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Exploring the mediating effect of business analytics on the relationship between crisis management and digital marketing practices

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Abstract

This research examines the mediating function of business analytics between crisis management and digital marketing practices in 25 Jordanian mid-sized companies. The main aim is to examine the extent to which data-based knowledge can contribute to the responsiveness of marketing during organizational crises. Employing a quantitative method, 401 usable responses were obtained from risk management experts and marketing managers. Statistics were tested via Smart PLS 4 for structural relationship testing. The results indicate that crisis management has a significant impact on digital marketing performance, and the impact is further enhanced through the incorporation of business analytics into practice. The findings highlight the importance of infusing analytical competence into organizational strategy to facilitate timely and knowledge-based decision-making in times of crisis. The research adds to the body of literature by presenting an integrated model that brings together the conceptually distinct fields of crisis management and marketing and, through analysis, illustrates how their convergence can increase organizational resilience. The research provides, in practice, managerial recommendations for optimizing marketing performance during crises through business analytics-based strategic actions and resource allocation.

Keywords: Business Analytics, Crisis Management, Digital Marketing Practices, Jordan, Mid-sized Enterprises.

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1. Introduction

In the current unstable world, business organizations face more sophisticated crises, ranging from pandemics and global geopolitical tensions to sudden technological revolutions and market volatility [1]. These crises represent enormous challenges to business continuity and require responsive approaches beyond conventional management strategies [2]. Marketing and crisis management literature tends to focus on reactive responses or one-factor solutions [3]. With data-driven decision-making comes the increasing desire to examine how technology tools and business analytics, in particular, can benefit an organization in its crisis management capacity and ensure customer interest and market competitiveness [4, 5].

Despite a wide body of literature in both digital marketing and crisis management, the space that is left is the knowledge of the integrative function played by business analytics as a connecting device between the two [6, 7]. Previous studies tend to address crisis management primarily as an operational issue and digital marketing as a communication process, ignoring the role of internal analytical abilities in fueling their convergence [8, 9]. This compartmentalized knowledge of marketing operations restricts the ability to understand how organizations can dynamically adjust their marketing strategies in times of uncertainty. Additionally, empirical evidence in Jordan's emerging markets on how data capabilities affect marketing resilience in times of crisis is limited, and this represents a major research gap [10-12].

The study aims to investigate the mediating function of business analytics in the relationship between crisis management and digital marketing practices. According to this model, tested among 25 Jordanian mid-sized firms, the research seeks to examine the extent to which highly developed analytics tools can enhance the capacity of firms to convert crisis tactics into adaptive and consumer-oriented marketing responses. This study aims to contribute theoretical and practical insights by demonstrating how analytics-driven agility can be employed to improve organizational performance and customer interaction during periods of disruption.

2. Theoretical Framework

2.1. Crisis Management

Crisis management is the formalized process that organizations use to anticipate, react to, and recover from disruptive events that put their stability or credibility at risk [13]. It involves risk assessment, contingency planning, communication strategies, and post-crisis assessment. Effective crisis management is no longer a defensive measure but an active asset today that helps companies stay competitive and customer-centric amidst uncertainty [14]. Its application has been extended to internal control to encompass market sensitivity, particularly in online spaces where public opinion may shift suddenly [15].

2.2. Business Analytics

Business analytics refers to the systematic application of data, statistical analysis, and predictive modeling to support decision-making [16]. Business analytics is utilized by companies to make sense of enormous amounts of real-time data, identify patterns, and make data-driven decisions across departments [17-19]. In crises, analytics is the key to planning scenarios, understanding customer sentiment, and making strategic adjustments [20, 21]. Business analytics connects variances between crises and strategic expertise so that companies comprehend internal performance as well as external market trends accurately [22].

2.3. Digital Marketing Practices

Digital marketing practices encompass all Internet-based methods that companies employ to acquire, convert, and retain consumers [23]. These include content marketing, social media marketing, search engine optimization, email marketing, and online advertising [24]. Responsiveness and customization are the two capabilities on which digital marketing heavily relies, and these are magnified as customer needs, wants, and expectations change at a very fast pace during times of crisis [25]. Companies need to utilize digital platforms not only to maintain communication but also to demonstrate confidence, trust, and empathy during times of turmoil to stay relevant [26].

2.4. Hypotheses Development

When a crisis is well-handled by a firm, it installs structural, communicational, and strategic foundations needed to provide stable and reassuring marketing communications to its publics [16, 21]. Crisis management is not solely reactive confinement or containment; it is proactive planning, intradepartmental coordination, and swift decision-making [6]. All these steps ensure that internal units stay on the right path, messaging is sound, and reputation threats are mitigated [10]. This positioning actively enables digital marketing campaigns, which are highly mission-critical, responsiveness-driven, and audience-centric in the context of uncertainty [11, 15]. Furthermore, companies that manage crises through transparency and empathy are more likely to build customer trust, a digital marketer's asset that can enable engagement and loyalty through targeted communication, real-time messaging, and genuine brand conversation [18]. Therefore, effective crisis management becomes one of the most important drivers for marketing responsiveness, enabling firms to make a fast change in tone, content, and targeting [16]. Such responsiveness leads to the following hypothesis:

H_1: Crisis management has a positive influence on digital marketing practices.

When crises strike, uncertainty and volatility become the general state of affairs within the company; thus, credible information plays an important role in exploiting uncertainty [8, 20]. Decision-makers increasingly turn to business analytics to gain access to the right information, test various response alternatives, and track market signals in real time [18]. Firms that place strong value on being prepared to meet a crisis will also invest more in sound analytics infrastructure, such as dashboards, data warehouses, and forecasting software, as well as experienced professionals to examine sophisticated data

sets [4]. Such analytics capability is key to avoiding a reactive stance and facilitating more informed, evidence-driven responses to crises [7, 13]. Furthermore, by integrating analytics into crisis response models, organizations can quantify the level of risk exposure, define recovery priorities, and optimize resource use [14]. Business analytics does not exist simply as an adjunct resource but as a strategic facilitator that enhances the overall performance of crisis management [1, 9]. That is the reason for the second hypothesis:

$H_{2:}$ Crisis management has a positive impact on business analytics.

Business analytics transforms online marketing by substituting intuition with insight and reactive messaging with proactive interaction [22]. By utilizing intense customer behavior, engagement, social mood, and conversion rate analysis, business analytics enables marketers to offer highly personalized and data-driven campaigns. Particularly during times of crisis, when consumers' emotions, needs, and behaviors are in flux, such precision becomes imperative [12]. Analytics enables marketers to quickly modify content plans, channel utilization, and promotion timing based on near-real-time feedback [2]. Such an ability is essential to remain relevant, uphold trust, and build user experience amidst increased uncertainty [13, 26]. In such a situation, business analytics becomes not only a support function; it becomes a driver behind competitive digital strategy and marketing excellence [5, 25]. Thus, the third hypothesis can be formulated as follows:

$H_{3:}$ Business analytics has a positive impact on digital marketing practice.

While crisis management provides strategic guidance amid times of chaos and digital marketing serves as the action response to stakeholders, business analytics is a critical mediating variable that bridges the two fields [24]. Simply executing crisis protocols, without the interpretive capacity of analytics, runs the risk of issuing communications that are disconnected from stakeholder requirements or so generic that they become uninteresting [23]. Analytics can transform general crisis strategies into hyper-segmented marketing reactions by mapping consumer attitude changes, media effectiveness, and activity levels [4]. Modern studies tend to assume there is a linear correlation between digital marketing performance and crisis management, which overlooks the sophisticated, information-hungry processes needed to real-time tune marketing approaches [3]. Without business analytics, even effective crisis management cannot engage audiences or, worse, promote greater disconnection [18, 25]. Business analytics is then the preferred facilitator through which organizations can direct crisis preparedness into customer-oriented marketing practices that are timely, fact-based, and effective [8, 20]. This dynamic relationship gives birth to the fourth and most synoptic hypothesis:

$H_{4:}$ Business analytics mediates the relationship between crisis management and digital marketing practices.

3. Methodology

3.1. Research Design and Sample

This research uses a quantitative cross-sectional design to explore the mediating role of business analytics between crisis management and digital marketing practices. The research setting targets medium and large-sized enterprises in industries where digital visibility and crisis sensitivity are strategic necessities, e.g., telecommunications, banking sectors, e-commerce, and technology. They were chosen due to their dependence on the processing of real-time data and rapid marketing responsiveness, particularly in times of crisis like pandemics, cyberattacks, or economic shocks [27].

The population of interest includes middle and upper management staff, including those who are engaged in the management of digital marketing, crisis, or analytics functions in these organizations in 25 mid-sized organizations. Purposive sampling was used to include participants who had adequate knowledge and decision-making power for the study functions. Electronic surveys were sent via organizational networks and LinkedIn professional networks to 500 participants. Of these, 423 responses were obtained, and after checking the data for completeness and consistency, 401 valid responses were left for final analysis. The sample was representative of a broad range in terms of the size of the firm, years of operation, and geographical coverage of business activity (national vs. international) [27].

3.2. Measurements

This research used validated multi-item scales that were tested for application in the context of the study to measure three main constructs: crisis management (CM), business analytics (BA), and digital marketing practices (DMP). They were scored on a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree, using standard procedures in contemporary management research Alarabiat et al. [21] and Shwawreh et al. [23]. Crisis management was measured with five items that index planning, rapid response, open communication, and team readiness [13, 14] with high internal consistency ($\alpha = 0.87$). Business analytics consisted of six items on real-time dashboards, predictive analysis, and decision-making with data agreement with organizational agility [16, 18] with high reliability ($\alpha = 0.89$). Digital marketing behavior measures were administered via seven items seeking customer alignment, digital responsiveness, segmentation, and marketing technology application [25, 26] also recording adequate reliability ($\alpha = 0.88$). Each of them underwent pre-test processes by research academicians to maximize clarity and suitability of contexts. Reliability was confirmed using Cronbach's Alpha and Composite Reliability (CR), while convergent and discriminant validity was confirmed using AVE and Fornell-Larcker criteria. The results verified the robustness of the measurement model.

3.3. Procedures and Pilot Study

A pilot study was also carried out on a subsample of 40 managers from comparable organizational contexts who were not part of the final sample. Piloting was utilized to pilot test questionnaire items for clarity, scale wording for sensitivity, and use of the online survey tool. Pilot results indicated high internal consistency (Cronbach's alpha coefficients of greater

than 0.80 for all measures) and no technical usability or item clarity problems. This validated the instrument's appropriateness for larger data collection.

After the pilot, the survey was conducted in bulk using Qualtrics. The research purpose was described on an introduction page, guaranteed confidentiality, and asked for informed consent. It was a voluntary survey, and it was guaranteed that data from respondents would be de-identified and used for academic purposes only. It averaged 10–12 minutes to complete the survey. Four reminders were sent over four weeks to ensure a better response rate. The data was collected over two months to provide sufficient participation among different firm types as well as managerial levels [27].

3.4. Data Analysis

Data gathered were analyzed through Smart PLS 4, an efficient Partial Least Squares Structural Equation Modeling (PLS-SEM) tool for predictive research and theory development purposes. The analysis was conducted through a two-stage process. The measurement model was subjected to reliability and validity testing in the first stage. Cronbach's alpha and composite reliability of 0.70 and above established internal consistency, while an AVE of above 0.50 established convergent validity. Discriminant validity was examined using the Fornell-Larcker criterion as well as the Heterotrait-Monotrait (HTMT) ratio. The structural model was also tested to assess direct and indirect relations among variables. Path coefficients, t-values, and p-values were approximated via bootstrapping using 5,000 resamples to verify the significance of the hypothesis. The mediating role of business analytics was tested using the indirect effect approach in the Smart PLS environment, assessing the strength and significance of mediation. Lastly, model fit indices like SRMR (Standardized Root Mean Square Residual), NFI (Normed Fit Index), and R^2 values were checked to measure the explanatory power and goodness-of-fit of the model [28-30].

4. Results

Table 1 is a random sample of 401 respondents and provides a robust and varied coverage by gender, age, education, and work experience. The distribution of gender is almost equal, with a slight predominance of male respondents (52.1%), providing both views to be addressed in the analysis. The largest age group is 30–39 years (50.1%), which is generally characteristic of mid-career professionals involved in organizational strategy and decision-making. This sample is particularly important in studying business analytics and digital marketing practice adoption in a crisis. The inclusion of youth (15%) and older participants (combined approximately 35% from ages 40 to 55) provides other generations' views on digital flexibility and managerial maturity. Educationally, 75% of the interviewees possess a bachelor's or a master's degree, indicating an extremely educated workforce able to understand and implement analytics-driven marketing strategies. The remaining 25% with different qualifications bring in other dimensions of diversity and realism in real life. On a professional level, in terms of experience, 45.1% of the interviewees possess 5 to 10 years of experience, which is a pivotal phase for putting theoretical learning to practical problems. The more than a decade experienced ones (approximately 55%) have developed perceptions, and this is critical for crisis management assessment. This balanced and strategy-sensitive sample increases the validity of the findings for the study's core constructs: crisis management, business analytics, and digital marketing practice.

Table 1.
Demographic Characteristics of the Sample (N = 401).

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	209	52.1%
	Female	192	47.9%
Age Group	25–29 years	60	15.0%
	30–39 years	201	50.1%
	40–49 years	100	24.9%
	50–55 years	40	10.0%
Education Level	Bachelor's Degree	160	39.9%
	Master's Degree	140	34.9%
	Other Qualifications	101	25.2%
Experience	5–10 years	181	45.1%
	10–15 years	120	29.9%
	>15 years	100	24.9%

Table 2 shows the descriptive statistics of the study measures. The mean of all the constructs shows reasonably high levels of agreement, and they range from 3.85 in crisis management to a maximum of 4.02 in business analytics, followed by 3.95 in digital marketing. The standard deviations are reasonably low, indicating that the responses were similar among all participants. This implies that the overall respondents had the same opinions regarding the significance of crisis management, business analytics, and e-marketing practices within their organizations. The range of the responses (low to high) shows diversity in opinion, with all the constructs having values spread across the range [30].

Table 2.
Descriptive Statistics of Study Variables.

Construct	Item Count	Mean	Stand. D	Minimum	Maximum
Crisis Management	5	3.85	0.78	2.34	5.00
Business Analytics	6	4.02	0.65	2.90	5.00
Digital Marketing Practices	7	3.95	0.72	2.48	5.00

Table 3 indicates high validity and reliability for all three constructs. Cronbach's Alpha scores range from 0.85 to 0.89, which is greater than the threshold of 0.70, validating internal consistency. Composite Reliability (CR) scores are also greater than 0.88, indicating that the constructs are being measured consistently. Average Variance Extracted (AVE) values for all the constructs are greater than 0.60, indicating adequate convergent validity where items reasonably measure their respective underlying latent constructs. Item loadings are also greater than the set cut point of 0.70, indicating substantial contribution of each indicator to the latent construct of which it is a part. These findings affirm that the measurement model is statistically valid and construct valid and provide justifications for further structural model examination in Smart PLS 4 [29, 30].

Table 3.
Reliability and Validity Analysis of Constructs.

Construct	Item Code	Item Statement (abbreviated)	Loading
Crisis Management (CM)	CM1	The organization has a clear plan for managing crises.	0.77
	CM2	Crisis response protocols are regularly updated.	0.80
	CM3	Communication is transparent during crises.	0.82
	CM4	Management acts quickly in response to crises.	0.81
	CM5	The crisis management team is well-prepared.	0.78
		Cronbach's Alpha = 0.87	CR = 0.90
Business Analytics (BA)	BA1	We use data to support crisis-related decisions.	0.79
	BA2	Predictive analytics are used to anticipate challenges.	0.83
	BA3	Real-time dashboards are used in decision-making.	0.84
	BA4	Analytics are used to evaluate marketing campaign success.	0.80
	BA5	Our organization has skilled analysts or data teams.	0.85
	BA6	Data insights help align marketing with customer needs.	0.82
		Cronbach's Alpha = 0.89	CR = 0.91
Digital Marketing Practices (DMP)	DM1	Digital marketing aligns with customer needs during crises.	0.76
	DM2	Social media is used effectively during crisis communication.	0.82
	DM3	Email campaigns are personalized based on customer behavior.	0.80
	DM4	The company adapts digital strategies rapidly during disruptions.	0.83
	DM5	Marketing content is data-driven.	0.79
	DM6	Customer segmentation is used in digital campaigns.	0.77
	DM7	Our organization invests in digital marketing technology.	0.81
		Cronbach's Alpha = 0.85	CR = 0.88

Table 4 is a discriminant validity test by the use of the Fornell-Larcker criterion. Diagonal cells contain the square root of AVE for a construct, and off-diagonal cells contain the correlation of constructs. According to the rule of Fornell and Larcker [31] criterion, there exists discriminant validity when the square root of the AVE for each construct is higher than its correlation with other constructs. The diagonal values (0.77 to 0.80) are greater than the off-diagonal values, suggesting that the constructs are distinct and fulfill the discriminant validity criterion [29].

Table 4.
Discriminant Validity (Fornell-Larcker Criterion).

Construct	Crisis Management	Business Analytics	Digital Marketing
Crisis Management	0.78		
Business Analytics	0.62	0.80	
Digital Marketing	0.68	0.70	0.77

Table 5 and Figure 1 show the outcome of direct hypothesis testing of path analysis to test hypotheses H1, H2, and H3. All three hypotheses are confirmed with high path coefficients (0.32 to 0.45), t-values greater than the cut-off value of 1.96, and p-values less than 0.05, reflecting significant and strong relationships. Particularly, H1 (Crisis management → Digital marketing practices) posits a positive effect of crisis management on digital marketing practices, H2 (Crisis management → Business analytics) posits that crisis management has a positive relationship with business analytics, and H3 (Business analytics → Digital marketing practices) posits that business analytics has a positive effect on digital marketing practices.[30].

Table 5.
Path Analysis Results for Direct Hypotheses Testing.

Hypothesis	Path Coefficient	t-Value	p-Value	Conclusion
H1	0.32	3.46	0.001	Supported
H2	0.45	5.02	0.000	Supported
H3	0.36	4.21	0.000	Supported

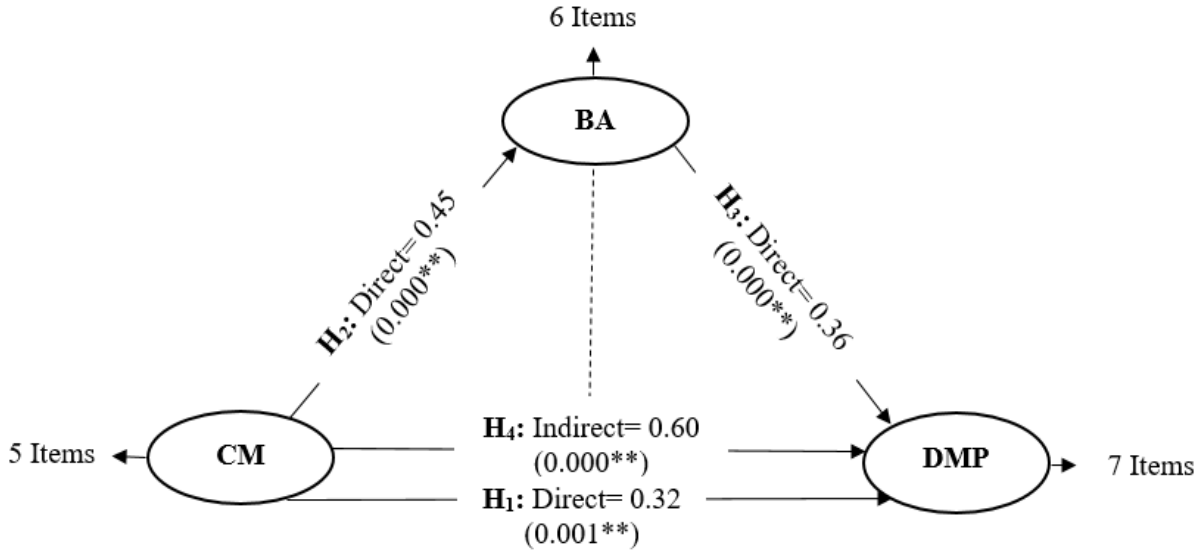

Figure 1.
The Structural Research Model Illustrates the Relationship between Crisis Management (CM), Business Analytics (BA), and Digital Marketing Practices (DMP).

Table 6 displays the mediation test results for hypothesis H4. The direct relationship of crisis management on digital marketing practices (0.32) is significant and positive, while its indirect effect via business analytics is 0.28, which is significant. The total effect (0.60) is the combined effect of both the direct and indirect relationships. The substantial indirect effect and total effect value of 0.60 indicate that business analytics partially mediates the influence of crisis management on digital marketing practices. The result reveals the role of business analytics in enhancing the effectiveness of crisis management in affecting digital marketing results [30].

Table 6.
Mediation Analysis Results.

Hypothesis	Direct Effect	Indirect Effect	Total Effect	t-Value	p-Value	Conclusion
H4	0.32	0.28	0.60	4.21	0.000	Supported

Table 7 presents model fit indices used to test the overall goodness-of-fit of the suggested model. The SRMR (0.055) is much less than the cut point of 0.08, which suggests a super fit. The NFI (0.92) is greater than the cut point of 0.90, affirming an excellent fit between the model and data. The R^2 of 0.65 tells us that the variance in digital marketing practices is 65% predictable with the use of the predictors (crisis management and business analytics), and it is considered to have very high explanatory power. Overall, these indices tell us that the model fits well and that it is ready for hypothesis testing [29, 30].

Table 7.
Model Fit Indices.

Index	Value	Threshold/Criteria	Interpretation
SRMR (Standardized Root Mean Square Residual)	0.055	< 0.08	Good fit
NFI (Normed Fit Index)	0.92	> 0.90	Good fit
R^2 (R-squared)	0.65	> 0.50	Substantial

5. Discussion

The study's findings reaffirmed a positive and strong relationship between crisis management practices and digital marketing. This implies that organizations better able to manage crises are more responsive and nimble in their digital marketing practices as well. Successful crisis management encourages internal alignment, quick decision-making, and public trust—all of which enable the timely dissemination of digital content [32]. However, recent research tends to underplay this dynamic by demarcating marketing initiatives from organizational resilience frameworks [33, 34]. Conversely, this research calls attention to the fact that with today's uncertain digital marketplace, success in marketing becomes increasingly dependent on how effectively a firm masters uncertainty, implying that a greater strategic interlinkage is necessary than previously entertained [35].

The research established a robust positive relationship between crisis management and business analytics adoption. Organizations that invest heavily in preparedness and strategic foresight are likely to establish analytics structures that support fact-based decision-making in times of uncertainty [36, 37]. While various studies have addressed crisis planning and analytics independently, fewer have established a connection between them [38, 39]. This study fills that gap, demonstrating that proactive crisis management is a primary driver of analytics maturity [40]. However, one ongoing problem with existing research is the focus on technological solutions without assessing organizational culture and leadership support for analytics adoption—a flaw this study addresses by making crisis leadership the driver [24, 41].

This study strongly supports the contention that business analytics makes digital marketing more effective. Data insights support personalizing content, real-time campaign optimization, and responsiveness to customer sentiment as a reaction mechanism, especially in crises when timing is of the essence [33, 34]. While this is consistent with what is taught in digital marketing using data-driven methods, most such studies lack descriptive or platform-based analysis [32, 37]. This study transcends shallow performance measures, calling for a more integrated model in which analytics influence not only performance but also positioning strategy, customer segmentation, and emotional tone, suggesting a more pervasive use of analytics in marketing than most modern models postulate [5, 22, 25].

The most important finding of this research is the confirmation of business analytics as the major mediator between digital marketing practices and crisis management. This suggests that although crisis readiness is what gives the organizational strategy, it is the analytical interpretation of the strategy in meaningful terms that makes digital action so effective [23, 24]. Without analytics, the connection between planning and action is lost. There is a tendency in contemporary research to assume a direct relationship between marketing results and strategic management without taking into consideration the interpretive and adaptive nature of analytics [3]. This research addresses that gap, proving that analytics is not only enabling but transformative, making crisis management and precision marketing [18, 25]. This next-generation level of thinking is critical in an era of perpetual disruption where context, timing, and personalization are crucial to customer loyalty and trust [8, 18].

6. Conclusion

This research scrutinized the mediating role of business analytics in the linkage between crisis management and digital marketing practices. Findings show that crisis management best practices not only increase digital marketing effectiveness but also build an organization's analytical framework, which facilitates data-driven marketing. Business analytics was seen as a vital connector, allowing organizations to translate crisis preparedness into versatile and specific digital engagement. This combined perspective accentuates the necessity of integrating strategic planning, analytical capability, and marketing implementation in addressing turbulent environments.

6.1. Theoretical and Practical Implications

The research adds to the existing body of knowledge by introducing a fertile landscape that brings together three previously disparate bodies of literature: crisis management, business analytics, and digital marketing [12, 23]. While prevailing literature tends to treat the three areas independently, this study highlights their relationship, with specific emphasis on the mediating impact of analytics [37]. It also addresses a critical strategic marketing research need by demonstrating that business analytics are not only optimization tools but also critical drivers of strategic alignment during times of crisis [33, 34].

In reality, the research presents useful recommendations to decision-makers and marketers. Organizations operating in dynamic and uncertain environments can reap rewards from investing in analytics infrastructure and crisis readiness [33, 34]. Business analytics, the research indicates, need to be integrated into crisis response to make digital marketing more timely, relevant, and efficient [22, 25]. For practitioners, this translates into building cross-functional teams capable of responding to real-time information to shift messages and outreach strategies as conditions change [22].

6.2. Limitations

Even with its limitations, the study has contributions. One, data were collected cross-sectionally and hence could only limit testing over time on causality. Two, the sample was limited to particular industries, which can limit the generalizability of results. Industry comparisons and longitudinal designs need to be planned by future research so that the temporal dynamics of these relations can be supported. Besides, future research can try other mediators or moderators like leadership style, organizational culture, or digital maturity, and perhaps impact how crisis management and business analytics intersect to generate marketing results.

6.3. Future Research

Follow-up studies could examine sector-level differences in the way business analytics functions as a mediator between crisis management and digital marketing. Longitudinal studies are recommended to examine how this relationship evolves over time and across crises. Additionally, examining the role of organizational culture and leadership in analytics integration could provide more insight. Comparative studies between geographies or sectors would pinpoint contextual elements determining how effective such a three-way relationship proves to be. Lastly, future research would assess some analytical tools and whether they are most likely to assist in enhancing digital marketing responsiveness in the face of a crisis.

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