.770	0.957	0.951	0.043
Alternative4	RISKMAN -> IMPRO COORD TRANSF REFLEAR AUTO -> IMPRO COORD TRANSF REFLEAR IMPRO -> TRANSF REFLEAR COORD -> TRANSF REFLEAR BCP < - TRANSF REFLEAR	879.404***	496	1.773	0.957	0.951	0.043

Legend: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

SE = 0.067 and statistical significance $p < 0.01$) and for Coordination Capability (standardised coefficient $\beta = 0.28$, SE = 0.13 and statistical significance $p < 0.03$), but not for the other capabilities. Since most of the relations between several DCs for resilience and the tension towards improving BC practices do not reach the minimum level for statistical significance, Hypothesis 3a is only partially supported.

To further assess the validity of the conceptual model, we constructed four alternative models by changing paths among the latent variables. Then, we compared goodness-of-fit statistics across the five models to detect the most fitting model. *Table 6* compares the original model with the alternative ones and displays the five models' goodness-of-fit statistics (i.e. χ^2 , df, χ^2/df , CFI, TLI and RMSEA). According to all goodness-of-fit statistics, the original model exhibits the best fit among the five models (Fornell & Larcker, 1981).

The interpretation of these results is twofold. On the one hand, focusing on the non-significant relations, DCs for resilience and BCM might somehow reflect alternative approaches to anticipating and learning from uncertainties. Differences might refer to the systemic nature of BMC, which frequently results in formal procedures, versus the flexible and context-dependent search for solutions based on DCs for resilience. In particular, developing organisational capabilities to deal with the unexpected might imply fostering a ‘thinking-out-of-the-box’ attitude that collides with the codified nature of BCM. On the other hand, focusing on the correspondences between DCs for resilience and the implementation of BC practices, the evidence of the existence of the nexus between BCM and improvisation and coordination capabilities reveals that the organisation’s ability to cope with external threats to the business continuity calls for clear rules and procedures to define how to orchestrate resources in pressing and unexpected circumstances. More precisely, resonance mainly emerges between BCM and the analytical dimension of the DCs for resilience that refers to resource mobilisation, which requires more procedural rigour than intuition and creativity, whilst it vanishes with reference to those DCs related to opportunities’ identification and continuous renewal, which have the opposite requirements. Future research might help gain additional insights and validate these interpretations.

4.2.3. *Testing Hypotheses 3b*

We employed two statistical methods, namely cluster analysis and ANOVA, to test hypothesis 3b.

First, we conducted a cluster analysis to understand whether it was possible to group organisations based on their different levels of DCs for resilience. To this end, we run a hierarchical clustering algorithm on the indicators of the latent constructs of DCs for resilience, as this method is preferable when the sample size is < 500 (Mooi et al., 2018). As a result, we identified a three groups solution from the dendrogram obtained by performing the hierarchical clustering analysis with Ward’s clustering algorithm and squared Euclidean distance. We tested the stability and validity of the solution by following an iterative procedure. First, we calculated Caliński and Harabasz’s (1974) variance ratio criterion and the Duda-hart index (Duda and Hart, 1973). Then, following the Mooi et al. (2018, p. 357) suggestion, we combined the VRC and the Duda-Hart indices by selecting the number of clusters that yield a large VRC, a large $Je(2)/Je(1)$ index, and a small pseudo-T-squared value. As a result, we retained the three groups’ solution.

We tested whether different methods produce similar results to claim stability (Mooi et al., 2018). In particular, we compared the three groups solution obtained with Ward’s clustering algorithm with respectively a two, three and four groups solution obtained by using clustering partitioning methods with the K-means algorithm and squared Euclidean distance. As a result, the three groups’ solution emerged as the most adequate and stable, as less than 20% of the cluster affiliations changed from one technique to another (Mooi et al., 2018) (Table 7).

Table 8 shows the cluster affiliation of observations between groups. DCs for resilience emerged in the sample organisations at three different levels that differs in DCs’ intensity, not in their combinations, allowing us to respectively classify the respondents as ‘High DCs’, ‘Medium DCs’, and ‘Low DCs’ organisations.

Based on this classification, we conducted a one-way analysis of variance (ANOVA) to test whether there were statistically significant differences in Focus on target BC outcomes (CFI = 1; TLI = 1; RMSEA = 0.00 $\chi^2/df = 0.306$) among the three groups. The results

Table 7. Cluster analysis results.

Clusters	Duda/Hart		Calinski/Harabasz pseudo-F
	Je(2)/Je(1)	Pseudo T-squared	
1	0.7692	125.13	
2	0.8455	35.8	125.13
3	0.8932	26.2	91.18
4	0.9182	13.89	69.94
5	0.8905	20.04	58.18
6	0.8201	8.34	51.28
7	0.8779	11.54	46.34
8	0.901	15.39	42.75
9	0.9029	13.66	40.02
10	0.8925	8.55	37.44
11			35.4

Table 8. Cluster affiliation and cluster means by DCs

Clusters	%	Riskman	Auto	Impro	Coord	Transf	Reflear
Low DCs	10	2.29	2.33	3.05	2.00	2.42	2.30
Medium DCs	38	3.51	2.36	3.62	3.23	3.28	3.43
High DCs	52	4.18	3.30	4.23	4.02	4.14	4.16

revealed that there was a statistically significant difference between at least two groups ($F(2) = [32.82]$, $p = 0.000$).

A Tukey's honest significant difference (HSD) test for multiple comparisons found that the mean value of Focus on target BC outcomes was significantly different between Low DCs and Medium DCs ($p = 0.002$, 95% C.I. = $[-0.392, -0.073]$) and for High DCs and Medium DCs ($p = 0.000$, 95% C.I. = $[0.134, -0.322]$). We calculated Cohen's d and Hedge's g to complete the statistical analysis with effect size. *Table 9* shows that the significant differences between the three DCs levels identified through the ANOVA were particularly relevant – Cohen suggests that $d = 0.5$ represents a 'medium' effect size and $d = 0.8$ a 'large' effect size (Cohen, 1992). Hence, hypothesis 3b is fully supported.

Overall, these results resonate with extant literature in that, on the one hand, low investments in DCs as a core organisational resource-base lead to a lack of awareness of BC and, on the other hand, BCM represents a core target for DCs-rich organisations. Additionally, they show that the organisations that are ambitious in pursuing BC outcomes may alternatively focus their investments on coping capabilities or on filling their lack through more extensive stocks of the other DCs.

5. Discussion

Our research built on the literature on OR from a DCs perspective to examine which capabilities better support the implementation of BCM in the context of major disruptions. To this end, the study proposed an original operationalisation of DCs that mirrors three main resilience dimensions in the attempt to measure their granular effects on two perceptual measures of the tension towards BC, namely the perceived need for improving BC practices and the focus on target BC outcomes. In detail, we investigated the relations

Table 9. ANOVA results.

Source	Partial SS	df	MS	F	Prob > F			
Different DCs levels	9.635	2	4.818	32.82	0.000			
Residual	61.067	416	0.147		0.000			
					Tukey		Effect Size	
Focus on target BC outcomes	Contrast	SD	t	P > t	[95% Conf. Interval]		Cohen's d	Hedges's g
<i>Different DCs levels</i>								
Low DCs vs Medium DCs	-0.233	0.068	-3.43	0.002	-0.392	-0.073	0.542	0.541
High DCs vs Medium DCs	0.228	0.040	5.71	0.000	0.134	0.322	-0.645	-0.644
High DCs vs Low DCs	0.461	0.066	7	0.000	0.306	0.616	-1.191	-1.188

between anticipation, coping, and adaptation capabilities and BCM by measuring the effects of six distinct components of DCs for resilience in a pandemic setting. The results provide multiple contributions to the literature on BC and OR that are relevant for researchers and practitioners that deal with organisational responses and BC issues caused by diverse sources of disruption like long-term interlaced ecological crises (e.g. biodiversity loss, food crisis and climate change) (Asayama et al., 2021; Engler et al., 2021) and geopolitical disorders.

5.1. Implications for theory and practice

First, we hypothesised that organisations conceive BC as the outcome of systematic implementation of an indivisible set of interrelated requirements that, in line with ISO 22301, refer to leadership, planning, support, operation and performance evaluation issues. Our results confirmed our hypothesis, which means that organisations are unlikely to exert efforts only on isolated practices or initiatives related to BC, as it would be unlikely to produce the desired results. This study offers the first empirical confirmation of the diffused belief emerging from the literature (Herbane, 2013, 2020; Karim, 2011) and the ISO 22301 (BS EN ISO 22301, 2019) that BCM requires a systemic and holistic approach that is incompatible with a partial implementation of just some requirements. As such, organisations that decide to increase their BC should value the convergence of theoretical contributions and practitioners' common beliefs and invest in integrating BCM practices and activities across functions in a systemic way.

Second, we hypothesised that Anticipation, Coping and Adaptation and their underlying DCs for resilience are moderately correlated. Our results support the moderate sub-scale intercorrelations for the DCs in the resilience setting, confirming previous qualitative insights from the extant literature postulating their distinct but interrelated nature (Duchek, 2020; Karman, 2020). In particular, our results support the possibility for organisations to experience different cascading dynamics among these capabilities that, altogether,

contribute to business resilience. This interpretation resonates with previous studies that theorise the dependence of OR and the whole set of related capabilities on the levels of pressure towards adapting to ecological adversity (Clément & Rivera, 2017). As such, we contribute to OR scholarship by illuminating the possibility of modelling DCs for resilience as specific sets of a firm's abilities to anticipate, survive in, adapt to, and bounce forward during major disruptions (Grandori, 2020; Song, 2022). The implications are relevant, as organisations now have empirical evidence that OR is a multifaceted organisational property that reflects different pathways of development of capabilities for answering both adaptation and transformation needs. The variety of the resulting configurations of capabilities helps better understand OR as a 'whole-system' and organisation-specific response to uncertainties that consists of a system-wide activation and alignment of abilities (Horne & Orr, 1998). In this regard, our empirical results also confirm that OR is not a static attribute that organisations do or do not possess (Ortiz-de-Mandojana & Bansal, 2016). Instead, OR tends to reflect different pathways of capabilities' development that interact with how organisations notice and correct for maladaptive tendencies (Sutcliffe & Vogus, 2003). As such, our results integrate recent evidence that supports the interpretation of OR as conceptually evolving from a 'viable property' to a 'meta-capability of systems under specific conditions' (Ciasullo et al., 2022). Notably, this interpretation provides an empirical demonstration of the role of evolutionary routines in managing uncertainties (Winter, 2003).

Third, we hypothesised the existence of an association between DCs for resilience and BC. Results from our analysis suggest that when these bundles of capabilities are present with high intensity in organisations, they influence BC by raising awareness and the tension towards its improvement. We first contribute to BCM literature by providing evidence of interdependencies between the operational framework informed by the ISO 22301 and the capabilities to pursue effective mitigation and response to disruptions (Azadegan et al., 2020). In addition, despite being aware of the limitations intrinsic to hypothesising causation with non-experimental designs, our results are coherent with theoretical predictions that BC is an outcome of OR rather than its antecedent. As such, we provide further evidence to debate around the nomological order of these relationships, reinforcing the literature that understands BC as a 'natural outcome' of OR (Herbane et al., 2004; BCI, 2020).

Fourth, we hypothesised positive associations between each DCs for resilience and the perceived need to improve the implementation of BC practices. Even though it was possible to detect a significant relationship between higher levels of DCs for resilience and tension toward BCM, a granular investigation of the relations between each component of DCs for resilience and BCM shows that Coping capabilities have a more significant and direct role than the other components. In particular, Improvisation capability presents the strongest and more substantial connection with BCM. This result is not surprising. Although improvising in chaotic situations might sound counter-intuitive, it helps activate organisational resources and prevent extreme conditions from escalating into catastrophe (e.g. fire disaster as in Weick, 1993; and emergency response in SWAT teams as in Bechky & Okhuysen, 2011). In fact, from an evolutionary perspective on the search for solutions to new challenges, improvisation fosters trial and error dynamics that involve creative minds within the organisation and speed up the demonstration of suitable ways to handle unforeseen situations (Hadida & Tarvainen, 2015). Coordination usefully integrates improvisation in that it ensures the capability to process and retain the different contributions that arise from a variety of problem-solvers involved in the organisation, making the difference between flexibility and

chaos. This interpretation resonates with Teece's call for interpreting DCs as parts of systems that should be nested and networked to allow systemic change to emerge over a period of trials and errors (Teece, 2018). Furthermore, our results extend previous literature by illuminating the central role of short-term remedies to ensure survival, as well as protection and conservation of essential operating systems during extreme events (Madni & Jackson, 2009; Vogel & O'Brien, 2004). Improvisation and Coordination appear to be fundamental for the process of dynamically maintaining equilibrium, preserving the overall organisational viability during a major mishap (La Sala et al., 2022). Nevertheless, the fact that only Coping capabilities were found significant in predicting the tension towards BC practices improvement doesn't necessarily mean that Anticipation and Adaptation capabilities do not play a role in increasing the overall OR. In fact, the cluster and the ANOVA analyses suggest that the overall stocks of moderately intercorrelated DCs for resilience are crucial for BC even when Improvisation and Coordination do not prevail. This result extends seminal literature in DCs that suggest that the more organisations invest in deploying DCs, the more they become aware of the need to be open to organisational change (Ambrosini & Bowman, 2009; Kurtz & Varvakis, 2016). The opportunity to compensate for Improvisation and Coordination with other components of the DCs for resilience increases the number of organisations that might aspire to achieve OR.

Finally, it is worth noting that the originality of the contribution resides not only in the novelty of the research design, which embeds an unattempted approach to investigate the organisational antecedents of BC, but also in the directions for the further development of quantitative studies in this field. In fact, it validates a conceptualisation and a measurement model for DCs for resilience. Furthermore, it offers a new measurement instrument to assess BC dimensions, a concept rarely operationalised in organisational and management studies. As such, this represents a first attempt to unveil the black box of DCs for resilience by extending the application of Teece's seminal configuration Sensing, Seizing and Reconfiguring to the field of OR.

5.2. *Limitations and avenues for further research*

Like all studies, this research has some limitations that represent an opportunity for future studies to enhance the understanding of OR and BC. In fact, our results confirm that this is a promising research field that deserves additional efforts to address the flaws reported in this section.

The first limitation is that our findings originate from a statistical analysis performed on cross-sectional data concerning a limited sample of informants from a single country and during a single pandemic setting. Even though collected data were exemplary and functional to the research design, the current study is not conclusive as it represents just an exploratory attempt to investigate organisational and managerial issues concerning the deployment of organisational capabilities for BC. Thus, we encourage further research to extend the generalizability of current results by controlling for different background conditions and enlarging the number of responses because of the general principle that the larger the sample size, the smaller the error and the higher the precision of the results (Cohen, 1988).

Secondly, informants' tendency to overemphasise certain perceptive traits may have resulted in an overestimation bias, regardless of the procedural remedies taken into account in the survey design process. Future studies might overcome this methodological flaw using results triangulation using different data sources (e.g. complementing BC

perceptions with interviews and direct observations) or extending the survey to other informants from the same organisation to gain a more detailed portrait of organisational commitment in terms of DCs for resilience and BC.

Third, despite the conceptual model having a solid background in the recent theoretical development of OR (Duchek, 2020; Linnenluecke, 2017; Linnenluecke & Griffiths, 2012) and the statistics supporting model specification, the study limits its ambition to the analysis of the role of some key DCs for resilience as antecedents of BCM requirements. As such, the selected variables and relations do not pretend to be exhaustive, as other organisational factors may influence BCM requirements as conceived in this study. According to that, future research should extend our conceptual model by introducing other organisational variables in the pursuit of a more comprehensive model of OR. In this regard, one opportunity might be to investigate potential moderating mechanisms such as, for instance, those of specific leadership styles or top management team competencies (such as specific BC competencies) in the relation between DCs for resilience and the perceived need to improve the implementation of BC practices or the focus on target BC outcomes.

Fourth, given the cross-sectional nature of our study, which was developed in the context of an ongoing pandemic that generated complex and multiple impacts on organisations, inferring differences in the involvement of DCs throughout the disruption life cycle goes beyond our goals. Nevertheless, our findings suggest that it might be reasonable that Anticipation, Coping, and Adaptation capabilities constitute a mutually reinforcing resource base that foresees a context-dependent activation of its components. Therefore, our results suggest that further investigation is needed to understand the role of Anticipation and Adaptation capabilities in the face of different disruptions and throughout their development paths. Similarly, future research might usefully investigate from this capabilities-based perspective on OR whether the intercorrelations between the components of DCs for resilience depend on dynamics that involve abilities and resources even beyond the organisational boundaries, i.e. at the level of the ecosystem where they operate.

Finally, we assessed BCM requirements with two exploratory psychometric scales appositely developed for the study. Even though the study results show that both the measures are promising in terms of internal and external validity, future research is necessary to further validate them in different domains and settings and test the possibility of using them to collect perceptions from other managerial families.

6. Conclusion

The DCs theoretical framework has sometimes been criticised because DCs' micro-foundations are blurry and difficult to measure empirically (Arndt et al., 2022). On the contrary, criteria leading to BC have been standardised (BS EN ISO 22301, 2019). Consequently, it is not surprising that current literature still provides little explicit guidance on how to empirically leverage DCs to achieve BC. Our study provides empirical evidence in support of theoretical connections among these elements.

First, our study shows that organisations, regardless of the constraints imposed by limited resources, conceive BC as the outcome of a systemic process. Additionally, we provide evidence that organisations conceive DCs for OR as a set of moderately mutually reinforcing sub-dimensions concerning the organisational ability to anticipate, cope with, adapt, and thrive in unprecedented situations.

What is more, our study shows that the evolution of companies towards BC can be monitored by observing the development of DCs for OR. In this regard, the DCs theoretical

framework offers a solid background for identifying the priority processes that can help usefully reconfigure organisational competencies.

Finally, our study shows that it is impossible to achieve BC through a mechanical implementation of universal procedures (e.g. ISO 22301) that do not encompass an individualised organisational learning process. This means that, in pursuing BC, owning information and knowledge does not suffice by itself. Instead, pursuing BC requires getting prepared to take situational action and exploit available organisational resources.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Annex

Construct/Variable	Survey item details for variables analysis	
		Items
Risk Management Brustbauer (2016); Subramaniam et al. (2011)		<i>In our organisation qualified employees focus exclusively on identifying risks</i> <i>Risks are well understood throughout our organisation</i> <i>Our organisation has successfully implemented a risk-assessment program</i> <i>Our organisation is effective at prioritising risks</i>
Work Groups Autonomy Vera et al. (2016)		<i>Work groups could experiment freely without seeking management approval</i> <i>Work groups could try out their own ideas without seeking management approval</i> <i>Work groups could make their own decisions without seeking management approval</i>
Organisational Improvisation Vera et al. (2016)		<i>Our organisation is very good at dealing spontaneously with unanticipated problems</i> <i>Our organisation is very capable at responding extemporaneously to unexpected opportunities.</i> <i>Our organisation has a strong capability to creatively improvise</i>
Organisational Coordination Pavlou and El Sawy (2011)		<i>In our company, the output of our work is synchronised with the work of others.</i> <i>Our organisation ensures an appropriate allocation of resources (e.g. information, time, reports) within its groups.</i> <i>Group members are assigned to tasks commensurate with their task-relevant knowledge and skills.</i> <i>We ensure that there is compatibility between group members expertise and work processes</i>
Transforming Kump et al. (2018)		<i>By defining clear responsibilities, we successfully implement plans for changes in our organisation.</i> <i>Even when unforeseen interruptions occur, change projects are seen through consistently in our organisation.</i> <i>Decisions on planned changes are pursued consistently in our organisation</i> <i>In the past, we have demonstrated our strengths in implementing changes</i> <i>In our organisation, change projects can be put into practice alongside the daily business</i>
Reflection and Learning Oertel and Antoni (2014)		<i>We evaluate the results of our actions</i> <i>We check what we can learn from our achievements</i> <i>We consider what we can do about things that did not work out as expected</i> <i>We reflect upon how dissatisfying results emerged</i>
Improvement of BC practices (BS EN ISO 22301:2019)		<i>Identify one or more leaders able to manage the disruption</i> <i>Understand how to assign operational roles and responsibilities to every member of the organisation</i> <i>Mobilise necessary technical and financial resources to manage the disruption</i> <i>Coordinate the organisation towards the achievement of a common goal during the disruption</i> <i>Predispose guiding documents supporting the organisation in the disruption</i>

(Continued)

Continued.

Construct/Variable	Survey item details for variables analysis Items
Focus on target BC outcomes (BS EN ISO 22301:2019)	<p><i>Predispose adequate services, facilities, tools, work locations, ICT systems and infrastructure during the disruption</i></p> <p><i>Calibrate communication tools as to answer the needs and expectations of all parties involved during the disruption</i></p> <p><i>Promote a pro-active and diffused leadership to face the disruption</i></p> <p><i>Promote the awareness of the collective benefits deriving from the correct management of the disruption</i></p> <p><i>Increase awareness of implications and risks deriving from the incorrect respect of measures adopted to manage the disruption</i></p> <p><i>Increase the awareness that individual contribution is fundamental to ensure the correct management of the disruption</i></p> <p><i>Delivery of essential products and services</i></p> <p><i>Ensure workers safety during the disruption</i></p> <p><i>Contain costs arising from the disruption</i></p> <p><i>Reconfigure the organisation's capability to remain effective throughout the pandemic</i></p>