Resilience Capabilities to Build Resilience Capacities: The Role of Organization Strategy

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Abstract

This research explores how manufacturing firms can build their resilience capacities by enhancing their resilience capabilities. This could be achieved through performing resilience activities before disruptive events, during disruptions and after disruptions. Moreover, based on the contingency perspective, the research aims to investigate the role of organizational strategy in developing the appropriate set of resilience capabilities for building resilience capacities.

This research collected data by a survey using a structured questionnaire to measure resilience activities, resilience capacities, and organization strategy. Data was collected from managing directors of 147 Egyptian manufacturing firms. Cluster analysis was adopted to classify respondents into two clusters (cost-leadership vs. differentiation strategy). Then, research hypothesis was tested by multiple regression analysis to examine the direct effects of resilience activities constructs on resilience capacity for each cluster separately and the results were compared to draw conclusions about the effect of the different resilience capabilities on each resilience capacity.

The results indicated that the effectiveness of resilient activities in building capacities differs across different organizational settings. Thus, the development of resilience capabilities and activities are much dependent on the organization strategy.

These findings provide practitioners with useful roadmap to direct their efforts and resources towards developing the appropriate resilient activities according to their strategy.

This paper contributes to knowledge by providing a detailed explanation to the relationships between resilience activities, capabilities and capacities. Besides, it proposes and empirically tests the role of the organization strategy in directing organizational efforts to develop specific resilience capabilities to build specific resilience capacities.

***Keywords**: Resilience Capabilities, Resilience Capacities, Organization Strategy.*

Introduction

The notion of resilience has increasingly become a focal point for both scholars and practitioners in today's world. Efforts are made in hopes of understanding how organizations can anticipate, resist, respond, and recover from internal or external disruptions (Hillmann & Guenther, 2021).

Resilience as a concept has had an enduring impact on the practice of social work over the past years (Hillmann & Guenther, 2021). Recently, there has been growing interest in providing better understanding to the meaning of resilience and how to make organizations resilient to adversative incidents (Battisti et al., 2019).

Today, the ongoing globalizing trends and the advances of technologies has led to extraordinary increases in the efficiency and effectiveness of organizations. Yet, it came with increased vulnerability of

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organizations particularly when global supply chains get disrupted (Interos, 2021). Accordingly, efforts are made in order to understand the meaning of resilience when facing difficulties occurring in diverse forms such as environmental changes, technological shifts, pandemics, economic pressure and challenges, among others (Bruyaka et al., 2018; Eggers & Park, 2018; Park & Rogan, 2019; Shepherd & Williams, 2020).

In 1973, Holling was the first to present the notion of "resilience" with an emphasis on flexibility and learning in response to uncertain events (Akpinar and Özer-Çaylan, 2022a). Later, Sheffi (2005), in his influential book "The Resilient Enterprise", supported this by stating the need for organizations to develop reactive and proactive strategies in hopes of managing and recovering from disruptive events. As for resilience, it could be defined as the process of building the required capacity to maintain performance during adversity as well as restoring normal functioning after disruption (Williams et al., 2017 and Dahlgaard & Anninos, 2022).

There is some evidence that managing adversity may result in positive functioning (Williams & Shepherd, 2018). Accordingly, the research community and practitioners are now much concerned with examining the concept of resilience and trying to understand theoretically and empirically how to make organizations resilient. In that sense, understanding the different activities resilient organizations undertake to anticipate, respond and recover from adversity is indispensable (Shepherd & Williams, 2023).

Throughout previous years, several studies discussed the concept of resilience in the manufacturing context, however, there are little consensus among previous studies on an agreed upon conceptualization to resilience and its components (Ma et al., 2018; Duchek, 2020; Madani & Parast, 2023).

In addition, our current knowledge of resilience is being challenged with several disruptive events that occurred recently. The COVID-19 pandemic revealed that our knowledge of resilience is still limited (Bastas & Garza-Reyes, 2022 & Bartuseviciene et al., 2024). With the advent of this pandemic, organizations faced major disruptions to their operations and several supply chains failed to respond to such disruptions or even recover to their normal state (Aldrighetti et al., 2021 & Gupta et al, 2022). This pandemic revealed vulnerabilities in global supply chains and accentuated the urged need for resilience capabilities.

In that sense, Madani & Parast (2023) provided a comprehensive literature review to redefine the building blocks of resilience and provide a comprehensive model of resilience management. In their model, they identified resilience capability, capacity, activities and measures as the main components of resiliency. Accordingly, this research study is proposing that a resilient firm build its resilience capabilities through a set of activities that are performed prior to, during and after disruptions in order to form organization capacity to anticipate, cope and recover from adversative events.

Besides, it is claimed by this research that there is no one-fit-all capabilities that is appropriate to all organizational settings and thus the effectiveness of resilient activities is not equal across different organizational settings. Today, the contingency perspective became of a paramount importance to understand the different organizational activities and capabilities and how it affects organizational performance (Sousa & Voss, 2008 and Akpinar & Özer-Çaylan, 2022b).

Thus, it is proposed by this research that the effectiveness of resilience activities and capabilities are defined with respect to the organizational contexts. It is suggested that the development of resilience capabilities and the associated resilience activities will be much dependent on the competitive strategy of the organization. The competitive strategy determines and governs the configurations of all organizational settings including resources, processes and activities to deal with uncertainties (Rashidirad & Salimian, 2020).

Study Problem and Questions

Despite the increasing number of articles published in recent years that are trying to understand resilience and its effect on managing organizations, it is still considered an emerging topic (Alikhani et al., 2021 and Bartuseviciene et al., 2022). It seems that there is a lack of consensus among previous studies on a

solid understanding of how to make organizations resilient (Kamalahmadi & Parast, 2016; Ma et al., 2018; Duchek, 2020; Madani & Parast, 2023).

In addition, resilience has been bargained by various misrepresentations along the way (Akpinar & Özer-Çaylan, 2022a). There are mixed interpretations to the meaning of resilience capacity, capability and activities. Moreover, there is a clear lack of a solid framework that explains the meaning and actual roles and the interrelationship between the three terms in resilience management (Madani & Parast, 2023). Besides, there is a clear absence of a systematic thinking of how organizations build their resilience model. More effort is needed to understand the different paths available between disruptive events, organizational resilience and performance.

In accordance, the current study has two main questions:

- Q1: What is the relationship between resilience capacities, capabilities and activities?
- Q2: How could the organization strategy affect the relationship between resilience capabilities and resilience capacities?

Study Objectives

The main objective of this research is two folds. First, it aims to explore how manufacturing firms can build their resilience capacities by enhancing their resilience capabilities through performing a set of resilience activities before, during and after disruptions. Second, it aims to adopt the contingency perspective to investigate the role of organizational strategy in developing the appropriate set of resilience capabilities for building resilience capacities.

Literature Review

Resilient Capacities

Resilient capacity is a fundamental element of organizational resilience. It could be defined in terms of the extent to which organizations can predict, absorb and recover from major disruptions. The resilient capacity as an evolving concept is deeply studied within past literature reflecting the major role it plays in facing diverse challenges. The early work of Holling (1973) highlighted the importance of building firm's capacity in order to recognize, absorb and organize turbulences. Later, more researchers explored various dimensions of capacity encompassing the attentiveness and learning processes that boost the firm's resilience. For example, Bouaziz and Hachicha (2018) highlighted that organizational resilience incorporates a capacity to resist and cope with risky events coupled with an ability to preserve position as well as benefit from such unfavorable events. Similarly, Akpinar and Özer-Çaylan (2022a) indicated that developing organizational resilience requires capacity to make the system ready to prevent, while at the same time, adapt and at the end of adversity, re-organize to restore performance. Duchek (2020) suggested three successive resilience stages; anticipation, coping, and adaptation that constitute resilience capacity. While there may be some differences in the terminologies used and the classification of resilience stages in previous studies, the main idea of resilience stages is well defined in the literature (Madani and Parast, 2023). Accordingly, within the scope of this research, three main capacities were identified namely, anticipation, coping and recovery defining the organization's resilience capacities (Su et al., 2022 and Marzouk & Jin, 2022).

First, anticipation capacity (before disruption) is the extent of readiness to predict and sense unexpected events that might affect the normal operations of a company (Su et al., 2022). This dimension refers to the proactive identification and organizational readiness to sense the possibility of risk occurrence. Thus, the higher the anticipation capacity the more ability of the organization to expect possible disruptions and accordingly prepare for implementing preventive measures; thus, the less vulnerability to disturbances.

Second, coping capacity (during disruption) refers to the readiness of the system to absorb disruptions and rapidly respond to them to make the firm stay in a relatively normal operational condition (Mandani & Parast, 2021). This dimension is related to the agility and flexibility of the processes within the organization. According to Mandani and Parast (2021), coping capacity requires adaptive behaviors that makes firms manage their surroundings efficiently and effectively.

Third, recovery capacity (after disruption) refers to the degree of the system ability to restore its normal state and make the system better able to respond to future disruptions (Marzouk & Jin, 2022). This recovery dimension is crucial when it comes to long-term stability and growth. This is because, it focuses on the implementation of learnt lessons in setting future resilience and not solely on operations restoration.

Accordingly, these capacities require organization to develop specific organizational competences and capabilities to make them able to predict and cope with disruptions as well as recover from them (Akpinar & Özer-Çaylan, 2022a and Beuren et al., 2022). For example, building anticipation capacity requires the organization to develop capabilities with respect to their processes and resources to be able to analyze and predict possible threats. In addition, building coping capacity requires leadership capabilities as well as integrative and collaborative capabilities that will help organizations to have quick decision making (Mandani & Parast, 2021). Similarly, a capacity to recover from disruptions requires cultural and leadership capabilities of initiating continuous improvement mindsets that invests in effective resilience-building blocks (Marzouk & Jin, 2022).

Thus, organizations capacity to anticipate, cope and recover from disruptions could be realized through a group of organizational competences and abilities, resilience capabilities, that should be developed by the firm (Duchek, 2020).

Resilience Capabilities

Resilience capability is progressively recognized as a vital element for the survival, competitiveness and sustainability of organizations. Resilience capability refers to the required competence by an organization to build the needed capacity to anticipate, cope and recover from disruption (Duchek, 2020). It means the required skills or power an organization and its supply chain develop to predict unexpected events, respond and recover from them to ensure stability and steadiness (Kamalahmadi & Parast, 2016). It is crucial that firms develop capabilities to overcome anticipated and sudden changes (Aslam et al., 2020).

In that sense, previous literature proposed several resilience capabilities that jointly forms the required competence of an organization to become resilient. Christopher and Peck (2004) proposed a framework presenting agility, flexibility, and collaboration as the main resilience capabilities. Duchek (2020) referred to resources, behaviors, strategies, and processes as required capabilities that may enhance an organization's resilience. Dittfeld et al. (2022) referred to redundancy, collaboration, flexibility and agility as commonly applied resilience capabilities in previous literature. However, Madani and Parast (2023), through an extensive literature review, identified that a resilient firm must develop a set of specific capabilities in order to cope with disruptions before, during and after a disruptive event. Accordingly, there is wide acceptance in previous studies that culture, collaboration, leadership, resources, business processes, and infrastructures are the main organizational capabilities of resilience (Kamalahmadi & Parast, 2016; Aslam et al., 2020; Madani & Parast, 2023).

Organizational culture is considered a fundamental dimension in shaping resilience capabilities as it builds employees self-awareness to identify risks and thus adapt the organization to suit the environment (Su et al, 2022 and Mishra and Singh, 2023). According to Bhamra et al. (2011), having a resilient culture characterized by being flexible, adaptable and innovative is a must for robust capabilities. Thus, organizations that succeed in fostering resilient cultures are better equipped to manage and take advantage of dis-

ruptions. Likewise, collaborations improve capabilities within the resilience framework (Madani and Parast, 2023 and Mishra and Singh, 2023). Scholten and Schilder (2015) studied the importance of partnerships during tough times highlighting the importance of joining resources and implementing merging strategies to get better firm's recovery abilities.

Infrastructure refers to the organization's systems and assets such as information technology, manufacturing, transportation and power management systems that represent critical organizational factors to respond and recover from disruptions (Francis and Bekera, 2014).

In addition, Zahari et al. (2022) and Ivanov and Dolgui (2020) debated the role of leadership capabilities in using transformative techniques and technologies to enhance the organization's resilient capabilities. It is claimed by Madani and Parast (2023) that leadership plays a positive role that affects resilience by altering managerial and employee's behavior to make them more responsive and innovative in their operating environments.

Several previous studies provided evidence of the role of resources in developing organization's ability to absorb disruptions, maximizing the agility of the firm's response and quickly recover from their impact (Bhamra et al., 2011 and Madani and Parast, 2023). Finally, it is argued that business processes including digitalized technologies within organizations improve the decision-making processes which has a positive effect on organization predictive, adaptive and restorative capacities (Sincora et al., 2018).

In conclusion, it could be identified that the aforementioned resilient capabilities are the building blocks of forming organizational capacity to predict, absorb and get well and improve from disruptions. These capabilities could be seen as the results of group of resilient activities that should be performed by the organization and its supply chain to make them acquire the desired capabilities to be resilient.

Resilience activities

Resilience activities refer to the required actions that should be taken by a firm to build the required competences to develop resilience capabilities. It refers to the tactics taken in advance before a disruption to predict its occurrence, tactics undertaken during disruption to manage its effect as well as tactics taken after a disruptive event to overcome its consequences (Madani & Parast, 2023).

Various past studies supported the importance and benefits of resilient activities. Organizations that succeed in developing proper resilience activities are always better prepared to adjust to environmental changes and foster new opportunities (Lohmer et al., 2020 and Chowdhury et al., 2023). Thus, these organizations are always able to maintain their competitive advantage as long as they consistently focus on their resilience edge (Barney, 1991; Um and Han, 2021). Lohmer et al. (2020) and Chowdhury et al. (2023) realized that engaging in resilience activities significantly decrease downtime and make recovery times faster which heightened operational stability.

In that sense, previous literature proposed several resilience activities to increase resilience capabilities of an organization (Kamalahmadi & Parast, 2016; Aslam et al., 2020; Lohmer et al., 2020; Madani & Parast, 2023; Um & Han, 2021; Chowdhury et al., 2023; 2 Juan et al., 2022).

Some of these activities are proposed to predict and absorb disruption whereas some other activities are proposed to restore the organization to its normal state of operation. In that sense, previous studies identified several activities that are used by resilient organizations such as early warning system, readiness training, reserve capacity, information tracking, inventory levels, multiskilled workforce and risk management culture.

Early warning system are a mechanism that is implemented to detect distortions before happening and calculate critical lead time as a preventive mechanism (Madani & Parast, 2023). Readiness training equips employees with the needed skills to respond to unexpected events in an effective way which leads to organiza-

tional success (Duchek, 2020). Reserve capacity helps the organization maintain operations through buffer inventory capabilities and excess production capabilities (Karman, 2020). Information tracking offers continuous monitoring capabilities to all activities within the supply chain which in turn, enables the organization to address issues arising efficiently and effectively (Akpinar & Özer-Çaylan, 2022a & Pellegrino et al, 2023).

It could be identified that maintaining appropriate inventory levels is considered as an important restorative activity as it helps firms meet actual demand even in disruptive times (Karman, 2020). Multiskilled workforce is associated with workforce capabilities in terms of performing tasks that ensure operational continuity mainly during chaotic times (Hillmann & Guenther, 2021). Risk management culture is mainly responsible for cultivating a strong organizational culture of proactive risk identification and justification (Garrido-Vega, et al., 2021).

In conclusion, these pre, during and post resilience activities could be seen as the building blocks for forming resilience capabilities of organizations. However, it is still not clear the interplay between the various activities and how to implement and use them collectively in favor of the overall organizational resilience over time and among diverse disruptions (Pettit et al., 2010).

Organization Strategy

Organization strategy refers to the overarching framework that guide all organizational decisions, plans and actions (Rashidirad & Salimian, 2020). Thus, it is expected that all decisions taken will be guided by the strategic posture of the firm. Over the past decades, considerable amount of research has been directed towards understanding the different strategic frameworks that organizations can use in order to upscale their performance. In that sense, previous studies claimed that an organization can outperform its competitors by following one of the two Michael Porter's generic strategies: cost-leadership strategy or differentiation strategy (Porter, 1980; Keskin et al., 2021). Such a strategic dichotomy has been broadly studied and validated in diverse contexts and various industries. Companies following a cost leadership strategy aim to have better cost structure while providing their customers with acceptable products. This could be done by enhancing operational efficiencies through streamlining processes, minimizing production and overhead costs and using advanced technologies and leveraging economies of scale. As a result, firms can offer their customers and clients products and services with lower competitive prices and increasing market share (Keskin et al., 2021).

Whereas companies operating under a differentiation strategy aim at providing their customers with distinct features, superior value and premium prices aiming at building brand loyalty through reducing the price sensitivity (Kharub et al., 2022). Moreover, a differentiation strategy could be implemented by different ways, some of which could be creating innovative products with high value and quality, unique customer service, or advanced technology for a great consumer experience. Furthermore, organizations that implement a differentiation strategy and make their value offering distinctive can easily ask for higher prices and still maintain their market share by having higher customer retention rates (Zhang et al. 2015).

Hypothesis Development

Previous literature indicated that the firm is resilient when it has a capacity to anticipate, cope and recover from disruptive events (Madani & Parast, 2023). Resilient firms are required to perform resilient activities to build capabilities; that in turn create resilient capacities. However, developing the appropriate capabilities and the associated activities and their effectiveness to create resilience capacities is not universally applicable as it depends on some contextual factors (Alikhani et al, 2021). Duchek (2020) highlighted the need of more research and knowledge to understand the needed capabilities of organizations to be resilient and the associated conditions to develop such capabilities.

In that sense, Akpinar and Özer-Çaylan (2022a) and Akpinar and Özer-Çaylan (2022b) indicated that the required resilient capabilities are context specific. Similarly, Dittfeld et al. (2022) proposed the need to understand resilience capabilities from a contingency perspective. They explored the contingency effect of production system characteristics on the resilience capabilities of organizations. Their study concluded the need to investigate if commonly applied resilience capabilities can be equally applied in different organizational contexts.

Moreover, Aslam et al. (2020) emphasized the dynamic nature of capabilities; stressing on the importance of continuous improvement and learning by adapting the organizational strategies in response to opportunities and threats faced. Such work goes in parallel with the resource-based view (RBV) within the organization, which postulates that resilient capabilities are not static and can change through strategic decisions (Barney, 1991).

Accordingly, it is proposed by this research that the effectiveness of the resilient activities is contingent to the organization strategy. The organization competitive strategy is a key determinant to configure organization's decisions and activities (Kharub et al., 2022). Thus, the appropriate emphasis on resilience capabilities and the associated resilience activities should be guided by the organization strategy. In that sense, it is important to note that in order to meet organization strategic goals (cost leadership vs. differentiation), there should be accurate planning as well as alignment of decisions, activities and actions with the chosen strategy (Rashidirad & Salimian, 2020). Thus, when assessing the organizational resilience from a strategic point of view, it could be said that the strategic orientation of an organization will play a considerable role in determining the actions and decision taken by a firm to be resilient. Accordingly, organizations should develop their resilient capabilities and select their resilient activities with respect to their chosen strategy.

There should be a fit between the developed resilience capabilities and the strategic orientation of the firm to build true resilience capacity and accordingly make organizations better able to anticipate, cope and recover from disruption.

Consequently, this research uses the contingency perspective to understand how the different resilient capabilities affect the different resilience capacities with respect to organization strategy (cost-leadership vs differentiation). Therefore, the research hypothesis the following:

H1. It is expected that the required resilience capabilities for building specific resilience capacities differ with respect to organizational strategy.

Methodology

Research Approach / Design

The main aim of this study is to understand the relationship between resilience capabilities and resilience capacities. The current research categorizes the different resilience activities according to their role in developing specific resilience capabilities. In addition, the research is investigating the role of organizational strategy in selecting the appropriate set of resilient capabilities for building specific resilience capacities. Thus, this study adopted an exploratory quantitative research methodology.

The research started with reviewing previous literature to understand resilience capacities, resilience capabilities and resilience activities and their interrelationship. In that sense, the research explored the activities that are commonly implemented to develop resilience capabilities. In addition, the research investigated the relationship between resilience capabilities and resilience capacities.

The research data was collected through a structured questionnaire to measure the research variables. The designed questionnaire includes a set of indicators to measure each research construct. These measures were collected from several previous studies. To enhance the face and content validity, two academic professors and three industry experts were consulted to review and judge the questionnaire. In accordance, some irrelevant items were removed while some other items were modified to overcome their ambiguity.

Research Instrument

The final version of the used questionnaire comprises four sections: demographic information about respondents, resilience activities, resilience capacities, and organization strategy measures.

Resilience activities were measured by using 28 items collected from recent studies (Lohmer et al., 2020; Um and Han, 2021; Chowdhury et al., 2023; Juan et al., 2022). These items represent the most commonly mentioned activities that should be implemented to enhance organizations' resilience capabilities. In this section, respondents are required to assess the extent to which their firms implement each activity using the following Likert scale (1 = totally not implemented, 2 = plan to be implemented, 3 = initial implementation, 4 = partial implementation, and 5 = total implementation).

For measuring resilience capacities, 9 items collected from previous studies (Yu et al., 2019; Liu and Wei, 2022; Nikookar and Yanadori, 2022; Queiroz et al., 2022) were adopted to cover the three main capacities (anticipation, coping, and recovery). In this section, respondents are required to assess the extent to which their firms achieve each item using the following Likert scale (1 = poor achievement, 2 = acceptable achievement, 3 = moderate achievement, 4 = good achievement, and 5 = excellent achievement).

Finally, 5 measures were adopted from the studies of Parnell and Brady (2019); Keskin et al. (2021); and Kharub et al. (2022) to distinguish surveyed organizations based on their strategy. In this section, respondents are required to assess the degree of emphasis their firms placed on each decision within each item using the following Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree).

Sampling and Data Collection

This research focuses mainly on exploring the concept of resilience and its key elements within the manufacturing context in Egypt. Although Egypt, similar to other emerging markets, has been exhibited to a massive shock due to the COVID-19 pandemic, it was one of the few emerging economies that showed resilience during and after the pandemic (IMF, 2021). In this context, the research sampling frame includes the manufacturing companies that belongs to the investors' associations of Mergem and the free zone, that are located in El Amriya industrial zone, Alexandria, Egypt. El Amriya industrial zone was selected due to the presence of several companies that are export oriented. This fact makes them more vulnerable to international market disruptions and thus are more concerned with resiliency. The sampling frame contains 432 manufacturing companies with complete information. The target respondents for the research questionnaire were the managing directors. Due to their strategic responsibility and focus on long-term goals, they have the required knowledge about the research variables. Thus, the structured questionnaire was e-mailed to all the 432 companies' managing directors. Non-respondents were contacted again after two weeks. Finally, 147 usable questionnaires were returned which represents 34% response rate.

Non-response and Common-method Biases

To examine the collected data for non-response bias, the mean scores of all research variables were compared between early and late respondents by conducting independent t-test. The test results revealed no significant differences between early and late responses with respect to all the research variables which emphasizes that the non-response bias is not an issue in this study.

Since data for all research variables were collected from the same respondent, Harman's single-factor test was performed to check common method variance (CMV) (Podsakoff et al., 2003) to examine the variance of the data explained by the first extracted factor. The test results revealed that the highest extracted factor only explains 11.5% of the data variance (> 50%) which indicates the absence of common-method bias (Fok et al., 2022).

Data Analysis

Data analysis encompasses three main phases measurement scale validity and reliability, cluster analysis, and hypotheses testing. In the first phase, exploratory factor analysis (EFA) was performed using maximum likelihood extraction and varimax rotation to identify the structure of the resilience activities. This was followed by conducting confirmatory factor analysis (CFA) to examine the measurement scale psychometric properties in terms of reliability, and convergent and discriminant validity. Moreover, the measurement items determined from previous literature to assess the three resilience capacities were loaded onto their corresponding constructs, and the measurement scale validity and reliability was assessed using CFA.

In the second phase, two-step cluster analysis was adopted to classify respondents into two clusters based on their strategy (cost-leadership vs. differentiation).

In the third phase, research hypothesis was tested by conducting multiple regression analysis to examine the direct effects of resilience activities constructs on each of the resilience capacities for each cluster separately. Finally, results of regression analysis for both clusters were compared to draw conclusions about the effect of the different resilience capabilities on each resilience capacity.

Results

Scale Validity and Reliability

The Kaiser-Meyer-Olkin (KMO) index and Bartlett's Test were conducted indicating the adequacy of data for conducting EFA (KMO = 0.798 (> 0.7) and Bartlett's Test (p-value < 0.001)) (Hair et al., 2010). Four items were excluded due to either high cross-loadings (≥ 0.40) or small loadings (< 0.40) (Hair et al., 2010). Then, five constructs were extracted to classify the remaining 24 items. These (resilience capabilities) explain 59.59% of the total variance. According to the factor loadings, the five constructs were named: resources capability (RC), processes capability (PC), management capability (MC), culture capability (CuC) and collaboration capability (CoC) as shown in table (1).

Following this, confirmatory factor analysis (CFA) was conducted to assess the constructed measurement model by loading the resilience activities onto their extracted constructs (resilience capabilities). The resilience capabilities measurement model showed acceptable model fit indicators ($\chi 2/df = 1.550$; RMSEA = 0.061; GFI = 0.839; CFI = 0.925; NFI = 0.818) that are within the recommended cut-off points (Hair et al., 2010; MacKenzie et al., 2011) which support its unidimensionality. Reliability was assessed by calculating both Cronbach's α and composite reliability (CR) coefficients for each construct. As shown in table 1, Cronbach's α coefficients and CR exceeded the recommended threshold (> 0.70) for all constructs which supported their reliability (Hair et al., 2010). Convergent validity was confirmed as all the standardized factor loadings were statistically significant (p-value < 0.05) and above the 0.50 cut-off point. The average variance extracted (AVE) for all constructs were above 0.50 which also confirms their convergent validity (Hair et al., 2010).

By checking that the AVE for each construct is higher than its squared inter-construct correlations (SIC), the discriminant validity of the model was supported. Furthermore, EFA was carried out for all possible pairs of constructs and only two factors were extracted for each pair, confirming the measurement model discriminant validity. Table 1 shows standardized factor loadings, Cronbach's α values, composite reliability (CR), and average variance extracted (AVE) of each construct as well as the resilience capabilities measurement model fit indices.

Regarding resilience capacities, CFA was used to assess the measurement model fit showing acceptable model fit indicators ($\chi 2/df = 0.526$; RMSEA = 0.000; GFI = 0.981; CFI = 1.000; NFI = 0.974) that support its unidimensionality. The resilience capacities measurement model reliability, convergent validity and discriminant validity were supported as shown in Table 1.

Regarding strategy measures, Cronbach's α is greater than 0.7 (Hair et al., 2010). Thus, these results indicate accepted reliability of the strategy measures.

Table 1: Scale Validity and Reliability

Construct	Items	Standardized Factor Loadings	Cronbach's α	CR	AVE
	Resilience capabilities and activities Measurement Model Fit: CMIN/df = 1.550; RMSEA = 0.061; GFI = 0.839; CFI = 0.925; NFI = 0.818				
	Resources Capability (RC): **% Variance Explained = 13.51%**		0.881	0.881	0.600
Resilience Activity 18	Multiskilled workforce	0.786			
Resilience Activity 21	Readiness resources	0.810			
Resilience Activity 27	Multiple transportation modes	0.844			
Resilience Activity 13	Multiple suppliers	0.807			
Resilience Activity 23	Information technology connectivity	0.602			
	Processes Capability (RC): **% Variance Explained = 13.45%**		0.860	0.863	0.519
Resilience Activity 01	Production flexibility	0.764			
Resilience Activity 12	Spare capacity	0.607			
Resilience Activity 08	Back-up utility	0.823			
Resilience Activity 11	Sourcing flexibility	0.529			
Resilience Activity 16	Distribution flexibility	0.853			
Resilience Activity 02	Buffer stock	0.692			
	Culture Capability (CuC): % Variance Explained = 12.73%		0.870	0.872	0.579
Resilience Activity 05	Change management culture	0.808			
Resilience Activity 04	Risk management culture	0.711			
Resilience Activity 03	High-risk awareness and evaluation	0.654			
Resilience Activity 9	Early warning signal	0.880			
Resilience Activity 26	Business intelligence	0.734			
	Collaboration Capability (CoC): % Variance Explained = 9.93%		0.832	0.829	0.552
Resilience Activity 14	Information sharing	0.693			
Resilience Activity 22	Collaborative planning AND demand forecasting	0.690			
Resilience Activity 24	Collaborative decisions	0.692			
Resilience Activity 28	Investing in suppliers' plant	0.878			
	Management Capability (MC): % Variance Explained = 9.93%		0.827	0.829	0.552
Resilience Activity 06	Contingency planning	0.852			
Resilience Activity 15	Frequent communications	0.730			
Resilience Activity 10	Adaptive / flexible structure	0.786			
Resilience Activity 07	Response team	0.576			
	Resilience capacities Measurement Model Fit: CMIN/df = 0.526; RMSEA = 0.000; GFI = 0.981; CFI = 1.000; NFI = 0.974				
	Anticipation Capacity (ACap):		0.857	0.859	0.669
Anticipation Capacity 1	Ability to maintain high situational awareness at all times	0.858			
Anticipation Capacity 2	Ability to predict possible disruptions, their probabilities, and severity	0.813			
Anticipation Capacity 3	Preparation to deal with outcomes of disruptions	0.782			
	Coping Capacity (CCap):		0.746	0.758	0.519
Coping Capacity 1	Ability to provide a quick response to disruptions	0.867			
Coping Capacity 2	Ability to cope with changes brought by disruptions	0.702			
Coping Capacity 3	Maintain a desired level of control over structure and function at the time of disruption	0.559			
	Recovery Capacity (RCap):		0.803	0.811	0.593
Recovery Capacity 1	Ability to adapt to the disruption easily	0.917			
Recovery Capacity 2	Quick return to the original state after being disrupted	0.723			
Recovery Capacity 3	Move to a new, more desirable state after being disrupted	0.645			

Cluster Analysis

The second step of the analysis aims to classify the respondents into two clusters. Two-step Cluster analysis is used to classify this research data according to the 5 items used to measure organization strategy. This analysis results in two clusters; the first cluster consists of 67 manufacturing firms while the second cluster contains the remaining 80 firms. Through reviewing the 5 items used for the classification, it appears that firms located in the first cluster (N=67) achieve high scores in items targeting the distinctiveness of their product offerings and thus, they were classified as differentiation strategy implementers. While firms located in the second cluster (N=80) achieve high scores in items targeting the cost dimension of the firm and thus, they were classified as cost leadership strategy implementers.

Hypotheses Testing

For each cluster (Cost-leadership and Differentiation), three regression models were constructed with the five resilience capabilities (processes capability (PC), management capability (MC), resources capability (RC), culture capability (CuC) and collaboration capability (CoC)) as independent variables and each of the resilience capacities (anticipation, coping, and recovery) as the dependent variable in each model respectively. Regression analysis results illustrated in table (2).

Regarding the cost-leadership strategy group, regression analysis results indicated that each of the resilience capabilities has positive significant effect on one or more of the resilience capacities. In specific, results showed that management (MC), resources (RC), and culture (CuC) capabilities have positive significant effect on coping capacity only while process capability (PC) has positive significant effect on recovery capacity only. Finally, collaboration capability (CoC) has positive significant effect on both anticipation and coping capacities.

Table 2: Regression Analysis Results

Organization Strategy	Differentiation Strategy (N = 67)			Cost-leadership Strategy (N = 80)		
Resilience capabilities	**Anticipation**	**Coping**	**Recovery**	**Anticipation**	**Coping**	**Recovery**
Constant	0.898	4.222	2.142	2.111	3.153	0.758
Processes (PC)	0.139	0.168	0.724***	-0.131	0.083	0.816***
Management (MC)	0.435*	0.444***	0.205*	0.305	0.261*	-0.134
Resources (RC)	0.184	0.242**	-0.128	0.008	0.210*	0.025
Culture (CuC)	0.416**	-0.034	0.012	0.012	0.356**	0.004
Collaboration (CoC)	0.307*	0.217*	-0.076	0.634***	0.278*	-0.130
R^2	34.7%	31.0%	59.6%	34.7%	23.1%	52.3%
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

Similarly, for the differentiation strategy group, regression analysis results indicated that each of the resilience activities has positive significant effect on one or more of the resilience capacities for this group. In specific, results showed that management capability (MC) has positive significant effect on all the three resilience capacities. Collaboration capability (CoC) has positive significant effect on both anticipation and coping capacities. Culture capability (CuC) has positive significant effect on anticipation capacity only while resources capability (RC) has positive significant effect on coping capacity only. Finally, process (PC) has positive significant effect on recovery capacity only.

Accordingly, the aforementioned results indicates that the required resilience capabilities for building specific resilience capacities differs with respect to the organization strategy. Figure (1) summarize the resilience model that highlights the differences between cost leadership-oriented and differentiation-oriented organizations in terms of the specific capabilities required for building each capacity.

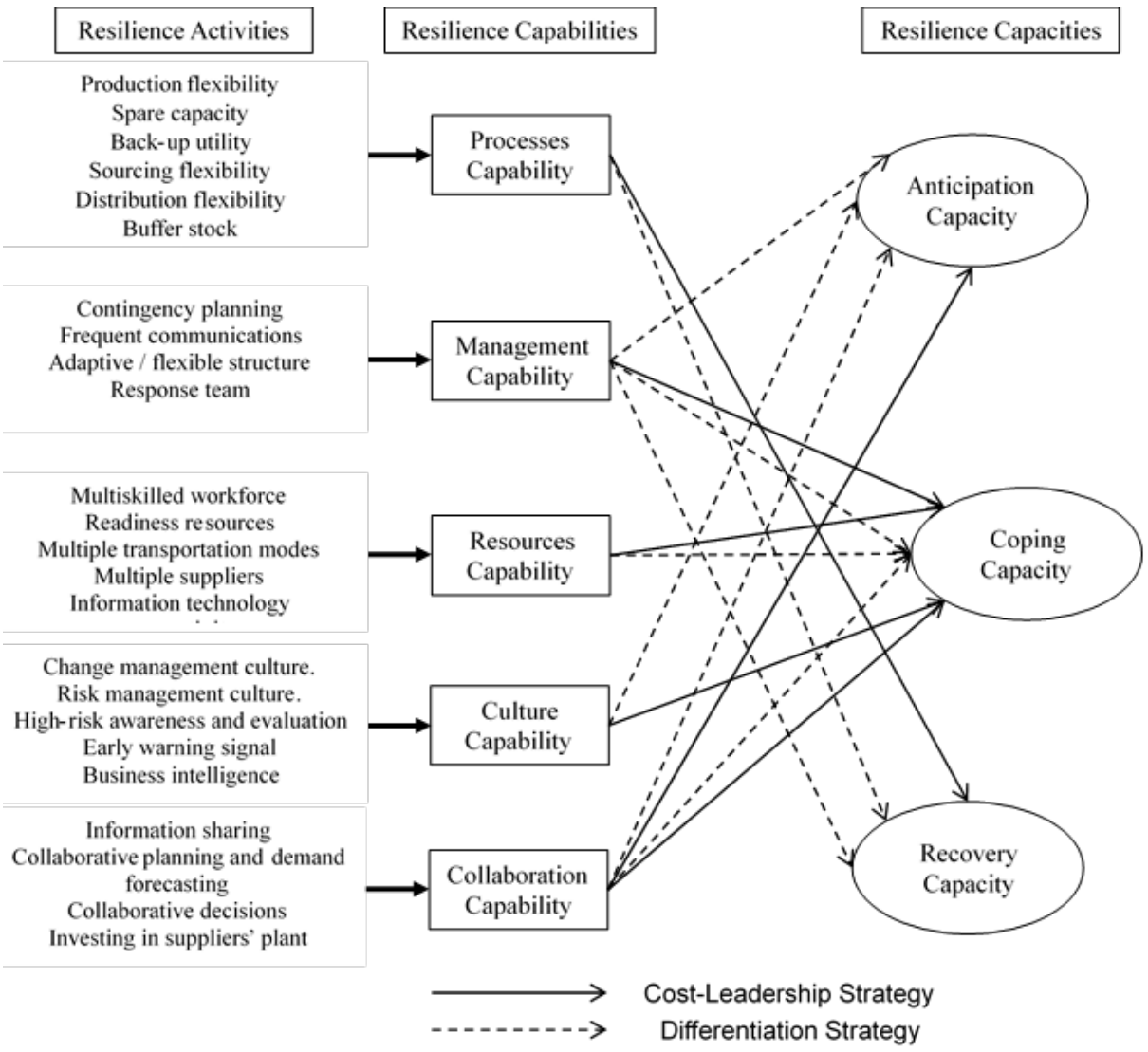

Figure 1 – The Resilience Model

Discussion

This research examined the relationship between resilience capacity from one side and resilience activities and capabilities from the other side from a contingency perspective. The research claims that this relationship is contingent to the strategic orientation of firms. It is proposed that companies following a cost leadership strategy will prioritize their resilience capabilities differently from those who pursue a differentiation strategy. Previous literature confirmed that organizations are required to develop anticipation, coping and recovery capacities to be resilient. However, Alikhani et al. (2021) identified that the capabilities required to build resilience are not universally applicable as it depends on some contextual factors. There appears to be a clear need for more research and knowledge to understand the needed capabilities of organizations to build resilience capacities and the associated conditions to develop such capabilities. The research explores the specific capabilities required by manufacturing firms to build specific resilience capacities under the assumption that the strategic orientation of an organization will shape the actions and decisions taken by a firm to be resilient.

First, this research paper explored previous literature to identify the commonly used activities that build resilient organizations. These activities were classified into five groups of resilience capabilities.

Similar to the studies of Kamalahmadi and Parast (2016), Aslam et al. (2020) and Madani and Parast (2023), these capabilities were named management, business processes, resources, culture, and collaboration representing the main capabilities required to be resilient.

Second, the research examined the relationship between resilience capabilities and resilience capacities with respect to the strategic orientation of the examined sample. The research proposed, similar to the studies of Akpinar and Özer-Çaylan (2022a) and Akpinar and Özer-Çaylan (2022b), that the relationship between resilience capabilities and resilience capacities is context specific. Thus, this study concludes that the strategic orientation of the firm shapes its decisions regarding the specific capabilities needed by the organization to develop specific resilience capacities. This finding supports several previous literature contentions that resilience capabilities are not static and are much dependent on the features that are shaped by organization strategic decisions (Barney, 1991 and Aslam et al., 2020). This finding also supports the previous study of Akpinar and Özer-Çaylan (2022b) who indicated that applying resilience differs according to the business environment and is organizational context.

In that sense, the results indicated that companies following a cost leadership strategy are building anticipative, coping and recovery capacities to build their resilience capacity. However, they are placing higher emphasis on building coping capacities (during disruption) at the expense of the anticipation (before disruption) and recovery capacity (after disruption). It is widely accepted that the main concern of companies following a cost leadership strategy is to have better control on their cost structure (Celikyay et la., 2023 and Ali et al., 2021). Thus, these companies are expected to be quite conservative in their spending patterns to build proactive capabilities to sense the possibility of risk occurrence (before disruption). Besides, they will try to recover and make the system better able to respond to future disruptions with the least possible cost (after disruption). Rather, they will be more concerned with the capabilities required to cope with disruptive events and make their processes return to their normal state (during disruption).

Similarly, it appears that companies following a differentiation strategy are building anticipative, coping and recovery capacities to build their resilience capacity. However, they are placing almost equal emphasis on building the three capacities (during disruption, before disruption and after disruption). Previous studies claimed that the companies following a differentiation strategy are targeting customers that are not price sensitive and thus they are ready to exert extra effort and uphold the extra cost needed to build their resiliency capabilities (Zhang et al., 2015 and Kharub et al., 2022). Thus, these companies are expected to be less conservative in their spending patterns to build proactive capabilities to sense the possibility of risk occurrence (before disruption), to cope with disruptive events and make their processes return to their normal state (during disruption) and to recover and make the system better able to respond to future disruptions (after disruption).

From the analysis, the results revealed that firms, regardless of their strategic position, develop collaborative capabilities to build their anticipation capacity. This supports the claimed proposition by Madani and Parast (2023) that developing partnerships with upstream and downstream partners provides better visibility to unforeseeable events. However, the results indicated that companies following a differentiation strategy will have an additional concern to enhance their anticipation capacity through building their management and cultural capabilities. These companies, due to their differentiation orientation, are less conservative in their spending pattern, and thus are ready to develop additional capabilities to better anticipate disruptions.

During disruptions, the coping capacity, regardless of the strategy, is influenced by building management, resources and collaboration capabilities. This supports previous studies that indicated the positive role of management, resources and collaboration in building coping capacity (Bhamra et al., 2011; Scholten & Schilder, 2015 and Zahari et al., 2022). However, culture capabilities appeared to be important in developing coping capacity in companies following a cost leadership strategy.

It seems that companies following a cost leadership strategy postpone their paying on culture capability until disruption occurs while those who are following a differentiation strategy are considering cultural capability to better anticipate disruptions.

After disruption, companies build their recovery capacity through building processes capabilities regardless of their strategy. This supports previous studies that claimed the role of process capability in recovering from disruptions (Sincora et al., 2018). However, the results indicated that companies following a differentiation strategy will have an additional concern to enhance their recovery capacity through building their management capabilities. These companies, due to their differentiation orientation, are less conservative in their spending pattern, and thus are ready to develop additional capabilities to better recover and learn from disruptions.

Conclusions, Limitations and Future Research

The contribution of this research is twofold. Firstly, the research provides detailed explanation to the relationships between resilience activities, resilience capabilities and resilience capacities. It could be concluded that a resilient firm build its resilience capabilities through a set of activities that are performed prior to, during and after disruptions in order to form organization capacity to anticipate, cope and recover from adversative events. Secondly, the research concludes that there is no one-fit-all set of capabilities that is appropriate to all organizational settings and thus the effectiveness of resilient activities is not equal across different organizational settings. It could be concluded that the development of resilience capabilities and the associated resilience activities to build resilience capacities are much dependent on the competitive strategy of the organization.

Theoretically, the proposed contingent approach of examining the relationship between resilience activities and capabilities to build resilience anticipative, coping and recovery capacities provides deep understanding on how to make an organization resilient. Thus, the proposed contingent effect of organization strategy on the relationship between resilience capabilities and resilience capacities provide new insights to understand how the different resilient capabilities affect the different resilience capacities with respect to organization strategy (cost-leadership vs differentiation). Academics should be aware that studying resilience in organizations should be undertaken from a continency perspective. The organization strategy plays a vital contextual role in determining what resilience capabilities to implement to build specific resilience capacities.

From a managerial point of view, this study provides useful roadmap for managers to build resilient organizations. Managers should be aware that their resilient capacities are shaped according to specific capabilities that are determined according to their strategy. Thus, managers should direct their efforts and resources towards developing the appropriate resilient activities according to their strategy and be fully aware what type of resilient capacity they are aiming to build.

However, there are some limitations associated with this research study. First, the generalisation of this research conclusions should be cautioned as the examined sample of this study is the Egyptian manufacturing organizations. Second, the low response rate is another limitation to the generalizability of the results. However, this research was intentionally designed to include companies from diverse industries to counteract these limitations.

Accordingly, several opportunities for future research are present. First, it appears to be a good research opportunity to investigate what resilient activities develop what resilient capacities. It would be useful to monitor the direct effect of individual resilient activities on developing specific resilient capacities.

This research is an exploratory study that explores the effect of strategic orientation on building resilient capacities. Thus, another interesting research opportunity is related to conducting case study research to better understand how resilient firms develop it capabilities to build resilient capacities before, during and after disruption.

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