

-RESEARCH ARTICLE-

THE ROLE OF CREATIVITY AND BUSINESS PERFORMANCE ON CRISIS MANAGEMENT: EVIDENCE FROM IRAQI LISTED COMPANIES

Ihab Malik Raji Al-Ameedee

College of Islamic science / Babylon University, Iraq

Email: ehab.malik@uobabylon.edu.iq

<https://orcid.org/0000-0002-6558-8163>

Haitham Obaid Abd Alzahrh

Department of Mechanical Engineering

Faculty Engineering / Babylon University, Iraq

Email: eng.haitham.oh@uobabylon.edu.iq

<https://orcid.org/0000-0003-4284-79658>

—Abstract—

Recently, crisis management has become an international issue that affects business and country economic conditions and needs the attention of regulators and recent literature. Thus, the current study examines the role of creativity (research and development (R&D) expenditures, technology maintenance expenditures and spending on high technology) and business performance (return on equity and return on assets) on the crisis management of the listed firm in Iraq. The researchers have used the secondary data extracted from the financial statements of the listed firm in the Iraq Stock Exchange (ISX). The data has been taken from the twenty top-rated companies in ISX from 2011 to 2020. The researchers have executed the robust standard error along with the fixed-effect model (FEM) to analyze the association between the constructs. The results revealed that creativity and business performance have a positive association with the effective crisis management of the listed companies in Iraq. These outcomes provided support to the policymakers while making the policies regarding crisis management in the firm.

Keywords: Creativity, research and development expenditures, technology maintenance expenditures, business performance, crisis management

Citation (APA): Al-Ameedee, I. M. R., Alzahrh, H. O. A. (2021). The Role of Creativity and Business Performance on Crisis Management: Evidence from Iraqi Listed Companies. *International Journal of Economics and Finance Studies*, 13 (2), 45-64. doi:10.34111/ijefs.20212003

1. INTRODUCTION

Uncertainty and risk element is common in the business world. A crisis is likely to happen as a result of an unforeseen incident or as an unpredictable consequence of an event that was previously deemed a serious risk (Coombs et al., 2018; Lita et al., 2020). In either event, crises nearly always necessitate swift decisions to mitigate the loss or harm to the organization. The potential of the damage or loss as a result of the crisis is dependent on the nature of the crisis. A crisis may cause damage to safety or health, the organization's financial resources, the organizations' public image, or all of these (Tokakis et al., 2019). For instance, a sudden fire may be a crisis in the organization that jeopardizes the organization's financial position. But, if the fire occurs during the working timing, it may also endanger the health and safety of employees. In order to handle all the matters related to the crisis occurrence, a body of persons known as crisis management is established within the organizations (Paraskevas et al., 2019). Crisis management is a body of persons who design strategies to assist the organization handle a contingent happening or event which have a negative impact and implementing these strategies efficiently at the right time mitigate the adverse consequences of these events (Ferreira et al., 2020; Hetu et al., 2018). The goal of crisis management is to minimize the harms that a crisis can cause. This isn't to say that crisis management and crisis response are the same things. Rather, crisis management is a multi-step process that starts well even before a crisis occurs. Crisis management practices are applied before, during, and after the occurrence of a crisis (Ertaş et al., 2021).

Creativity and business performance determine the effectiveness of crisis management. Creativity is the process of thinking in a different and unique manner, generating ideas to face challenges, find a solution to the problems, and create opportunities out of critical situations (Bhaduri, 2019). Creativity involves novel processes, techniques, and technological changes like the adoption of new technology or maintenance. Creativity in the form of R&D and technological changes (new technology or maintenance) is useful to crisis management at all three stages: warning and crisis assessment, crisis response and management, post-crisis and resolution (Kwok et al., 2021). Business performance is the level of effectiveness and efficiency with which an organization perform its functions applying optimal organizations with the objective to meet consumers and customers' expectations (Tajbakhsh et al., 2019). Business performance is determined by the profitability of the organization and its financial position in the market. For designing and implementing strategies to mitigate the negative influences of crises, crisis management needs large financial resources. The organizations having high profitability and sound financial position can more effectively implement crisis management practices of crisis assessment, warning, crisis response, and mitigation of crisis impacts after the occurrence of crisis.

This study examines the influences of creativity like R&D expenditures, high technology purchased, technology maintenance expenditures, and business performance, return on assets and return on equity on crisis management for the economy of Iraq. Iraq is a fast developing upper-middle-income economy with an estimated nominal gross domestic product (GDP) of \$ 190.733 billion in 2021 and the estimated (PPP) GDP of \$ 413.316 billion in 2021 (Zarei, 2020). According to nominal GDP, it is the 51st largest economy in the world while 49th in terms of PPP. The major economic sectors are industry and services, while agriculture has a little share in GDP. The main focus of our study for the analysis of 20 companies listed in the stock exchange of Iraq. The oil industry dominates Iraq's economy. The oil sector provides 95% of foreign exchange earnings (Malik et al., 2020). Most of the listed companies in Iraq deal in oil products and are belong to the financial sector of the economy. The well-known listed economies are Iraq National Oil Company, Iraqi Oil Tankers Company, midland Oil Company, Missan Oil company, North Oil Company, South Oil Company, Central Bank of Iraq, Industrial Bank of Iraq, Iraqi Telecommunication and Post Company, Real Estate Bank of Iraq and Trade bank of Iraq (Abdullah et al., 2018). Though Iraq has a sound economy still, Iraq has participated in many wars and disputes since the twentieth century and has some economic and financial as well. Many of these wars like the Iran-Iraq War, Bombay War, Gulf War, 1991 Iraq Uprising, Iraq War, and War in Iraq, and most fatal economic & financial crisis caused by Covid-19 in 2020 (Ansell et al., 2017; Bizhan, 2018).

Any country or economy has to face uncertainty, and there is a risk element everywhere. Out of uncertain situations, sudden, unforeseeable events could occur, which may have a serious and harmful impact on the people health, economic conditions, organizations, their performance, and financial resources. Iraq is one such country, which has faced many uncertain situations which left an adverse impact on the living standard of individual persons, social, political, and business organizations, and economic growth. Thus, there is a need, especially after the economic crisis came into existence by the covid-19 pandemic, to make research and debate on how to deal with the crises and their impacts (Bowers et al., 2017; Fabeil et al., 2020). The current meets this need as it puts emphasis on the effectiveness of crisis management and describes the ways to administer crisis before, during and after happening. The aim of the study is to elaborate the role of creativity through R&D expenditures, high technology purchased, technology maintenance expenditures, and business performance in the form of return on assets and return on equity in making crisis management effective (Jeong et al., 2017; Mao et al., 2021).

The study makes a contribution to the literature in three ways: (1) In the past, many studies have explored the impacts of creativity and business performances on the effectiveness of crisis management, but hardly a research study has been presented which has addressed the creativity and business performance impacts on crisis

management at the same time. So, the current study has addressed creativity and business performance as the two factors of crisis management simultaneously (Ma et al., 2018). (2) In the past studies, mostly the authors have taken the generation of novel ideas, thinking, cognitive skills, and analytical views as the dimensions or measures of creativity while analyzing the effectiveness of crisis management. But the presents study analyzes the R&D expenditures, procurement of new high technology, and the expenditures on technology maintenance as the measures of creativity which is a significant addition to the literature. (3) Though the economy of Iraq has been facing many glimpses of crisis, the statistics of these crises have been stored in reports and documents. Still, no organized study has been conducted which analyzes creativity and business performance as the measures to control the crises in Iraq (RESMI et al., 2021). So, the selection of Iraq for the analysis of influences of creativity and business performance on crisis management.

This paper has its specific structure, which is as follows: In the very next portion, the arguments of authors about the relationship between creativity like R&D expenditures, high technology purchased, technology maintenance expenditures, and business performance, return on assets and return on equity on crisis management are reviewed. The third part of the paper describes the procedures adopted for data collection and empirical analysis & results. In the fourth part, the discussions and implications of the study are described, which are followed by study conclusions and future recommendations.

2. LITERATURE REVIEW

Because of uncertainty in geographical issues, the economic and political sphere is likely to occur unpredictable and unforeseeable events or happenings. These uncertain happenings may be negative in nature and have adverse impacts on society (Zhao, 2020). Crisis management is based on three stages like a warning and crisis assessment, crisis response and management, post-crisis and resolution to interact with the crises. An effective crisis management minimizes the potential damages of crises to individuals, and commercial organizations (Arzalier-Daret et al., 2018). A crisis management can be effective in case the organizations have creativity adoption and high financial performance. R&D expenditures, high technology purchased, technology maintenance expenditures, return on assets and return on equity are the factors which determine the effectiveness of crisis management. Different authors have addressed the relationship among creativity like R&D expenditures, high technology purchased, technology maintenance expenditures, and business performance, return on assets and return on equity and crisis management. In the light of past studies, the concepts of the studies are illuminated:

2.1 Creativity and Crisis Management

In organizations, creativity is the manner of thinking that is inspiring, challenging, and helpful too in organizational personnel to find innovative ideas and solutions to the problems. Creativity gives the chance to create successful opportunities out of the problems they face. Creativity is the source of inspiration and innovation (Kapucu et al., 2018). Creativity is not only to create novel ideas to face challenges and complex situations; it is also to apply those ideas into practice by creating value to something, purchasing or hiring something new, or inventing something new (Frykmer et al., 2018). In crisis management which deals with serious issues, sudden situations, and unforeseeable consequences of this situation, creativity in the form of research & development, procurement of new technologies, and value addition to or maintenance of concerned technology, plays a key role (Kwok et al., 2019).

A study by Ardito et al. (2021) analyzes the role of research and development investment and technological exaptation in crisis management with evidence from the covid-19 outbreak. The narrative approach is applied for the analysis of 2 drugs that are the case studies: (i) Remdesivir, an antiviral drug (ii) Tocilizumab, for the treatment of rheumatoid arthritis. Secondary data sources from articles in concerned journals like Blood, Autoimmunity Reviews, Journal of Translational Medicine, National Academy of Sciences, Nature, and Scientific Reports were applied for analysis of case studies. According to the results of this study, R&D enhanced information and knowledge about features of Remdesivir and tocilizumab and gave the solution to covid-19 in the form of technological exaptation. Cruz-Castro et al. (2018) analyzes the inter-relationship of economic crisis, R&D, and crisis management after the 2008 economic crisis. For research analysis, a microdata panel of Spanish business organizations was applied. The study proves that economic crisis and R&D have a reciprocal relationship. Though the economic crisis put backward influences on R&D at a domestic level and some of the business frameworks but R&D investment also work as a solution to economic crisis adversities as it improves the effectiveness of crisis management. Similarly, a piece of literary research was conducted by Yalamov (2021) to analyze the innovation factor in organizations at a time of crisis and also check the role of R&D expenditures and academic researchers in this regard. The study collected data from companies having innovation intensity in Bulgaria. The results showed that the organizations which have the tendency to maintain innovation in all departments by spending money on R&D and employment of academic researchers have effective crisis management, which provides protection against the crisis.

Creativity and innovation through the adoption of new higher technologies (Information technologies, communication technologies, analytical technologies, risk monitoring technologies, and other supportive technologies & techniques) enable and improves the functioning of crisis management with business organizations (Hetu et al., 2018). The study by Reuter et al. (2018) focuses on the adoption of social media

through digital technologies for crisis management. 9/11 terrorist attacks, a large number of studies have been conducted which focus on the use of high information communication technologies (ICT) and social media prior to, during, and after the crisis. The empirical research is based on these case studies of ICT and social media used in emergencies for analysis and communication of crisis. The study implies that high human-computer interaction, adoption of digital technologies, and social media are helpful tools to get information or communicate the causes and chances of crisis, happenings during the crisis, precautions, and ways to mitigate the devastation of crisis afterwards. So, the adoption of innovative technologies helps organizations to cope with crises efficiently. da Silva [Avanzi et al. \(2017\)](#), analyzes the technology interoperability enhancement expenditures and their role in crisis management. This study applied the assessment method, which was based on the Analytic Hierarchy Process technique (AHP), and analyzed a company involved in the disaster management (DM) sphere responsible for the ICT infrastructure of a region in the south of Brazil. The study findings analyzed that the improvement in the interoperability of technologies improves information and communication systems in several economic and social sectors. This helps to deal with emergencies and crises in an effective manner.

Creativity not only encourages the generation of new ideas, which results in the invention of new procedures, technologies, and other things, it also motivates the individuals and organizations to add value to, improve the efficiency of, or maintain the quality technologies or other technological procedures ([Hung et al., 2020](#)). The maintenance of technologies helps consistent training the individuals to respond to the crisis, getting in time information of chances of occurrence of some threatening event and awareness of the causes and precautions, and the assessment of the damages caused by the crisis ([Kapucu et al., 2018](#)). [Saide et al. \(2021\)](#), investigates the role of Knowledge exploration-exploitation and information technology in crisis management in education scenarios in the context of the COVID-19 crisis. For empirical analyses, 290 published research articles were searched, and after getting filtered, 51 concerned articles were chosen. The study elaborates that covid-19 and other crises which affect the health of humans, reduce transportation, human gatherings, and thus, affects the communication, learning, pieces of training, and financial performance of economic sectors greatly, improvement or maintenance of information technology instruments and implementation of knowledge management effectively the impacts of crisis can be removed. [Gruber et al. \(2015\)](#), in their research study focuses on technology maintenance, social media listening practice, and performance of crisis management. The study elaborates the role of technology maintenance in improving social media listening practices and also how effective social media listening enhances the knowledge and information through broad and any time communication needed for the effective performance of crisis management. Thus, the study findings show that

technological maintenance has a positive impact on social media listening practice, and effective social media listening has a positive influence on crisis management.

2.2 Business Performance and Crises Management

Business performance is linked with the commercial effectiveness of an organization which shows the capacity of the organization to apply and integrate the resources optimally with an objective to present the products and services which fulfil the requirements and expectations of customers and consumers (Al-Dmour et al., 2019). Business performance is measured by financial resources like profits, productivity or input/output relationships, customer emphasis in feedback, and human resource performance. The main indicator of business performance is profitability which can be determined by the return on assets and return on equity. Business performance determines the capacity of the organization to carry crisis management effectively (Popović et al., 2018). At all the three stages of crisis management like a warning and crisis assessment, crisis response and management, post-crisis and resolution, it is needed to adopt up-dated technologies, many software, techniques, different services, human resources, and necessary technological changes. For all this, financial resources are required, which can be managed out of extra profits. Moreover, the high business effectiveness has the ability to sense the risks, watch the sudden changes in circumstances, and analyze the nature of contingent threats, losses, failures, damages, or hardships. Thus, the organizations having a high business must have effective business crisis (Kang et al., 2020).

Return on assets is an indicator of how profitable a company is relative to its total assets. Return on assets gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings (Pokharel et al., 2019). The consistent increase in the return on assets at the same rate is useful for the organizational management to make estimations and future planning to ensure business survival even in critical situations and develop sustainability in business effectiveness. Thus, the high return on assets increases strengthen the financial position of the organization, increasing financial resources in hand to be used, and the stronger financial position assists in meeting the requirements of effective crisis management (Azadegan et al., 2020). A study was conducted by Adelopo et al. (2018), to examine the bank profitability before, during, and after the financial crisis and crisis management. The objective of the paper was to analyze the association among macroeconomic factors, bank-specific, and bank profitability before (1999-2006), during (2007-2009), and after (2010-2013) the financial crisis. Panel data were acquired from the Economic Community of West African States for the period of 1999-2013 for fixed-effect models. This model consists of industry level, bank-specific determinants, and macroeconomic variables. The results based on the panel data analysis indicate that there is a positive association among the bank-specific

determinants, macroeconomic determinants, bank-profitability (ROA), and crisis management.

Return on equity is the most significant indicator of an organization's performance. High return on equity is relatively higher income as compared to equity from shareholders, and it shows high organizational performance. Return on equity is the measurement of the organization's profitability and the extent to which the organization is efficient in generating profits (Hakimi et al., 2018). Return on investment is helpful to an organization in administrating the crisis and related matters as it provides the investors and organizational management a sense of how much effective it is in making sustainable profits. A research was conducted by Shad et al. (2019), to investigate the relationship between business financial performance, technology and crisis management. This study analyzes the marketing level, return on assets, and return on equity for measuring financial performance. This study posits that the organizations having a high return on equity efficiently operate the crisis management as they are able to spend money on acquiring innovation technology for monitoring the risk, preparation to respond to crisis whenever it actually occurs, to overcome the destruction by crisis, and minimizes the destructive influences of crisis. Thus, the financial performance because of a high return on equity improves crisis management. The study by Sathyamoorthi et al. (2020), analyzes the interrelationship between financial performance (ROE), and crisis for Botswana. The research population consisted of ten commercial banks in Botswana, and the secondary data for the period of 2011-2018 was collected from the Bank of Botswana Financial Statistics database. The study applied descriptive statistics, correlation and regression analyses for data analysis. The results showed a significant positive association between the return on equity and crisis management.

3. METHODOLOGY

The article examines the role of and business performance on the crisis management of the listed firm in Iraq. The researchers have used the secondary data extracted from the financial statements of the listed firm in ISX. The data has been taken from the twenty top-rated companies in ISX from 2011 to 2020. The equation of the study with understudy constructs is given as under:

$$CM_{it} = \alpha_0 + \beta_1 RDE_{it} + \beta_2 HTP_{it} + \beta_3 TME_{it} + \beta_4 ROA_{it} + \beta_5 ROE_{it} + e_{it} \quad (1)$$

Where;

CM = Crisis Management
 i = Firm
 t = Time Period
 RDE = Research and Development Expenditures

HTP = High Technology Purchased
 TME = Technology Maintenance
 Expenditures
 ROA = Return on Assets
 ROE = Return on Equity

The researchers have taken crisis management as the dependent variable and measured the ratio of spending on disputes to total spending. In addition, two predictors have been used such as creativity that is measured as the ratio of R&D expenditure to total expenditures, amount spent on high technology purchased to total capital spending and the ratio of technology maintenance expenditure to total expenditures, while business performance is measured as the ratio of net profit to total assets and the ratio of net profit to total equity. These measurements are shown in [Table 1](#).

Table 1: Measurements of Variables

| S# | Variables | Measurements |
|----|----------------------|---|
| 01 | Crisis Management | The ratio of spending on disputes to total spending |
| 02 | Creativity | The ratio of R&D expenditure to total expenditures |
| | | Amount spent on high technology purchased to total capital spending |
| | | The ratio of technology maintenance expenditure to total expenditures |
| 03 | Business Performance | The ratio of net profit to total assets |
| | | The ratio of net profit to total equity |

The present study executes the descriptive statistics that exposed the total observation used by the study and shows the minimum and maximum values. In addition, it also provided the mean and standard deviation of all the constructs. Moreover, the researchers also used the correlation matrix to explore the directional association among the variables. Furthermore, the findings section also show the variance inflation factor (VIF) that is used to analyze the multicollinearity in the model. The equations for VIF are as follow:

$$R^2_Y \longrightarrow Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it} \dots \dots \dots (2)$$

$$j = R_Y^2, R_{X1}^2, R_{X2}^2, R_{X3}^2, R_{X4}^2, R_{X5}^2 \dots \dots \dots (3)$$

$$Tolrance = 1 - R_j^2 \quad VIF = \frac{1}{Tolrance} \dots \dots \dots (4)$$

The present study authors also run the Hausman test to select the appropriate model for testing the association among the constructs. The FEM is also run by the researchers

because the data usually have autocorrelation and heteroscedasticity issues. The equation for FEM is given as follow:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + u_{it} \dots\dots\dots(5)$$

The subscript (i) shows the individual firm and makes the different firms according to their characteristics. By adding the current study constructs, the FEM equation is as under:

$$CM_{it} = \beta_{1i} + \beta_2 RDE_{it} + \beta_3 HTP_{it} + \beta_4 TME_{it} + \beta_5 ROA_{it} + \beta_6 ROE_{it} + u_{it} \dots(6)$$

In addition, the data is cross-sectional dependence the cross-sections such as firm are higher than time-series sections such as years. Thus, when the data is a cross-section, then the robust standard error is considered as the best approach to test the association among constructs. In addition, it also adjusts the “model's heterogeneity issues” that generally exist. By adding the current study constructs, the robust standard error equation is as under:

$$CM_{it} = \beta_1 RDE_{it} + \beta_2 HTP_{it} + \beta_3 TME_{it} + \beta_4 ROA_{it} + \beta_5 ROE_{it} + \varepsilon_{it} \dots\dots\dots(7)$$

4. RESEARCH FINDINGS

The present study executes the descriptive statistics that exposed the total observation used by the study and shows the minimum and maximum values. In addition, it also provided the mean and standard deviation of all the constructs. [Table 2](#) below figures highlights that the total observations of the study are 200 (20 firms x 10 years). In addition, the mean value of CM is 0.591, while the average value of RDE is 0.187. Moreover, the average value of HTP is 0.271, and the mean value of TME is 0.273. Finally, the mean value of ROE is 11.733, and the average value of ROE is 0.938.

Moreover, the researchers also used the correlation matrix to explore the directional association among the variables. [Table 3](#) given below shows that all the predictors such as RDE, HTP, TME, ROA and ROE have a positive association with CM of the listed companies in Iraq. Furthermore, the findings section also show the VIF that is used to analyze the multicollinearity in the model. [Table 4](#) shows that the VIF values are lower than five that is the indication of no multicollinearity.

The present study authors also run the Hausman test to select the appropriate model for testing the association among the constructs. [Table 5](#) given below shows that the FEM is appropriate because the probability value is lower than 0.05, and rejecting the null hypothesis related to the random model is appropriate.

Table 2: Descriptive Statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|----------|-----|--------|-----------|-------|-------|
| CM | 200 | 0.591 | 0.595 | 0.179 | 0.437 |
| RDE | 200 | 0.187 | 0.194 | 0.045 | 0.271 |
| HTP | 200 | 0.271 | 0.624 | 0.399 | 0.486 |
| TME | 200 | 0.273 | 0.810 | 0.162 | 0.471 |
| ROE | 200 | 11.733 | 19.86 | 4.380 | 65.89 |
| ROA | 200 | 0.938 | 1.988 | 0.180 | 5.116 |

Table 3: Matrix of Correlations

| Variables | CM | RDE | HTP | TME | ROE | ROA |
|-----------|-------|--------|--------|-------|-------|-------|
| CM | 1.000 | | | | | |
| RDE | 0.268 | 1.000 | | | | |
| HTP | 0.362 | -0.302 | 1.000 | | | |
| TME | 0.108 | -0.416 | 0.534 | 1.000 | | |
| ROE | 0.552 | -0.028 | -0.066 | 0.323 | 1.000 | |
| ROA | 0.433 | -0.027 | -0.167 | 0.217 | 0.811 | 1.000 |

Table 4: Variance Inflation Factor

| | VIF | 1/VIF |
|----------|-------|-------|
| ROE | 3.175 | 0.315 |
| ROA | 3.057 | 0.327 |
| TME | 1.909 | 0.524 |
| HTP | 1.600 | 0.625 |
| RDE | 1.238 | 0.807 |
| Mean VIF | 2.196 | . |

Table 5: Hausman Test

| | Coef. |
|-----------------------|---------|
| Chi-square test value | 126.464 |
| P-value | 0.000 |

The results of FEM revealed that creativity and business performance have a positive association with the effective crisis management of the listed companies in Iraq. The results also indicated that the 58.6 per cent changes in the CM are due to all the predictors such as RDE, HTP, TME, ROE and ROA. These results of FEM are shown in [Table 6](#).

Table 6: Fixed Effect Model

| CM | Beta | S.D. | t-value | p-value | L.L. | U.L. | Sig |
|-------------------------------------|-------|--------|---------|---------------|-------|-------|-----|
| RDE | 1.227 | 0.210 | 5.84 | 0.000 | 0.812 | 1.642 | *** |
| HTP | 0.445 | 0.089 | 4.98 | 0.000 | 0.621 | 1.269 | *** |
| TME | 0.260 | 0.137 | 1.89 | 0.060 | 0.531 | 1.011 | * |
| ROE | 0.008 | 0.003 | 3.00 | 0.003 | 0.003 | 1.014 | *** |
| ROA | 0.095 | 0.028 | 3.39 | 0.001 | 0.010 | 1.190 | *** |
| Constant | 5.099 | 0.738 | 6.91 | 0.000 | 3.642 | 6.557 | *** |
| R-squared | | 0.586 | | Number of obs | | 200 | |
| F-test | | 49.613 | | Prob > F | | 0.000 | |
| *** $p<.01$, ** $p<.05$, * $p<.1$ | | | | | | | |

s

The results of robust standard error also revealed that creativity and business performance have a positive association with the effective crisis management of the listed companies in Iraq. The results also indicated that the 50.28 per cent changes in the CM are due to all the predictors such as RDE, HTP, TME, ROE and ROA. These results of robust standard error are shown in [Table 7](#).

Table 7: Robust Standard Error

| CM | Beta | S.D. | t | P>t | L.L. | U.L. |
|-------|-------|-------|--------|-------|-------|-------|
| RDE | 0.851 | 0.119 | 7.140 | 0.000 | 0.602 | 1.100 |
| HTP | 0.410 | 0.077 | 5.330 | 0.000 | 0.570 | 1.249 |
| TME | 0.225 | 0.052 | 4.290 | 0.000 | 0.115 | 0.335 |
| ROE | 0.016 | 0.001 | 14.190 | 0.000 | 0.014 | 0.019 |
| ROA | 0.042 | 0.012 | 3.560 | 0.002 | 0.067 | 1.017 |
| _cons | 2.819 | 0.949 | 2.970 | 0.008 | 0.834 | 4.805 |

R-squared = 0.5028 Prob > F = 0.0000

5. DISCUSSIONS

The results of the study have indicated that R&D expenditures in organizational creativity have a positive relationship with the effectiveness of crisis management. These results are in line with the previous study of [Boeke \(2018\)](#), which analyzes that R&D enhances the prior knowledge and awareness of any potential risk or negative events, enable to interact with and respond to the crisis, and mitigate the influences of the crisis on the firm's performance, their financial position, and the health of the stakeholders. Thus, R&D helps in crisis management. These results are also in line with the previous study of [Pennington-Gray \(2018\)](#), which states that the intensive creativity organizations which spend on R&D practices can effectively manage the crisis and related matters before, during, and after the occurrence of unforeseeable

events have been considered as potential risks for the organization. The study results have also indicated that the purchase of high technology under creativity strategy has a positive relationship with the effectiveness of crisis management. These results agree with the past study of [Lakovic \(2020\)](#), which analyzes the creativity role in crisis management. This study reveals that with creative development, innovation and newness can be brought in technologies and processes adopted by the organization for crisis management. The application of high technologies enables crisis management to make quick decisions to monitor the risks, estimate the potential damage of crisis, and secure the business finances and reputation. These results are also supported by the past study of [Benaben et al. \(2020\)](#), whose focus is on the creativity for technological changes and effective crisis management. The study implies that the business organizations, in case of any crisis or occurrence of any negative event like fire setting, may have to face damages of different nature. But by applying high to sense the occurrence of any such event and control its havoc at the right time, the organizations can protect them. It has also been indicated by study results that creativity through expenditures on technology maintenance has a positive impact on crisis management. These results match with the study of [Tsuda et al. \(2021\)](#), which elaborates that agility in crisis monitoring, assessment of the potential of resultant damages and the areas which may be inflicted, and quick responsiveness is required for effective crisis management. This all is possible if the technologies used for crisis management are gone through periodical maintenance. These results are also supported by the past study of [Fertier et al. \(2020\)](#), which shows that the periodical maintenance of technologies used for crisis management always keeps the organizations ready to face unpredictable negative situations.

The study results have shown that business performance, return on assets has a positive association with the effectiveness of crisis management. These results are also in line with the past study of [Prayag \(2018\)](#), which implies that when the company has high profitability as compared to their assets means if it is generating more profits, it can also focus on the management of sudden crises of any sort. These results are also in line with the previous study of [Uitdewilligen et al. \(2018\)](#) which states that when the organization generate more profits with the available assets like machinery, equipment, different technologies, and cash in hand, it has extra profits which are saved after paying shareholders. These excessive profits enhance the financial position of the organization and enable them to carry effective crisis management. The study results have indicated that return on equity has a positive association with the effectiveness of crisis management. These results are in line with the past study of [Paraskevas et al. \(2019\)](#), which implies that when the company has high profitability with some changes in their policies, strategies, and process without any change in the amount of equity available, it can afford heavy monitoring and warning technologies and technological processes to effectively administer crisis and their impact on organization welfare. These results agree with the research of , which states that having high financial

performance with a high return on equity, the organization can adopt the processes and technologies for anticipation, assessment, planning, testing, and communication of crises and post-crisis analysis and resilience. Hence, higher business performance improves crisis management effectiveness.

6. IMPLICATIONS

The current study is an excellent piece of theoretical work and a significant contribution to economic-based literature. This study analyzes the role of creativity and business performance in crises management. It addresses three creativity factors like R&D expenditures, high technology purchased, technology maintenance expenditures, and two business performance elements, return on assets and return on equity and examines their influences on crisis management. In the existing literature, the authors have discussed the role of creativity and business performance in improving business management but separately. This study provides the support to the policymakers while making the policies regarding crisis management in the firm. Many of the literary articles have been written to analyze the role of creativity in achieving high business performance, which assists in crisis management. But in the current article, creativity and business performance stand side by side, and their influences on the effectiveness of crisis management have been analyzed at the same time. This study analyzes the listed companies in Iraq for examining creativity in the form of R&D expenditures, high technology purchased, technology maintenance expenditures, and business performance with return on assets and return on equity and their influences on crisis management. This is also a great contribution to the literature. This study has made an empirical implication as well. This study has great significance in the emerging economies in general and the economy of Iraq in particular. It is a guideline for the government, economists, and business organizations on how to ensure survival and sustainable business performance through effective crisis management. The current study suggests that crisis management can be effective with the efficient implementation of creative practices like R&D expenditures, procurement of new high technology, and expenditures on technology maintenance. It also clarifies that with consistent business performance through sustainable return on assets and return on equity, the financial position of the firm can be strengthened for effective management of the crisis in future.

7. CONCLUSION AND LIMITATIONS

The chances of uncertain happenings and circumstances are there in any economy or particular business. These uncertain happenings may occur as a threat to progress, even the survival of businesses and economies. They must be ready to face the contingent situations and overcome the adverse consequences of these situations. Usually, the body of persons known as crisis management was established to manage all the matters related to sudden situations. This study was conducted to show how crisis management

can be made effective. The aim of the study was to elaborate how much the creativity with R&D expenditures, high technology purchased, technology maintenance expenditures, on the effectiveness of crisis management and to check the impacts of two business performance elements return on assets and return on equity on crisis management. The study examined R&D expenditures, high technology purchased, technology maintenance expenditures, return on assets and return on equity and their influences on crisis management in the listed companies of Iraq. The results in the light that empirical analysis showed a positive association between R&D expenditures, high technology purchased, technology maintenance expenditures, return on assets and return on equity and the effectiveness of crisis management. The results showed that the organization's tendency to spend on R&D enables it to predict the occurrence of some negative event and consequences of this event, to respond to these events and control the potential damages of the un-foreseeable event. The results have indicated that the replacement of technologies or application of some new technology is useful to make effective crisis management at all three stages. The results of the study stated that the maintenance of technology is an important factor of crisis management because of effective warning of dangerous events, efficient response to the happening of these events and resolution after the incident. The results also indicated that if there is more return on the assets and return on equity, the firms have large financial resources which are required for the application of crisis management strategies.

There are a number of limitations this article has despite the efforts to make this study comprehensive, reliable, and valid according to the present requirements of a good piece of literature. First of all, the current study has discussed the role of only creativity factor-like R&D expenditures, procurement of new high technology, and expenditures on technology maintenance and business performance like return on assets and return on equity in crisis management. The financial factor, other resources, and human capital all have a strong impact on the effectiveness of business, but they have not been addressed in this study. Thus, the scope of the study is still limited. For a more comprehensive study, authors should also analyze these factors as well. Moreover, the study analyzes the impact of R&D expenditures, procurement of new high technology, and expenditures on technology maintenance, return on assets and return on equity in crisis management in the listed companies of Iraq. The study based on the enterprises of a single country may not provide valid guidelines. Hence, future authors are recommended to analyze multiple countries with diverse economic circumstances for more reliable results.

REFERENCES

- Abdullah, Y. A., & Mansor, M. N. B. (2018). The moderating effect of business environment on the relationship between entrepreneurial skills and small business performance in Iraq. *International Journal of Entrepreneurship*, 22(4), 1-11.

doi:<https://www.proquest.com/openview/147c9618bbbecbd44a10525a1804b5d/d1?pq-origsite=gscholar&cbl=29727>

- Adelopo, I., Lloydking, R., & Tauringana, V. (2018). Determinants of bank profitability before, during, and after the financial crisis. *International Journal of Managerial Finance*, 14(4), 378-398. doi:<https://doi.org/10.1108/IJMF-07-2017-0148>
- Al-Dmour, H. H., Algharabat, R. S., Khawaja, R., & Al-Dmour, R. H. (2019). Investigating the impact of ECRM success factors on business performance: Jordanian commercial banks. *Asia Pacific Journal of Marketing and Logistics*, 31(1), 105-127. doi:<https://doi.org/10.1108/APJML-10-2017-0270>
- Ansell, C., & Boin, A. (2017). Taming Deep Uncertainty: The Potential of Pragmatist Principles for Understanding and Improving Strategic Crisis Management. *Administration & Society*, 51(7), 1079-1112. doi:<https://doi.org/10.1177/0095399717747655>
- Ardito, L., Coccia, M., & Messeni Petruzzelli, A. (2021). Technological exaptation and crisis management: Evidence from COVID-19 outbreaks. *R&d Management*, 51(4), 381-392. doi:<https://doi.org/10.1111/radm.12455>
- Arzalier-Daret, S., Buléon, C., Bocca, M.-L., Denise, P., Gérard, J.-L., & Hanouz, J.-L. (2018). Effect of sleep deprivation after a night shift duty on simulated crisis management by residents in anaesthesia. A randomised crossover study. *Anaesthesia Critical Care & Pain Medicine*, 37(2), 161-166. doi:<https://doi.org/10.1016/j.accpm.2017.05.010>
- Azadegan, A., Mellat Parast, M., Lucianetti, L., Nishant, R., & Blackhurst, J. (2020). Supply Chain Disruptions and Business Continuity: An Empirical Assessment. *Decision Sciences*, 51(1), 38-73. doi:<https://doi.org/10.1111/deci.12395>
- Benaben, F., Fertier, A., Montarnal, A., Mu, W., Jiang, Z., Truptil, S., . . . Lamothe, J. (2020). An AI framework and a metamodel for collaborative situations: Application to crisis management contexts. *Journal of Contingencies and Crisis Management*, 28(3), 291-306. doi:<https://doi.org/10.1111/1468-5973.12310>
- Bhaduri, R. M. (2019). Leveraging culture and leadership in crisis management. *European Journal of Training and Development*, 43, 554-569. doi:<https://doi.org/10.1108/EJTD-10-2018-0109>
- Bizhan, N. (2018). Aid and state-building, Part II: Afghanistan and Iraq. *Third World Quarterly*, 39(5), 1014-1031. doi:<https://doi.org/10.1080/01436597.2018.1447369>
- Boeke, S. (2018). National cyber crisis management: Different European approaches. *Governance*, 31(3), 449-464. doi:<https://doi.org/10.1111/gove.12309>
- Bowers, M. R., Hall, J. R., & Srinivasan, M. M. (2017). Organizational culture and leadership style: The missing combination for selecting the right leader for effective crisis management. *Business Horizons*, 60(4), 551-563. doi:<https://doi.org/10.1016/j.bushor.2017.04.001>

- Coombs, W. T., & Laufer, D. (2018). Global Crisis Management – Current Research and Future Directions. *Journal of International Management*, 24(3), 199-203. doi:<https://doi.org/10.1016/j.intman.2017.12.003>
- Cruz-Castro, L., Holl, A., Rama, R., & Sanz-Menéndez, L. (2018). Economic crisis and company R&D in Spain: do regional and policy factors matter? *Industry and Innovation*, 25(8), 729-751. doi:<https://doi.org/10.1080/13662716.2017.1355231>
- da Silva Avanzi, D., Foggatto, A., dos Santos, V. A., Deschamps, F., & Loures, E. d. F. R. (2017). A framework for interoperability assessment in crisis management. *Journal of Industrial Information Integration*, 5, 26-38. doi:<https://doi.org/10.1016/j.jii.2017.02.004>
- Ertas, M., Sel, Z. G., Kirlar-Can, B., & Tütüncü, Ö. (2021). Effects of crisis on crisis management practices: a case from Turkish tourism enterprises. *Journal of Sustainable Tourism*, 29(9), 1-18. doi:<https://doi.org/10.1080/09669582.2021.1879818>
- Fabeil, N. F., Pazim, K. H., & Langgat, J. (2020). The impact of Covid-19 pandemic crisis on micro-enterprises: Entrepreneurs' perspective on business continuity and recovery strategy. *Journal of Economics and Business*, 3(2), 9. Retrieved from <https://ssrn.com/abstract=3612830>
- Ferreira, J., Coelho, A., & Moutinho, L. (2020). Dynamic capabilities, creativity and innovation capability and their impact on competitive advantage and firm performance: The moderating role of entrepreneurial orientation. *Technovation*, 92-93, 102061. doi:<https://doi.org/10.1016/j.technovation.2018.11.004>
- Fertier, A., Montarnal, A., Barthe-Delanoë, A.-M., Truptil, S., & Bénaben, F. (2020). Real-time data exploitation supported by model-and event-driven architecture to enhance situation awareness, application to crisis management. *Enterprise Information Systems*, 14(6), 769-796. doi:<https://doi.org/10.1080/17517575.2019.1691268>
- Frykmer, T., Uhr, C., & Tehler, H. (2018). On collective improvisation in crisis management—A scoping study analysis. *Safety science*, 110, 100-109. doi:<https://doi.org/10.1016/j.ssci.2018.02.028>
- Gruber, D. A., Smerek, R. E., Thomas-Hunt, M. C., & James, E. H. (2015). The real-time power of Twitter: Crisis management and leadership in an age of social media. *Business Horizons*, 58(2), 163-172. doi:<https://doi.org/10.1016/j.bushor.2014.10.006>
- Hakimi, A., Rachdi, H., Mokni, R. B. S., & Hssini, H. (2018). Do board characteristics affect bank performance? Evidence from the Bahrain Islamic banks. *Journal of Islamic Accounting and Business Research*, 9(2), 251-272. doi:<https://doi.org/10.1108/JIABR-06-2015-0029>
- Hetu, S. N., Gupta, S., Vu, V.-A., & Tan, G. (2018). A simulation framework for crisis management: Design and use. *Simulation Modelling Practice and Theory*, 85, 15-32. doi:<https://doi.org/10.1016/j.simpat.2018.03.001>

- Hung, W., & Sitthiworachart, J. (2020). In-Service Teachers' Conception of Creativity and Its Relation with Technology: A Perspective from Thailand. *The Asia-Pacific Education Researcher*, 29(2), 137-146. doi:<https://doi.org/10.1007/s40299-019-00460-6>
- Jeong, I., & Shin, S. J. (2017). High-Performance Work Practices and Organizational Creativity During Organizational Change: A Collective Learning Perspective. *Journal of Management*, 45(3), 909-925. doi:<https://doi.org/10.1177/0149206316685156>
- Kang, J., Diao, Z., & Zanini, M. T. (2020). Business-to-business marketing responses to COVID-19 crisis: a business process perspective. *Marketing Intelligence & Planning*, 39(3), 454-468. doi:<https://doi.org/10.1108/MIP-05-2020-0217>
- Kapucu, N., & Ustun, Y. (2018). Collaborative Crisis Management and Leadership in the Public Sector. *International Journal of Public Administration*, 41(7), 548-561. doi:<https://doi.org/10.1080/01900692.2017.1280819>
- Kwok, P. K., Yan, M., Chan, B. K., & Lau, H. Y. (2019). Crisis management training using discrete-event simulation and virtual reality techniques. *Computers & Industrial Engineering*, 135, 711-722. doi:<https://doi.org/10.1016/j.cie.2019.06.035>
- Kwok, P. K., Yan, M., Qu, T., & Lau, H. Y. (2021). User acceptance of virtual reality technology for practicing digital twin-based crisis management. *International Journal of Computer Integrated Manufacturing*, 34(7-8), 874-887. doi:<https://doi.org/10.1080/0951192X.2020.1803502>
- Lakovic, V. (2020). Crisis management using persuasive Technology in a Mobile Game for children. *Health and Technology*, 10(6), 1579-1590. doi:<https://doi.org/10.1007/s12553-020-00476-9>
- Lita, R. P., Faisal, R. F., & Meuthia, M. (2020). Enhancing small and medium enterprises performance through innovation in Indonesia: A framework for creative industries supporting tourism. *Journal of Hospitality and Tourism Technology*, 11(1), 155-176. doi:<https://doi.org/10.1108/JHTT-11-2017-0124>
- Ma, X., & Jiang, W. (2018). Transformational Leadership, Transactional Leadership, and Employee Creativity in Entrepreneurial Firms. *The Journal of Applied Behavioral Science*, 54(3), 302-324. doi:<https://doi.org/10.1177/0021886318764346>
- Malik, A., & Gallien, M. (2020). Border economies of the Middle East: why do they matter for political economy? *Review of International Political Economy*, 27(3), 732-762. doi:<https://doi.org/10.1080/09692290.2019.1696869>
- Mao, Y., He, J., Morrison, A. M., & Andres Coca-Stefaniak, J. (2021). Effects of tourism CSR on employee psychological capital in the COVID-19 crisis: from the perspective of conservation of resources theory. *Current Issues in Tourism*, 24(19), 2716-2734. doi:<https://doi.org/10.1080/13683500.2020.1770706>

- Paraskevas, A., & Quek, M. (2019). When Castro seized the Hilton: Risk and crisis management lessons from the past. *Tourism Management*, 70, 419-429. doi:<https://doi.org/10.1016/j.tourman.2018.09.007>
- Pennington-Gray, L. (2018). Reflections to move forward: Where destination crisis management research needs to go. *Tourism Management Perspectives*, 25, 136-139. doi:<https://doi.org/10.1016/j.tmp.2017.11.013>
- Pokharel, K. P., Regmi, M., Featherstone, A. M., & Archer, D. W. (2019). Examining the financial performance of agricultural cooperatives in the USA. *Agricultural Finance Review*, 79(2), 271-282. doi:<https://doi.org/10.1108/AFR-11-2017-0103>
- Popovič, A., Hackney, R., Tassabehji, R., & Castelli, M. (2018). The impact of big data analytics on firms' high value business performance. *Information Systems Frontiers*, 20(2), 209-222. doi:<https://doi.org/10.1007/s10796-016-9720-4>
- Prayag, G. (2018). Symbiotic relationship or not? Understanding resilience and crisis management in tourism. *Tourism Management Perspectives*, 25, 133-135. doi:<https://doi.org/10.1016/j.tmp.2017.11.012>
- RESMI, S., PAHLEVI, R. W., & SAYEKTI, F. (2021). The Effect of Financial and Taxation Literation on Competitive Advantages and Business Performance: A Case Study in Indonesia. *The Journal of Asian Finance, Economics, and Business*, 8(2), 963-971. Retrieved from <https://www.koreascience.or.kr/article/JAKO202104142261638.page>
- Reuter, C., Hughes, A. L., & Kaufhold, M.-A. (2018). Social Media in Crisis Management: An Evaluation and Analysis of Crisis Informatics Research. *International Journal of Human-Computer Interaction*, 34(4), 280-294. doi:<https://doi.org/10.1080/10447318.2018.1427832>
- Saide, S., & Sheng, M. L. (2021). Knowledge exploration–exploitation and information technology: crisis management of teaching–learning scenario in the COVID-19 outbreak. *Technology Analysis & Strategic Management*, 33(8), 927-942. doi:<https://doi.org/10.1080/09537325.2020.1854714>
- Sathyamoorthi, C., Mapharing, M., Mphoeng, M., & Dzimiri, M. (2020). Impact of financial risk management practices on financial performance: Evidence from commercial banks in Botswana. *Applied Finance and Accounting*, 6(1), 25-39. Retrieved from <http://afa.redfame.com>
- Shad, M. K., Lai, F.-W., Fatt, C. L., Klemeš, J. J., & Bokhari, A. (2019). Integrating sustainability reporting into enterprise risk management and its relationship with business performance: A conceptual framework. *Journal of Cleaner Production*, 208, 415-425. doi:<https://doi.org/10.1016/j.jclepro.2018.10.120>
- Tajbakhsh, A., & Shamsi, A. (2019). Sustainability performance of countries matters: A non-parametric index. *Journal of Cleaner Production*, 224, 506-522. doi:<https://doi.org/10.1016/j.jclepro.2019.03.189>

- Tokakis, V., Polychroniou, P., & Boustras, G. (2019). Crisis management in public administration: The three phases model for safety incidents. *Safety Science*, 113, 37-43. doi:<https://doi.org/10.1016/j.ssci.2018.11.013>
- Tsuda, S., Olasky, J., & Jones, D. B. (2021). Team training and surgical crisis management. *Journal of Surgical Oncology*, 124(2), 216-220. doi:<https://doi.org/10.1002/jso.26523>
- Uitdewilligen, S., & Waller, M. J. (2018). Information sharing and decision-making in multidisciplinary crisis management teams. *Journal of Organizational Behavior*, 39(6), 731-748. doi:<https://doi.org/10.1002/job.2301>
- Yalamov, T. T. (2021). Innovation in companies at a time of crisis: What is the role of R&D units and employment of academic researchers in business? *IFAC-PapersOnLine*, 54(13), 402-407. doi:<https://doi.org/10.1016/j.ifacol.2021.10.481>
- Zarei, M. (2020). The water-energy-food nexus: A holistic approach for resource security in Iran, Iraq, and Turkey. *Water-Energy Nexus*, 3, 81-94. doi:<https://doi.org/10.1016/j.wen.2020.05.004>
- Zhao, H. (2020). Explicating the social constructionist perspective on crisis communication and crisis management research: a review of communication and business journals. *Journal of Public Relations Research*, 32(3-4), 98-119. doi:<https://doi.org/10.1080/1062726X.2020.1802732>