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THE IMPACT OF CRISIS ANTICIPATION AND RESPONSE ON INNOVATIVE BUSINESS PRACTICES: A STUDY OF SELECTED MINING COMPANIES IN JORDAN

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Abstract
The mining industry is characterised by a high level of crisis surrounding it. Therefore, proactive crisis management has become crucial. This study aims to investigate the impact of crisis anticipation and response (CAR) on innovative business practices (IBP) in the Arab Potash Company and Jordan Phosphate Mines Company. The study adopted a quantitative, descriptive-analytical research design and draws on Dynamic Capabilities Theory. The data was collected from a structured online questionnaire from the selected companies. A total of 391 responses were collected, which is enough to conduct the regression analysis to test the hypothesis. The results indicate that the CAR positively and significantly impacts IBP. The findings also suggest that organizations with more robust preparedness mechanisms, coordinated response systems, and early-crisis-detection skills are better able to support adaptive and innovation-oriented organizational practices. Moreover, the results imply that the capability for anticipation and response to crises is a crucial strategic capability for improving operational responsiveness, process improvement and organizational flexibility in high-risk industrial environments.

Keywords: Arab Potash Company; Crisis Anticipation and Response; Dynamic Capabilities Theory; Innovative Business Practices; Jordan Phosphate Mines Company; Jordanian Mining Sector; Proactive Crisis Management.

Introduction

Nowadays, organizations face greater uncertainty than ever due to technological disruption, geopolitical tensions, economic volatility and frequent operational crises (Malynovska et al., 2025). Such situations lead organizations to significantly change their approach, predictions and sustainability to keep pace with these rapid, sometimes unexpected fluctuations. In risk-sensitive, competitive industries such as the mining sector, the capacity to foresee and act on a crisis is no longer just an operational requirement but has become an essential organizational skill for continuity, flexibility and long-term competitiveness (Fernandez, 2020; Jonek-Kowalska & Nawrocki, 2019).

In the face of increasingly complex and common crises, organisations are under greater pressure to adopt proactive strategies that enable them to take early warnings seriously, mobilise resources quickly and reduce the downside risks of unanticipated disruptions. In this context, the importance of crisis anticipation and response (CAR) has increased in contemporary management research (Kashri, 2024; Rizk & Challita, 2025). Anticipation can be a strength for organizations, enabling them to sense changes in the environment, plan for potential disruptions, and make timely strategic responses. At the same time, crisis response systems help facilitate organizational flexibility, coordination and decision making in times of uncertainty.

Dynamic Capabilities Theory (DCT) suggests that these capabilities embody an organization's capacity to sense threats in the environment, seize opportunities when environmental conditions are uncertain, and reconfigure resources within the organization in a manner that assists adaptation and survival (Teece, 2007). Thus, capabilities for crisis anticipation and response can be thought of as

strategic capabilities that can help organizations maintain performance and engage in innovation even in uncertain times (Helfat et al., 2007).

Meanwhile, innovation has captured the attention of many organizations as a key way to thrive in uncertain business climates (Tidd & Bessant, 2024). During crisis situations, such as those faced by organizations, there is often strong pressure to change and adapt existing practices, processes and ways of operating and to engage in more adaptive forms of managerial and strategic behaviour. In this respect, innovative business practices (IBP) have become crucial to preserving competitiveness and responding to new environmental requirements.

In this study, IBP is defined as a multidimensional construct that captures an organization's capacity to create and execute new ideas, initiatives, and strategic moves (Kör et al., 2021). Two main elements, innovation and entrepreneurship, operationalize this construct, which includes opportunity recognition, proactiveness, risk-taking, and development and implementation of new goods, processes, and practices (Al-Aqrabawi, 2023; Al-Baqom, 2022).

These practices are not confined to product innovation; they also involve organizational flexibility, process improvements, strategic experimentation, and entrepreneurial responsiveness (Zhao, 2005). Organizations that can forecast crises and respond appropriately may thus be more likely to maintain innovative momentum and develop adaptive business practices that strengthen their organizational resilience and sustainability.

Although the literature on crisis management (Malhooz, 2025; Masadeh et al., 2026; Purkayastha & Singh, 2024) and organisational innovation (Javanmardi Kashan et al., 2021) is expanding, the link between CAR and innovative business practices remains relatively under-researched, especially in high-risk industries. Most existing studies have focused on crisis recovery (Mair et al., 2016), organizational resilience or operational continuity in industries such as healthcare (Emami et al., 2024), manufacturing and SMEs (Kukanja et al., 2022; Puumalainen et al., 2023). Less focus has been placed on how proactive crisis management capabilities can foster innovation-oriented practices in resource- and operation-dependent industries such as mining.

The Jordanian mining sector is a relevant context for analysing this relationship, as it is a strategic sector in the country's economy and is vulnerable to uncertainties in operations, the environment and the market (Forum, 2022; Taib, 2025). In such a complex world as the one faced by major mining companies: Arab Potash Company (APC) and Jordan Phosphate Mines Company (JPMC), the ability to prepare for crises and adapt to change is becoming a crucial element in maintaining competitiveness and innovation within organizations.

In view of this, this study aims to analyse the impact of CAR on IBP in selected mining companies in Jordan. This research seeks to answer the following research question: What is the effect of the CAR on IBP in APC and JPMC? The research aims to extend the discussions on the role of proactive crisis management capabilities in fostering adaptive, innovation-oriented organizational behaviour in uncertain environments, grounded in the DCT. Beyond its theoretical aspects, the paper offers practical implications for organizations in high-risk sectors on the critical role of crisis preparedness and responsive capability in driving innovation and sustainable organizational development.

Innovative Business Practices in Crisis Environments

IBP enables organizations to adapt to uncertainty and environmental demands and to compete. Innovation and entrepreneurial orientation are combined to define IBP, which encompasses the

creation of new goods and processes, as well as the organization's ability to anticipate and capitalize on disruption-related opportunities.

Schumpeter (1934) introduced the concepts of innovation and entrepreneurship, but scientists have viewed them differently (Landström et al., 2015). Few studies have attempted to conceptualize the link between innovation and entrepreneurship (Brazeal & Herbert, 1999) and their complementary roles (Brem, 2011; Zhao, 2005). However, innovation and entrepreneurship are continual, complementary activities. Entrepreneurship enhances the economic and social value of innovation (Yang et al., 2025). Innovation depends on entrepreneurship, which nurtures it. Innovation and entrepreneurship are present throughout the process, but the focus switches from novelty to value. Not necessarily simultaneous, they overlap and are somewhat parallel (Brem, 2011).

Innovation usually means new or improved products, processes, or organizational approaches. Entrepreneurship involves finding opportunities, taking risks, and acting (Miller, 1983). Organisations with IBP often blend these two dimensions (Lumpkin & Dess, 1996).

This interaction intensifies during crises. Crisis organizations must rethink routines, allocate resources, and make judgments in uncertain times. Depending on how firms handle the crisis, these conditions might boost or hinder innovation (Bundy et al., 2017). . Crisis can generate risk aversion and operational rigidity. They help others experiment and evolve by breaking established patterns.

Corporate entrepreneurship, or intrapreneurship, drives this process. Strategic renewal, innovation, and new business models inside current organizations are included (Zhara, 1991). Corporate entrepreneurship can arise from necessity rather than opportunity when organizations seek alternative ways to survive and compete during crises. Leadership orientation, corporate culture, and resource flexibility affect how much such conduct is practiced.

Business innovation includes process improvements, organizational reorganization, and new value-generation techniques, not just technology. There are four types of innovation: product, process, marketing, and organizational (Sulton & Sawabi, 2022). In industries like mining, where cost savings, safety, and environmental management are objectives, quality and efficiency innovation is incremental. Crises can accelerate revolutionary innovation, especially when current systems fail.

When crises disclose organizational inefficiencies or flaws, they can spur innovation, according to research. Economic pressures can spur process innovation, which boosts efficiency, whereas externalities such as regulatory changes or environmental mishaps might prompt enterprises to adopt new technologies and practices (Archibugi et al., 2013).. Crisis-related resource constraints may impede innovation investment, putting short-term survival against long-term growth.

This tension is especially pronounced in capital-intensive industries such as mining. The high operating expenses and risk may discourage experimentation and encourage conservative management. Conversely, crisis-driven demands can spur innovation in operational efficiency, environmental sustainability, and supply chain management. Thus, inventive business methods in the mining industry are likely to be built on demand.

Organizational learning is another significant IBP characteristic (Mitroff et al., 1988). Crises generate massive volumes of data under unclear, time-bound conditions. Companies that can capture, process, and use such data to make decisions are more creative. Learning organizations enable long-term

flexibility by continuously improving and integrating knowledge (Argyris & Schön, 1998; Mitroff & Anagnos, 2000).

However, not all firms respond to crises innovatively. Crisis management may prioritize damage control and conformity over learning and innovation. The association between crisis management and IBP appears contingent. The same problem can inspire innovation in one company and stagnation in another.

CAR is an independent variable that impacts creative business strategies in this study. The key idea is that flexible, learning-oriented, and proactive crisis management would boost innovation and entrepreneurship. However, rigid and reactive tactics can reduce these.

APC and JPMC groups value this. These high-risk, resource-dependent enterprises face operational instability, market volatility, and regulatory challenges. Their ability to apply crisis lessons to new practices may determine long-term performance and competitiveness.

The literature does not adequately cover these organizations' IBP development and maintenance. Most research on the Jordanian mining industry focuses on output, exports, and economic contributions rather than organizational behaviour and innovation. This gap underscores the need to examine how crisis management affects entrepreneurship and innovation (Al-Aqrabawi, 2023; Al-Arqan, 2018; Al Rawashdeh et al., 2016).

Dynamic Capabilities Theory (DCT)

DCT is one of the most popular theories used to describe the adaptation of the organization to an unstable and changing environment. This theory came in the wake of criticism against the traditional theories, which emphasized the ownership of the resources as the main source of competitive advantage. But according to DCT, ownership of resources is not enough; the organization must also be able to redeploy and develop its resources in response to the fast-paced changes in the environment (Teece et al., 1997).

The theory suggests that the organizations that are able to sense the changes and threats that are present in the external environment (Sensing), seize the opportunities and respond to challenges effectively (Seizing) and reconfigure the internal resources and processes to adapt and sustain continuity (Reconfiguring) are the ones that are successful (Teece, 2007). These have become more significant in today's business world, where uncertainty abounds, and economic and operational conditions are unstable, especially in industries that are constantly under operational stress and risk, like the mining industry (Apascaritei & Elvira, 2022; Helfat et al., 2007).

Based on this theoretical background, CAR can be seen as dynamic organizational capacities, which make it possible for organizations to actively cope with unexpected situations more effectively (Kaltenbrunner & Reichel, 2018). Organizations with the ability to prepare for crises, to identify early warning indicators for risks, and to have a flexible response plan in place are more likely to be able to reduce the negative effects of crises and stay on course. Furthermore, the speed of response and the reorganization of resources and processes during a crisis reflect an organization's ability to continuously respond to changes in its environment, which is the very core of DCT.

In this study, DCT helps to understand the link between the anticipation and reaction to crisis and innovative business practices. Those with stronger capabilities to sense and respond to crises have the

potential to be more flexible and innovative in their business practices, whether by improving internal processes, adopting more flexible management styles, or creating new solutions in difficult situations. Thus, the theory offers an appropriate lens for understanding modern crisis management and its potential to drive innovation and sustainability for Jordanian mining companies, APC and MPMC, in a complex, risky and uncertain context.

Review of Literature

Crisis research has evolved from the notion of a crisis as a singular disruptive event to a complex process of anticipation, coordination, response and learning in the organization. Pearson and Clair (1998) suggested that crisis management should not be restricted to post-crisis response but should include organizational preparation, interpretation, and coordinated action in pre- and crisis situations. Likewise, Bundy et al. (2017) stated that there are two emerging research pathways in crisis management: internal organizational responses and external stakeholder management. According to their review, crises impact not only the continuity of operations but also strategic decision-making, reputation and long-term organizational adaptation.

Within this broader discussion, the anticipation and response to crisis have been emerging as a key capability for organisations functioning in a state of uncertainty. According to Williams et al. (2017), organizational responses to adversity are not just about recovery, but also about the anticipation of adversity, adaptation of resources and resilience over time. This perspective is significant because it transforms the act of crisis management from a defensive posture into a strategic capability. The ones that catch the signs, make alternative arrangements and act swiftly will be more likely to keep continuity and adjust their internal procedures when the weather is rough.

DCT offers a viable conceptual framework for the relationship between the two. Teece et al. (1997) suggested that dynamic capabilities are the ability of the firm to integrate, build, and reconfigure internal and external competencies to adapt to the rapidly changing environments. Subsequent research by (Teece, 2007; Teece, 2018) further refined the concept to the idea of dynamic capabilities, including the ability to sense opportunities and threats, seize them with strategic actions, and transform or reconfigure organizational resources. This logic is very pertinent to the anticipation and response to a crisis, as sensing capability is manifested in anticipating a crisis, and seizing and reconfiguring capability is manifested in responding to one.

A few studies have associated crisis capabilities with adaptation and innovation. For instance, studies on business model adaptation in the COVID-19 crisis have revealed that business models were adapted, resources were reorganised, and new practices were adopted in order to sustain the business under emergency situations. Peñarroya-Farell and Miralles (2022) demonstrated the ability of small companies to adapt to crisis situations using improvisation and emergency management, and Clauss et al. (2021) revealed that small companies found alternative models of operation as a way of innovating amid the pandemic. These studies indicate that crises can be a pressure for organisations to change their routines and implement new modes of operation.

The connections between resilience, crisis response, and innovation have also been gaining attention. Asare-Kyire et al. (2023) revealed that organizational resilience has a positive effect on innovation performance and firm performance in the hospitality industry. They found that companies that are more resilient are better equipped to be able to innovate in uncertain conditions. Likewise, Garrido-Moreno et al. (2024), drawing on DCT, found that service innovation and organizational resilience are

relevant to improving business performance. These studies present evidence that crisis-related capabilities can serve as a means for organizations to transition from a survival to an innovation-oriented mode of behaviour.

New empirical research has also highlighted the importance of dynamic capabilities in a firm's ability to react to crises and adapt its business strategies. In the context of the COVID-19 pandemic, Huang and Ichikohji (2024) studied SMEs in China and concluded that dynamic capabilities played a role in crisis management and business model innovation. Sahebalzamani et al. (2023) also combined dynamic capabilities with business model innovation in crisis management in the tourism industry, revealing that a crisis can be an opportunity for tourism firms to change their business models and meet new market demands. The results support the notion that crisis anticipation and response can serve as a means for organizations to maintain innovation in uncertain conditions.

However, most of the available literature has dealt with SMEs, tourism, hospitality, health care or the service sector. But less has been said on the high-risk industries like the mining industry, where mining companies are exposed to operational risks, supply chain disruptions, environmental pressures, and market volatility. Recent research on the resilience of the mining industry has pointed to the need for more robust risk management and supply chain resilience frameworks, particularly given the pressure of continuity and supply of critical raw materials in an uncertain context, for mining companies.

Research Gap

While previous studies have focused on crisis management, resilience, dynamic capabilities and innovation, there are three important gaps. Second, numerous studies have focused on crisis management in general and have not specifically addressed the role of crisis anticipation and response as a particular organizational capability. Second, the majority of empirical evidence concerned with capabilities and crisis is related to resilience/recovery or performance, and less is known about the direct impact of crisis on innovative business practices. Third, there has been very little focus on this relationship in high-risk industries, especially in the Jordanian mining industry and in companies such as APC and JPMC. Based on this, the present study aims to fill the above gap by studying the impact of CAR on IBP in the selected mining companies in Jordan. Accordingly, this study proposed the following research hypothesis:

$H_0$1: There is no statistically significant effect of crisis anticipation and response on innovative business practices in APC and JPMC.

Research Method

This Section outlines the methodological framework that was adopted to achieve the study's objective and empirically test the study’s hypothesis.

Research Design

The design used in this study is a quantitative, descriptive-analytical design to study the influence of CAR on IBP in the APC and JPMC. The choice of this approach stems from the nature of the study, which involves testing the hypotheses derived from theory and estimating the strength and direction of the relationship between well-defined constructs, using statistical techniques. Creswell and Creswell (2017) state that quantitative research can be used to analyse relationships between variables through standardised instruments and statistical analysis, which could lead to greater objectivity, and have the potential for replications.

Population of the Study

The study focuses on employees of the two large mining companies (APC and JPMC). These companies have been chosen strategically, as they represent companies that can make a difference in the Jordanian mining industry and where complex environments mean that some crisis management practices are highly crucial. Bryman (2016), states that defining the population is essential, as it will give the basis of the sampling frame as well as the choice of the methodological tools. There are 4,111 employees, of which 1,700 work for APC and 2,411 work for JPMC. This population is considered appropriate for the current study because employees at different organizational levels are directly involved in or impacted by practices associated with crisis management and/or innovation.

Sampling Method

The stratified random sampling is used in this study, where the population is divided into two strata, the APC and the JPMC, and participants are selected at random from the population. Stratified sampling is based on theoretical and methodological considerations. Firstly, stratified sampling is useful for improving representativeness in populations with subgroups that are proportionately represented in the sample (Sekaran & Bougie, 2016). Secondly, stratified sampling reduces sampling errors and thus yields more accurate statistical estimates than simple random sampling, particularly if the population is heterogeneous (Saunders et al., 2009).

Sample Size Determination

In this study, we have used the most common Krejcie and Morgan (1970) table to suggest sample sizes for finite populations. The sample size of 351 respondents at a 95% confidence level and a 5% margin of error is recommended for a population of about 4,000. Thus, the study aimed for a sample size equal to or larger than these to account for possible low response rates and questionnaires that were not completed. In all, 411 questionnaires were sent to the study sample, but only 391 were returned; these were considered usable for statistical analysis, yielding a response rate of about 95%. The sample size of 277 is approximately 9.5% of the total employee population, which is considered sufficient to achieve statistical reliability and make the study's results generalizable.

Primary Data

Primary data were collected using a systematic questionnaire from selected employees of the selected mining companies. In quantitative research, questionnaires can be used to measure perceptions, attitudes, and organizational practices for many respondents. The questionnaire was sent and collected online and was only delivered and collected by Google Forms, which guarantees a quick data collection. Convenience, faster data collection, automatic recording, and reduced data entry errors are the benefits of using online surveys (Dillman et al., 2014). A self-completion questionnaire can increase the response rate because people can complete it online at their convenience (Saunders et al., 2009).

Self-administered online questionnaires enable participants to answer questions in a controlled and confidential manner, and are suitable for organizational research. This will eliminate social desirability bias and make answers more reliable (Bryman, 2016). The method used is suitable for a quantitative and descriptive-analytical study, which measures and compares data with the target population. The questionnaire was designed based on the concepts used in the questionnaires available in the literature that had previously been tested and had been used in various studies carried out on this subject (Al-Abdalat & Al-Shura, 2020; Al-Awadhi & Al-Awadhi, 2020; Al-Subaie et al., 2022; Ayad, 2015; Mahmoud, 2017; Matabs et al., 2022), in addition to considering the study's conceptual framework and

the impact of MCM on IBP. Items were carefully selected and refined for their relevance, clarity and consistency with the theoretical basis of the study.

Furthermore, a professional experienced with this type of questionnaire reviewed the questionnaire and a survey of professors and subject-matter experts was conducted to identify areas in the questionnaire that could be improved in terms of wording, structure, and content validity. They were involved in the feedback process prior to the final distribution of the tool. Following this, a pilot study was conducted with a sample of 30 employees from the target population to increase the instrument's validity and reliability. Based on their feedback, minor revisions were made to improve item clarity and coherence.

Operationalization of Variables

Independent Variable: Crisis Anticipation and Response

The operationalization of this construct, CAR, was based on six items that measured the company ability to spot indicators of possible crises, to prepare in advance, and to act in a coordinated manner to manage the impact, suppress the crisis and limit damage to operations and reputation is the organization's capacity to respond to potential crises in advance (Ayad, 2015; Coombs, 2007).

Dependent Variable: Innovative Business Practices

This construct is operationalized through entrepreneurship and innovation in the Jordanian mining industry; each one of them was measured using ten items to build the concept of IBP. This construct assessed the capacity to develop, adopt and implement new ideas, processes and projects that enhance performance and competitiveness. The concept of IBP is conceptualized as a composite with two components: innovation and entrepreneurship, and it involves both the creativity and the opportunity aspects of organizational behaviour (Vuori & Huy, 2016).

Data Analysis Techniques

The Statistical Package for the Social Sciences (SPSS) was used for data analysis. The validity and reliability of the measuring scales and the testing of the hypothesis of the study were done using several statistical techniques. To check the internal consistency of the study constructs, the Cronbach's alpha coefficient was initially used. The measurement items' factor structure was then examined using Exploratory Factor Analysis (EFA), and construct validity was confirmed. Skewness and kurtosis values were also used to assess normality to ensure the suitability of the data for parametric statistical analysis. Pearson correlation analysis was then used to analyse the correlation between crisis anticipation and response, and innovative business practices. Finally, simple linear regression analysis was used to assess the impact of crisis anticipation and response on innovative business practices of selected mining companies in Jordan.

Data Analysis : This section presents the study's empirical findings. It began with the preliminary statistical tests, then the descriptive analysis, followed by demographic profile of respondents and finally the inferential analysis by using simple linear regression to test the formulated hypothesis.

Preliminary Statistical Tests

This subsection serves as preliminary statistical tests to ensure that the dataset meets the assumptions required for reliable regression analysis to the main empirical analysis. First of all, Cronbach’s alpha is conducted, followed by EFA and normality testing. Finally, correlation analysis is performed to explore the strength and direction of relationships among the study variables.

Reliability Analysis (Cronbach's Alpha)

The internal consistency of the study's measurement scales was assessed using reliability analysis. Cronbach's alpha coefficient was used to evaluate the consistency of items within the constructs and determine whether they measure the same underlying construct.

Table 1: Cronbach's Alpha Reliability Coefficients for Study Variables

Variables	No. of Items	Reliability Coefficient (α)
CAR	6	0.889
Entrepreneurship	10	0.832
Innovation	10	0.807

Table 1 shows that the internal consistency reliability for all the study variables was satisfactory. The Cronbach's alpha values obtained were between 0.807 and 0.889, which is above the required value of 0.70, indicating the reliability of the measurement scales used in the study.

Exploratory Factor Analysis (EFA)

EFA was used to investigate the factor structure of measurement items and the construct validity of study variables. Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity were used to assess the suitability of the data for factor analysis.

Table 2: Summary of Exploratory Factor Analysis Results

Construct	No. of Items	Factor Loading Range	Eigenvalue	Variance Explained (%)
Innovation	10	0.679 – 0.779	6.389	12.778
Entrepreneurship	10	0.631 – 0.782	5.744	11.488
CAR	6	0.603 – 0.761	4.457	8.914
KMO = 0.900; Bartlett's Test of Sphericity: $\chi^2 = 5980$, df = 1225, $p < 0.001$				

According to the KMO value and Bartlett's Test of Sphericity data were suitable for analysis using factor analysis as presented in Table 2. Furthermore, the factor loading values of all items were greater than 0.50, which was the acceptable level for ensuring acceptable construct validity and item convergence within constructs.

Normality Test of Data Distribution: The normality of the study variables was assessed using normality tests to determine if the study variables meet the important assumption of parametric statistical analysis. Skewness and kurtosis values were used to evaluate the normality of the data distribution.

Table 3: Skewness and Kurtosis of Study Variables

Construct	Mean	Std. Deviation	Skewness	Kurtosis	Interpretation
CAR	4.090	1.079	-0.746	0.117	Normal
IBP	3.943	1.060	-0.646	-0.019	

The results presented in Table 3 indicate that the values of the skewness and kurtosis of all the study variables are within the acceptable range, which means that the data are normally distributed in the small society. The results therefore indicate that the data are suitable for subsequent parametric analyses.

Correlation Analysis

Pearson correlation analysis was used to explore the relationship between crisis anticipation and response and innovative business practices in terms of their nature and intensity. It was analysed to see if there was any significant relationship between the study variables.

Table 4: Pearson Correlation Matrix among Study Variables

Variables	CAR	IBP
CAR	1.000	.552*
IBP	.552*	1.000
* Correlation is significant at the 0.05 level (2-tailed).		

As shown in Table 4, there is a positive relationship between crisis anticipation and response and innovative business practices, which is statistically significant ($r = 0.552$, $p < 0.05$). The results showed that there is a significant relationship between the use of crisis anticipation and response and the use of innovative business practices in the selected mining companies.

Demographic Profile of Respondents

The demographic profile of the respondents shows that the majority of respondents were male (95%), and the female respondents accounted for 5% of the sample. The age distribution of the respondents indicated that the largest age category was from 31 to less than 39 years (30.5%), followed by 50 years and over (24.5%), 40 to less than 49 years (23.7%) and less than 30 years (21.3%). As far as education was concerned, the majority of the respondents had a bachelor's degree (44%), followed by a diploma (30%) and a master's degree (23.3%).

Regarding current job position, the largest group of respondents (36.6%) were the supervisors, followed by employees (33%), assistant managers (20.7%) and managers of the units (9.7%). Furthermore, the results indicate that respondents had varying levels of experience in their professions, with 29.5% having between 10 and 15 years of experience. Finally, 59% of the sample was employed by JPMC, and 41% worked for APC.

Descriptive Analysis

Descriptive statistics were calculated to examine the overall response patterns for the study variables. Mean scores and standard deviations were used to provide an initial understanding of respondents' perceptions regarding crisis anticipation and response and innovative business practices.

Table 5: Descriptive Statistics of Study Variables

Variables	Mean	Std. Deviation
Crisis Anticipation and Response (CAR)	4.090	1.079
Innovative Business Practices (IBP)	3.943	1.060

The mean scores of the study variables ranged from 3.943 to 4.090, reflecting generally positive perceptions among respondents regarding crisis anticipation and response and innovative business practices, as presented in Table 5. Furthermore, the standard deviation values indicate an acceptable level of variation in responses.

Inferential Analysis: Simple Linear Regression

A simple linear regression analysis was used to examine the effects of CAR on IBP. The analysis was conducted to assess the predictive power of crisis anticipation and response in explaining differences among companies in terms of innovative business practices.

Table 6: Regression Analysis of the Impact of CAR on IBP

Variable	B	Std.Error	T-statistic	Sig.
Constant	0.982	0.21	4.67	< 0.001
CAR	0.462	0.031	14.90	< 0.001
R		0.598		
^{2}R		0.357		
^{2}Adj.R		0.355		
S.E. regression		0.486		
statistic-F		216.00		
Sig. (F-statistic)		< 0.001		

Table 6 shows that the regression results reveal that the relationship between crisis anticipation and response with innovative business practice is positive and significant. This regression coefficient value (B = 0.462) means that an increase of 1 unit in crisis anticipation and response will increase innovative business practices by 0.462 units. Furthermore, there was a low value of the standard error (Std.). The estimated coefficient of regression is stable and accurate, as shown by the value of error = 0.031

The results also indicate that there is statistical significance between the variables as indicated by the high value of the t-statistic (t = 14.90) and the significance (p < 0.001). This means that the crisis anticipation and response is a significant and important component in predicting innovative business practices of the companies selected.

Furthermore, as seen in the results, the correlation coefficient (R = 0.598) shows that there is a moderate positive relationship between crisis anticipation and crisis response and innovative business practices. Crisis anticipation and response have a coefficient of determination of $R^2 = 0.357$, which shows that the variance in innovative business practices is explained by about 35.7% of the variance in crisis anticipation and response. Likewise, the modified coefficient of determination (Adjusted R2 = 0.355) implies that the regression model is stable and that it is sufficiently explanatory.

The standard error of the regression estimate (0.486) shows that the regression model has a reasonable amount of prediction accuracy. Additionally, the overall regression model was statistically significant (F = 216.00, p < 0.001). Based on the regression results, the significance level for CAR is well below the acceptable threshold (Sig < 0.001), indicating a statistically significant relationship with IBP. Accordingly, the null hypothesis ($H_0$1) is rejected, and the alternative hypothesis (H_1) is accepted.

Discussion

At a more fundamental level, the results reveal that CAR is a meaningful organizational tool that goes beyond crisis management and shapes IBP. Whereas companies that exhibit higher competencies in predicting possible disturbances and planning in advance more effectively are found to be better equipped to develop internal conditions conducive to innovation and entrepreneurship. This implies that crisis preparation is not only defensive, but it can also help to create value and renew organizations.

This interpretation is also consistent with the previous studies conducted by khudhair Abbas (2025), Zheng et al. (2022), Elarabi (2019), and Bărbulescu et al. (2021), which demonstrated that crisis-oriented capacities are beneficial for the adaptability of organizations and the restructuring of processes to favour innovation. Al-Abdalat and Al-Shura (2020) also state that proactive crisis management enhances the flexibility of the organization, allowing it to respond creatively as opposed to reactively. The present results corroborate this view, as anticipation and response mechanisms were found to be directly linked to better innovative business practices, especially in the case of high-risk industrial situations like mining.

The results indicate from an operational point of view that organizations use crisis anticipation to increase awareness, quality of decision-making, and the organization's processes. Consistent with khudhair Abbas (2025), who asserts that risk identification in the early stages enables adaptation to strategic response. In this respect, CAR supports the findings of the descriptive analysis in favour of incremental and efficiency-oriented IBP.

It can be concluded from the results that, at a deeper level, crisis management also plays a role in the learning processes of an organization; however, learning seems to be unevenly inbuilt. Al-Awadhi and Al-Awadhi (2020) have highlighted that experience during a crisis can produce learning that can be used to improve crisis response in the future and also for innovation. The current results show a similar pattern, but also that the translation of the crisis experience into "sustained innovation" is not fully institutionalized, which means that there can be variations in how learning is captured and used throughout the organization.

It must also be noted that, although the relationship observed is strong and significant, it does not explain all the variation in innovative business practices. This result is consistent with Gunday et al. (2011), who pointed out that innovation is determined by several factors such as organizational culture, organizational leadership and strategic orientation. Hence, CAR needs to be seen as an important but not exclusive determinant of the system of innovation.

As far as DCT, the results indicate that CAR improves the firm's capacity to match environmental dynamism. Specifically, crisis anticipation involves sense-making, and response mechanisms involve seizing mechanisms such as resource mobilization and coordinated action. But as Teece (2018) has pointed out, the translation of these capabilities into lasting innovation requires good transforming (reconfiguring) processes. Current findings suggest a relative consistency in both sensing and seizing, but a relative lack of consistency in the transformation of the insights from the crisis to long-term innovative outcomes, suggesting a capability imbalance.

This interpretation is complemented by the view of dynamic capabilities as a way to reconfigure operational routines in order to respond to changes in the environment (Helfat et al., 2007). The terms crisis anticipation and response mechanisms are used in the context to improve the ability to recognise emerging disruptions and to re-allocate resources. The results indicate, however, that it is not necessarily institutionalized in a predictable way, and thus, only a certain degree of awareness of the crisis is transformed into continuing innovative business practice.

In the light of ORT, the CAR can be seen as a multi-stage adaptive process Duchek (2020). The results show that there is a strong correlation with the anticipation and coping stages, where the organizations are able to track the risks and act accordingly to the disruptions. The shift to the adaptation stage is not as full as a complete resilience cycle, which may indicate that companies are able to respond to crisis

effectively, but the extent to which they may be systematically using the crisis to drive long-term innovation and renewal is unevenly distributed throughout the company.

Moreover, the results endorse the perspective that crises can give rise to innovation and organizational revitalization. During a crisis, companies may be forced to reconsider their practices and develop new solutions or strategies Archibugi et al. (2013) , and a crisis can also serve as a catalyst for learning and adaptation (Williams et al., 2017). The current findings in part support this view as CAR does drive innovation, but this is not a foregone conclusion, as it depends on the capacity of the organization to incorporate crisis-related capacities within the organization's innovation system.

They are relevant especially in the high uncertainty, high operational risk and regulatory pressure of the mining industry. As highlighted by Abdalat and Al-Shura (2020), these places require high adaptability to ensure their operation and innovation. The results of the current study suggest that CAR is more about providing a bridge between risk management processes and incremental innovation and operational enhancement, rather than facilitating radical or transformative innovation.

The evidence suggests that CAR is a strategic asset to the business that will enable innovative business practices, but it is important to consider its contribution to a larger, more interdependent suite of organizational assets. CAR contributes to awareness, responsiveness, and process improvements, but the extent to which these contribute to long-term innovation relies on the extent to which it is coupled with learning mechanisms, strategic alignment and innovation systems. This indicates that CAR is a robust enabling capability and has the potential to continue to engage the organization in ongoing development if more fully institutionalized.

Conclusion

The results obtained from the present study show that CAR is an important capability of the organizations, which positively improves the innovative practice of the mining companies of Jordan in the selected ones. Results suggest that the stronger the anticipatory mechanisms, structured response systems, and proactive crisis management practices in a crisis, the more likely that organizations are able to facilitate adaptive and innovation-oriented business behaviour. This implies that crisis management is not exclusively an operational activity, but also a strategic capability that should contribute to the organizational continuity, flexibility, and incremental innovation under changing circumstances.

Theoretically, the results corroborate the assumptions of DCT, as they show that the competences related to sensing and response are crucial in improving organizational adaptability and innovative processes. The study, in practice, emphasizes the need to invest in proactive crisis management systems in high-risk industrial fields like mining. The findings imply that it is important for mining companies to improve their early warning systems, their mechanisms for coordination during a crisis, and the way in which they learn from the effects of a crisis and apply the resulting knowledge to create sustainable innovation and operational improvement. Crisis management can also be better aligned with strategic planning and innovation systems to enhance long-term competitiveness and adaptability.

The study has some limitations, however. Although these contributions were made, the study has some limitations. Second, the study was limited to selected mining companies in Jordan, which could restrict the generalizability of the results to other areas or industries. Second, the study focused on one aspect of modern crisis management, which is CAR, not the other variables in the organization, culture or leadership that could affect innovative business practices. Thirdly, the cross-sectional design of the

study makes it difficult to analyse trends in the development of crisis management competencies over time or their impact on long-term innovation results.

Future Research might consider analysing more aspects of crisis management, consider more intervening or moderating variables, and use longitudinal research designs to better appreciate the evolving nature of the relationship between crisis-related capabilities and innovation over time. Additional research could also investigate the similarities and differences between various industry settings and/or countries to ensure that the same relationships are found in different organizational and environmental conditions.

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