Quality Dimensions of Management Information Systems and Business Intelligence in Crisis Management

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ABSTRACT

This study aimed to explore the quality dimensions of Management Information Systems (MIS) and Business Intelligence (BI) that support effective crisis management in higher education institutions. The study used a PRISMA-guided systematic review and analyzed 16 high-impact peer-reviewed studies published between 2020 and 2025. The initial Google Scholar search returned approximately 18,000 records, which were screened using predefined criteria and thematic relevance. Through inductive thematic analysis, seven core quality dimensions were identified: information quality, system quality,

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service support, decision support functionality, governance and training, risk mitigation capacity, and predictive/prescriptive analytics. The results showed that information quality, system quality, and decision support functionality were the most consistently emphasized across studies. These dimensions are linked to improved crisis preparedness, responsiveness, and institutional resilience. Predictive analytics and strategic alignment further enhanced decision-making agility. While less dominant, service support and governance emerged as critical enablers for system usability and sustainability. The findings provide a structured understanding of how MIS and BI systems function under crisis conditions and offer practical recommendations for universities and policymakers to strengthen digital preparedness and operational continuity. This study fills a gap in the literature by connecting specific quality attributes of MIS and BI with effective institutional crisis response.

JEL Classifications: G01, I24, l15, L86

Keywords: crisis preparedness; digital decision-making; system quality evaluation; institutional resilience; higher education technology, thematic analysis

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I. INTRODUCTION

In an era of rapid technological transformation and growing complexity within higher education institutions, the ability to respond effectively to crises has become a defining element of institutional resilience. Universities today face multifaceted challenges ranging from global health emergencies to cybersecurity threats that demand not only swift decision-making but also informed, data-driven strategies. In such dynamic environments, the quality of information systems plays a pivotal role in enabling institutions to adapt, survive, and recover from unexpected disruptions. Management Information Systems (MIS) and Business Intelligence (BI) have emerged as integral tools in this process, providing the technological infrastructure to collect, process, and analyze vast amounts of institutional data. However, their effectiveness in crisis management depends not merely on their existence but on the quality of their implementation across several dimensions, such as data integrity, real-time processing, decision support functionalities, and predictive capabilities. These dimensions influence how well institutions can monitor risks, detect early warning signals, coordinate responses, and make timely decisions during emergencies. Despite their increasing adoption in the education sector, there remains a need to systematically examine how the qualitative aspects of MIS and BI contribute to effective crisis response (Maligudu, 2023). Specifically, understanding which quality attributes of these systems enhance institutional agility, information reliability, and decision-making effectiveness is critical to building more robust crisis management frameworks. For instance, during an unexpected campus disruption, delays in accessing accurate enrollment or staffing data can hinder timely communication and coordination, leading to fragmented responses. In contrast, information systems that provide reliable, real-time dashboards allow institutional leaders to assess evolving conditions quickly, prioritize actions, and maintain academic and operational continuity under pressure. This study addresses this need by investigating the quality dimensions of MIS and BI in the context of crisis management, aiming to synthesize key themes that define their strategic value in higher education.

Accordingly, this study contributes to the literature on crisis management in higher education by providing a structured synthesis of the quality dimensions of Management Information Systems and Business Intelligence that directly influence institutional preparedness, response, and resilience. By synthesizing evidence through a PRISMA-guided systematic review and thematic analysis, this study advances understanding beyond system functionality to demonstrate how information quality, system quality, and decision support capabilities interact as integrated institutional capacities during crises. The findings offer a conceptual foundation to guide the design, evaluation, and strategic use of MIS and BI systems in higher education institutions facing complex disruptions.

A. Problem Statement

Although Management Information Systems and Business Intelligence have become increasingly integrated into the operational and strategic frameworks of higher education institutions, their actual performance in times of crisis remains inconsistent and underexplored. Many universities adopt MIS and BI tools without fully evaluating or optimizing the quality dimensions that determine their usefulness during critical

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incidents. As crises demand rapid, accurate, and well-informed responses, gaps in data reliability, system responsiveness, and decision support can lead to delays, poor coordination, and institutional vulnerability. The issue is not the availability of MIS and BI platforms, but rather the degree to which these systems exhibit quality characteristics essential for effective crisis management. Factors such as the integrity of data sources, the speed of real-time processing, the sophistication of predictive analytics, and the accessibility of decision support outputs all influence how well universities can manage crises. However, existing research remains fragmented, with limited systematic synthesis that integrates these quality dimensions within crisis management phases or examines their collective influence on institutional resilience in higher education settings. This gap highlights the need for a comprehensive review of how MIS and BI systems are applied and assessed during crises, particularly in the context of higher education institutions. Without a clear understanding of which quality attributes matter most, universities risk relying on technological solutions that are operational but not strategically effective. Therefore, this study seeks to address the problem by identifying, classifying, and analyzing the quality dimensions of MIS and BI that contribute meaningfully to crisis management capabilities in the education sector.

B. Research Questions

To achieve these objectives, the study addresses the following key research questions:

1. What are the most frequently reported quality dimensions of MIS and BI systems in the context of crisis management in higher education?
2. How do specific quality dimensions (e.g., data accuracy, real-time processing, system integration, and decision support) enhance or limit crisis response capacity in universities?
3. To what extent do MIS and BI systems contribute to the preparedness, response, recovery, and learning phases of crisis management?
4. What recurring patterns in the literature explain how MIS and BI quality dimensions are integrated and operationalized to strengthen institutional crisis resilience?

C. Research Objectives

This study aims to conduct a systematic review and thematic analysis to explore the role of quality dimensions in Management Information Systems (MIS) and Business Intelligence (BI) for effective crisis management in higher education institutions. Specifically, the study seeks to:

1. Identify the key quality dimensions of MIS and BI systems that are critical during crisis management.
2. Analyze how these quality dimensions influence institutional responsiveness and decision-making in crises.
3. Evaluate the extent to which MIS and BI systems support proactive and reactive crisis management strategies in higher education institutions.

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4. Synthesize thematic insights from empirical and theoretical literature to clarify how quality dimensions are integrated within institutional systems and to inform the strategic design and implementation of high-quality MIS and BI frameworks for crisis resilience.

D. Study Importance

This study is important because it addresses a critical gap in understanding how the quality of Management Information Systems (MIS) and Business Intelligence (BI) affects crisis management in higher education. While these systems are widely implemented, their effectiveness during crises depends on key quality dimensions such as data accuracy, real-time processing, decision support, and predictive capabilities. By focusing on these attributes, the study offers a structured analysis of how MIS and BI contribute to timely decision-making and institutional resilience. It provides practical insights for improving system design and implementation, helping universities enhance their preparedness and response to future crises through data-driven strategies.
In addition to practical implications, the study contributes conceptually by consolidating fragmented evidence into a coherent framework that clarifies how the quality dimensions of MIS and BI collectively strengthen crisis preparedness and institutional resilience in higher education.

II. LITERATURE REVIEW

Crisis management has become a vital function in higher education institutions, especially in light of increasing uncertainties such as global pandemics, cybersecurity threats, and financial instabilities (Fouad, 2021). Universities are not immune to these disruptions, and their ability to respond effectively often determines the continuity of academic and administrative operations (Bartusevičienė et al., 2021). In this context, crisis management extends beyond traditional emergency response plans to encompass proactive strategies, real-time interventions, and post crisis recovery (Emami et al., 2024). The complexity of modern crises requires institutions to adopt structured processes that include early warning detection, impact assessment, response coordination, and continuous learning from past events (Boin et al., 2020). The dynamic and multi-phase nature of crises highlights the need for timely information, accurate data interpretation, and system-wide coordination (Abdel-Latif et al., 2023). To address these challenges, higher education institutions have increasingly turned to Management Information Systems (MIS) as a core component of their decision-making infrastructure (Biswas et al., 2024). MIS serves as a centralized platform that supports data collection, storage, processing, and dissemination across various administrative and academic departments (Rainer et al., 2019). These systems are essential in ensuring that institutional leaders have access to reliable data that can inform strategic and operational decisions (Wamba-Taguimdje et al., 2020). MIS facilitates the monitoring of institutional performance, helps identify potential risks, and supports the alignment of institutional goals with available resources (Hossain et al., 2024; Elbashir et al., 2022). Safwan et al. (2016) found that MIS is the ability to integrate data from multiple sources into a unified platform, which enhances organizational visibility and transparency, which are critical

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during crises. In addition, the evolution of MIS has been further enhanced by the integration of Business Intelligence (BI) systems, which offer advanced data analysis, visualization, and reporting capabilities. Meanwhile, Mallikarjuna Paramesha and Rane (2025) observed that BI goes beyond the transactional nature of MIS by enabling users to generate insights from historical and real-time data. Abid et al. (2021) concluded that both MIS and BI support functions such as predictive modeling, trend analysis, and scenario planning, which are particularly useful during crisis management. Through interactive dashboards and data-driven reports, BI systems allow decision makers to quickly grasp the scope of a crisis and evaluate alternative responses. This enables universities to transition from reactive to proactive crisis management approaches (Elvas et al., 2021). However, Business Intelligence applications are increasingly embedded within institutional strategies for risk assessment and mitigation (Shah et al., 2023). BI tools can analyze patterns in enrollment data, financial indicators, or health records to anticipate emerging issues before they escalate into full-blown crises (El Morr and Ali-Hassan, 2019). By identifying potential vulnerabilities early, universities can allocate resources more effectively and take preemptive action (Rane et al., 2024). In addition, BI facilitates post-crisis analysis by capturing detailed data about the institution's response, providing a valuable foundation for learning and improvement (Alhinai et al., 2024). These capabilities make BI an indispensable asset in navigating the uncertain landscape facing higher education today (Kalebar et al., 2024). The intersection of MIS, BI, and crisis management forms a strategic framework that allows institutions to operate with greater agility and confidence (Hameed et al., 2024). While MIS provides the structural backbone for data management, BI offers the analytical tools needed to interpret that data and translate it into actionable decisions. Together, they support comprehensive crisis management processes that include prevention, preparedness, response, and recovery (Maligudu, 2023; Hossain et al., 2024). The integration of these systems enables institutions to shift from fragmented, reactive approaches to coordinated, strategic responses that align with institutional goals and stakeholder expectations (Kamaldeen, 2024). Despite their widespread adoption, the effectiveness of MIS and BI in crisis management is heavily influenced by the quality of these systems (Masa'Deh et al., 2021). According to Alwan et al. (2022), in this context, both MIS and BI refer not only to technical reliability but also to dimensions such as data accuracy, real-time accessibility, user friendliness, and system scalability. A high-quality system ensures that information is both timely and trustworthy, enabling informed decision-making under pressure (Gade, 2021). Spencer et al. (2022) mentioned in their study that poor system quality, on the other hand, can lead to misinterpretations, delayed responses, and missed opportunities for intervention. Therefore, Asiedu and Ameyaw (2021) found that evaluating system quality is essential for maximizing the value of MIS and BI in institutional crises and projects, even in developing countries and educational institutions. One of the most critical quality dimensions in MIS and BI systems is data integrity (Touil and Jabraoui, 2023). Accurate and consistent data is the foundation upon which all decisions are made, particularly during a crisis when information must be processed quickly and confidently (Sharma et al., 2022). Errors in data entry, duplication of records, or outdated information can compromise the reliability of system outputs (McGilvray, 2021). Institutions must invest in data governance frameworks that ensure high standards of data quality across all departments and platforms. Real-time data processing is another essential quality feature (Adepoju et al., 2023). During a crisis,

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delays in data availability can lead to missed windows of opportunity and ineffective responses. Systems that support real-time data capture and analysis enable institutional leaders to assess changing situations as they unfold and adapt strategies accordingly (Chikomba, 2024). The capacity to generate up-to-date insights enhances institutional responsiveness and fosters a culture of informed agility (Jaafar et al., 2025). Decision support functionality also plays a significant role in the quality evaluation of MIS and BI systems. Systems should be capable of generating customized reports, scenario models, and visual dashboards that facilitate decision-making across various levels of leadership (Bobylev, 2023; Martins et al., 2024). Intuitive interfaces, role-based access controls, and integration with communication tools further enhance the usability of these systems. When decision support is both accessible and context specific, institutional leaders are better equipped to manage crises effectively (Sottilare, 2024; Troitiño et al., 2024; Lotfi et al., 2023). Finally, predictive analytics is emerging as a key quality dimension that differentiates traditional MIS from more advanced BI systems (Hossain et al., 2024). The ability to forecast potential crises based on historical patterns and current data enables institutions to shift from reactive to anticipatory modes of operation (Aziz and Andriansyah, 2023). Predictive models can inform contingency planning, guide resource allocation, and shape institutional policies to mitigate risks (Firoozi and Firoozi, 2024). Moscardini et al. (2022) concluded that as universities continue to face complex and evolving challenges, the integration of predictive analytics into MIS and BI frameworks represents a strategic advancement in institutional crisis readiness.

A. Summary of Previous Studies

Previous studies have shown that crisis management is essential for higher education institutions facing unexpected events such as health emergencies or system failures. Management Information Systems (MIS) have been recognized for supporting data collection and coordination, while Business Intelligence (BI) tools offer advanced analytics and help decision makers respond quickly and effectively. Scholarly work increasingly positions MIS and BI not merely as operational tools but as strategic enablers of institutional resilience. Research has also highlighted the benefits of integrating MIS and BI to improve crisis preparedness and response. Some studies examined how these systems can help monitor risks, analyze trends, and support strategic planning. Others have confirmed that system quality, including data accuracy, user access, and real-time processing, can improve how institutions manage crises. However, much of the existing literature addresses these dimensions in isolation, with limited synthesis that integrates quality attributes across crisis phases or evaluates their collective impact within higher education contexts.

B. Research Gap

While there is growing interest in using MIS and BI during crises, few studies have explored how the quality of these systems influences their effectiveness in real-world crises within institutional settings. Most research focuses on system functions or general outcomes, without clearly linking specific quality dimensions to crisis management success. Existing studies often examine individual attributes such as analytics capability or system integration, yet they rarely synthesize these dimensions into a cohesive

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framework that explains their combined impact across crisis phases. This study fills that gap by identifying and analyzing the key quality dimensions of MIS and BI, such as data integrity, decision support, and real-time processing, and examining how they support crisis management in higher education. By integrating dispersed findings into a structured thematic model, the study advances understanding of how system quality attributes collectively shape institutional preparedness, response, and recovery. It aims to answer what qualities matter most, how they help institutions respond, and what patterns emerge across the literature.

III. METHODOLOGY

This study follows a systematic and qualitative methodology to examine the quality dimensions of Management Information Systems (MIS) and Business Intelligence (BI) in supporting crisis management within higher education institutions. To ensure rigor and reliability, the research design adheres to established systematic review protocols, specifically incorporating a PRISMA-guided screening structure, focusing on transparency, replicability, and analytical depth. The study aims to identify recurring quality attributes that enhance crisis responsiveness by reviewing recent, high-impact scholarly literature published between 2020 and 2025. A qualitative synthesis approach was adopted to enable thematic integration of diverse empirical and conceptual findings across sectors.

A. Qualitative Data Collection Approach

The study employs a systematic review design combined with thematic analysis as its primary approach. This design was chosen to provide a comprehensive and evidence-based understanding of how MIS and BI quality dimensions contribute to effective crisis management. The review process followed clear inclusion and exclusion criteria and used predefined keywords to filter relevant peer-reviewed articles. After screening and selection, thematic analysis was applied to identify recurring patterns and concepts related to system quality and crisis response. The inductive coding process enabled the categorization of quality dimensions across diverse institutional contexts while maintaining alignment with the study's research questions. This qualitative synthesis allowed for a deeper interpretation of how these systems function under crisis conditions and which dimensions are most influential in supporting institutional resilience.

B. Systematic Review Protocol (PRISMA)

This study follows the PRISMA protocol, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. PRISMA is a widely recognized set of evidence-based reporting guidelines designed to improve the transparency, accuracy, and completeness of reporting in systematic reviews. It provides a structured approach for identifying, selecting, and synthesizing relevant studies in a way that minimizes bias and enhances reproducibility. The protocol includes specific stages such as defining research questions, developing inclusion and exclusion criteria, documenting the search process, screening results, and extracting key data. In this study, PRISMA was operationalized through clearly defined identification, screening, eligibility, and inclusion stages, with

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explicit documentation of search limits, selection filters, and final study counts. PRISMA guided the selection of peer-reviewed literature related to the quality dimensions of Management Information Systems and Business Intelligence in crisis management. Following this structured process ensured that the review was methodical, transparent, and aligned with international academic standards.

C. Study model (PRISMA)

In line with the systematic review methodology, this study began with a comprehensive literature search conducted through Google Scholar to identify research addressing the quality dimensions of Management Information Systems (MIS) and Business Intelligence (BI) in crisis management. Keywords were derived directly from the study title and core concepts, and the initial search covering the period 2020–2025 yielded approximately 18,000 records. To ensure feasibility while maintaining scholarly relevance, the screening process was operationalized by limiting results to the first five pages returned by Google Scholar, where studies with the highest citation counts are typically concentrated. From this pool, articles were shortlisted based on citation frequency, thematic relevance to MIS, BI, and crisis management, and full-text availability, resulting in an initial shortlist of 20–25 highly cited studies. These shortlisted articles were then subjected to a PRISMA-guided screening process, including identification, eligibility assessment, and exclusion of duplicates, non-peer-reviewed sources, and studies outside the education or institutional crisis context. Following this assessment, a final set of 16 studies that met all inclusion criteria was retained for analysis. Following eligibility assessment and application of inclusion criteria, a final set of 16 studies met all requirements and were retained for analysis. The included studies were subsequently analyzed using an inductive thematic approach, with manual coding supported by Microsoft Word for keyword identification and Excel for organizing and categorizing thematic dimensions. The coding process involved iterative theme refinement to ensure alignment with the research questions and conceptual framework. This process enabled a focused and systematic synthesis of MIS and BI quality dimensions relevant to crisis management in higher education.

1. Step 1: Identification: Google Scholar search (2020–2025) using keywords from the study title.
2. Approximately 18,000 articles identified.
3. Step 2: Screening: Results limited to the first five pages of Google Scholar; studies filtered by citation count and thematic relevance, resulting in a preliminary shortlist of 20–25 highly cited articles.
4. Step 3: Eligibility: Inclusion and exclusion criteria applied; duplicates, non-peer-reviewed sources, and unrelated sectors removed. reducing the pool to 16 studies that met methodological and thematic requirements.
5. Step 4: Inclusion: Sixteen studies were retained for final thematic analysis.
6. Step 5: Thematic Coding: Manual thematic analysis conducted using Word macros and Excel to identify and group quality dimensions (e.g., data accuracy, decision support).

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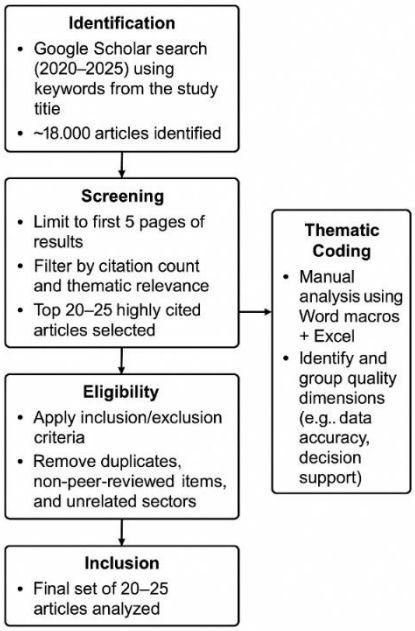
Figure 1
Study Model (PRISMA)



D. Inclusion and Exclusion Criteria

To ensure the relevance and quality of the reviewed literature, specific inclusion and exclusion criteria were applied. Studies were included if they (1) were published between 2020 and 2025, (2) were peer-reviewed journal articles, (3) focused on Management Information Systems (MIS), Business Intelligence (BI), or crisis management within higher education institutions, and (4) addressed aspects of system quality or decision-making. Studies were excluded if they (1) lacked full-text access, (2) focused on sectors unrelated to institutional crisis management or without transferable relevance to higher education, or (3) did not discuss any relevant quality dimensions.

E. Search Strategy and Data Sources

The literature search was conducted using Google Scholar as the primary database due to its broad multidisciplinary coverage and inclusive indexing of peer-reviewed journal articles across education, information systems, public administration, and crisis management domains.

Google Scholar was selected to support interdisciplinary retrieval and citation-based filtering, allowing identification of both highly cited foundational studies and recent high-impact publications within the defined time frame. To enhance rigor and manageability, the search was limited to the first five pages of results, where highly cited and thematically relevant studies are typically concentrated.

This approach was adopted to prioritize influential and methodologically robust

studies while maintaining transparency in selection boundaries. Although, databases such as Scopus and Web of Science provide structured indexing, Google Scholar was chosen for its wider accessibility and comprehensive citation coverage. To mitigate potential selection bias, clear inclusion and exclusion criteria were applied, focusing exclusively on peer-reviewed journal articles published between 2020 and 2025 that explicitly addressed system quality dimensions within institutional crisis contexts. In addition, thematic relevance was independently verified during full-text review to ensure alignment with the research questions, thereby strengthening internal validity of the final sample.

F. Data Extraction and Coding

Data extraction involved reviewing the selected articles in full and identifying relevant content related to the quality dimensions of MIS and BI in crisis contexts. A structured data extraction sheet was developed in Excel to record key themes, system characteristics, and outcomes. Microsoft Word macros were also used during full-text reading to highlight thematic keywords and recurring phrases. Coding was conducted iteratively, with themes reviewed and refined to ensure conceptual coherence and consistency with the research questions. Cross-checking between extracted themes and study findings was performed to reduce interpretive bias. This combination allowed for an efficient and replicable coding process across all included studies.

G. Thematic Analysis Procedures

Thematic analysis was conducted using an inductive coding approach. Each selected study was examined in full, and relevant excerpts relating to system quality dimensions were highlighted and coded manually. Initial codes were generated based on explicit references to quality attributes such as data accuracy, system reliability, governance, predictive analytics, and decision support mechanisms. These codes were then grouped into broader thematic categories through iterative comparison and constant review. To enhance analytical consistency, the coding framework was refined progressively as patterns emerged across studies, ensuring that categories were conceptually distinct and non-overlapping. Percentage values presented in Table 2 were assigned based on the proportional emphasis of each quality dimension within the study's findings and discussion sections, allowing a comparative visualization of thematic concentration. The proportional assessment was conducted using a structured content-weighting approach, in which the number of substantive analytical references to each dimension was compared relative to the total thematic content of the study. This ensured that percentage values reflected analytical depth rather than mere keyword frequency.

Although the coding process was conducted manually, repeated cross-checking of coded excerpts and category definitions was performed to ensure internal consistency and transparency in theme allocation.

Theme allocation was reviewed multiple times against the original study context to ensure conceptual fidelity and reduce interpretive bias.

The percentage values assigned to each quality dimension were not derived from statistical computation but from a structured proportional content assessment. For each study, thematic emphasis was evaluated based on the relative depth, frequency, and

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analytical weight given to each dimension within the study's results and discussion. The distribution was normalized to reflect comparative emphasis across dimensions within each individual study, allowing thematic concentration to be visually represented without implying statistical generalization.

To enhance methodological transparency, normalization was performed within each study independently, ensuring that percentages represented internal thematic distribution rather than cross-study statistical comparison. This approach preserved the qualitative integrity of the review while enabling structured thematic visualization

H. Quality Assessment of Selected Studies

Each selected study was assessed for methodological rigor, relevance to the research questions, and clarity of findings. A structured quality appraisal checklist was developed to systematically evaluate study robustness and thematic suitability. The checklist examined whether the study (1) clearly defined its methodology, (2) provided empirical or theoretical insights, (3) addressed system quality aspects, and (4) related findings to higher education or institutional crisis response. Studies that did not meet minimum quality thresholds were excluded from the final synthesis. The thematic coding process was aligned with the quality assessment checklist to ensure that only methodologically robust studies contributed to the development of thematic categories. This alignment ensured coherence between study quality and thematic inclusion, strengthening the credibility and internal validity of the final synthesis.

IV. RESULTS

A. Summary of Included Studies

A total of 16 high-impact, peer-reviewed studies published between 2020 and 2025 were included in this review. These studies were selected through Google Scholar using a PRISMA-guided screening process. The initial search yielded over 18,000 records, which were narrowed to the most cited and thematically relevant articles from the first five pages of results. The selected studies span sectors such as education, healthcare, government, and industry, reflecting a wide application of Management Information Systems (MIS) and Business Intelligence (BI) in various crisis contexts. This cross-sectoral distribution strengthens the transferability of thematic insights to higher education settings, as crisis dynamics share structural similarities across institutional environments. Most of the studies reviewed emphasized the strategic role of MIS and BI tools in improving decision-making, operational efficiency, and resilience during crises. Several focused on technological attributes like real-time analytics, AI-driven decision support, and system integration. Others highlighted organizational enablers such as governance structures, user training, and data management practices. In the context of higher education and public institutions, MIS and BI were consistently linked to improved crisis response and institutional agility. Despite variations in context, a common pattern across studies revealed that the effectiveness of MIS and BI in crises depends on their underlying quality dimensions. These dimensions include information accuracy, system usability, analytical capabilities, governance, and user empowerment. The studies also pointed to emerging risks, such as AI opacity, data quality issues, and

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lack of employee training, that can compromise the intended value of BI systems. Collectively, these findings demonstrate that technological capability alone does not ensure crisis effectiveness; rather, system quality, governance alignment, and user readiness operate as interdependent determinants of institutional resilience.

B. Thematic Map of Quality Dimensions

A thematic analysis of the 16 included studies revealed seven core quality dimensions central to the effectiveness of MIS and BI in crisis management. This thematic map reflects a growing consensus across the literature: the success of MIS and BI during crises depends not just on their presence but on how well their quality attributes are designed, managed, and aligned with institutional goals.

Table 1
Thematic Map

Theme	Description	Representative Findings
1. Information Quality	Accuracy, completeness, timeliness, and relevance of system outputs.	Poor data quality reduces analytical transparency and may result in distorted or suboptimal decisions (Rana et al., 2022).
2. System Quality	Reliability, user friendliness, integration, and real-time performance.	High system responsiveness and usability enhance agility during crises.
3. Service Support Quality	Availability of vendor support, maintenance, and user assistance.	Effective support increases user satisfaction and system use.
4. Decision Support Functionality	BI systems' ability to guide, visualize, and structure decisions.	AI-enabled dashboards and predictive tools aid crisis response.
5. Governance and Training	Institutional governance structures and employee training practices.	Lack of governance and training reduces AI effectiveness and increases risk.
6. Risk Mitigation Capacity	Systems' ability to detect, alert, and model risk scenarios.	BI tools help identify vulnerabilities early and support response planning.
7. Predictive and Prescriptive Analytics	Advanced analytical capabilities for forecasting and optimization.	Strong predictors of proactive strategy formation and competitive resilience.

C. Studies per Thematic Map Criteria

To provide a detailed understanding of how Management Information Systems (MIS) and Business Intelligence (BI) contribute to crisis management, this study examined the thematic alignment of 16 selected peer-reviewed studies with the seven quality dimensions identified in the review framework. These dimensions include Information Quality, System Quality, Service Support Quality, Decision Support Functionality, Governance and Training, Risk Mitigation Capacity, and Predictive/Prescriptive Analytics. Each study was analyzed based on the extent to which it addressed these categories, and percentage values were assigned to reflect relative emphasis. Table 2

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presents the contribution of each study across the seven quality dimensions, enabling comparative insight into thematic concentration and focus areas. The percentage distributions presented in Table 2 represent the relative thematic emphasis placed on each quality dimension within individual studies. These values reflect proportional interpretive coding rather than statistical measurement. Each study was analyzed for the intensity and recurrence of discussion related to the seven quality dimensions, and percentages were assigned to visualize comparative focus areas across the reviewed literature. The total for each study approximates 100 percent to reflect structured internal thematic allocation. Percentages were normalized within each study to illustrate relative emphasis rather than cross-study statistical comparison. Where a study does not address certain dimensions, zero values reflect the absence of substantive thematic emphasis rather than methodological omission.

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These 16 studies span a variety of domains, including higher education, healthcare, small and medium-sized enterprises (SMEs), manufacturing, public sector management, and disaster response. Studies such as Kalankesh, et al. (2020) and Saide and Sheng (2021) reflect the concerns of the education sector by highlighting usability, governance, and system support, while works like Fan, et al. (2021) and Araz, et al. (2020) represent disaster management and public sector resilience, contributing broadly across multiple dimensions.

In contrast, Akter et al. (2020) and Dwivedi et al. (2023), which focus on analytics and competitive intelligence in the private sector, demonstrate a high concentration in predictive capabilities and service quality. This cross-sector variation illustrates how contextual priorities shape the relative prominence and strategic weighting of specific quality dimensions. Nevertheless, the underlying logic of crisis response, including the need for reliable information, coordinated decision-making, and anticipatory analytics, remains structurally consistent across sectors. This consistency supports the transferability of these insights to higher education institutions. At the same time, the

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relative weighting of dimensions across studies reveals patterned prioritization rather than random distribution, indicating that certain quality attributes systematically anchor crisis effectiveness. Among the seven dimensions, Information Quality emerged as the most foundational and recurrent theme across multiple studies. For instance, Rana et al. (2022) emphasized that accurate and well-structured information feeds are essential to crisis decision-making frameworks in digital environments. Similarly, Akter et al. (2020) demonstrated that the quality of information output from business analytics directly influences performance gains and responsiveness in competitive environments. Studies like Chatterjee et al. (2024) and Yiu et al. (2021) also confirmed that institutions prioritizing information quality were more agile during disruptions. Across contexts, Information Quality consistently functioned as an enabling infrastructure rather than a standalone attribute, reinforcing its integrative role within broader system effectiveness.

To visually complement the tabulated thematic analysis, Figure 1 illustrates the relative emphasis placed by each of the 16 reviewed studies on the seven identified quality dimensions of MIS and BI. This comparative chart highlights the distribution of emphasis across the seven quality dimensions, including information quality, system quality, decision support functionality, and predictive/prescriptive analytics. As shown, some studies like Papadopoulos, et al. (2020) and Elbashir, et al. (2022) demonstrated a strong focus on specific dimensions, particularly information and service support quality, while others, such as Chatterjee, et al. (2024) and Wu, et al. (2023), displayed a more balanced distribution across multiple themes. The visualization reinforces patterns observed in Table 2, confirming that information and system quality remain dominant across the literature, whereas service support and risk mitigation capacity appear more variably represented depending on the context and sectoral application of each study. Taken together, the comparative visualization strengthens the interpretive validity of the thematic coding by demonstrating patterned emphasis rather than isolated frequency, thereby supporting the analytical coherence of the seven-dimensional framework.

Overall, the figure consolidates the comparative patterns identified in Table 2 and visually reinforces the structured thematic architecture underlying the proposed framework.

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Table 2
Retrieved Studies

Study (Author, Year)	Information Quality	System Quality	Service Support Quality	Decision Support Functionality	Governance and Training	Risk Mitigation Capacity	Predictive/Prescriptive Analytics
Rana et al. (2022)	19.5	19.8	0	19.4	19.6	19.9	0
Nussbaumer, et al. (2023)	33.3	33.5	0	0	33.2	0	0
Akter, et al. (2020)	33.4	0	33.2	0	0	0	33.1
Zhou and Fang (2020)	0	49.6	0	49.3	0	0	0
Wamba-Taguimdje, et al. (2020)	24.5	23.8	24.1	0	0	24.3	0
Dwivedi, et al. (2023)	0	33.7	33.8	0	0	0	31.3
Mikalef and Gupta (2021)	0	0	0	32.5	33.5	0	32.8
Papadopoulos, et al. (2020)	50	0	0	0	0	50	0
Elbashir, et al. (2016)	50	0	50	0	0	0	0
Chatterjee, et al. (2024)	20	20	0	20	0	20	20
Kalankesh, et al. (2020)	17	16.6	16.5	16.7	16.9	16.3	0
Wu, et al. (2023)	0	20	0	20	20	20	20
Yiu, et al. (2021)	20	20	0	20	0	20	20
Fan, et al. (2021)	16.8	16.2	0	16.4	16.7	16.8	16.3
Araz, et al. (2020)	14.2	14.3	14.5	14.6	14.1	14.2	14.3
Saide and Sheng (2021)	19.8	19.9	0	19.7	0	19.9	19.8

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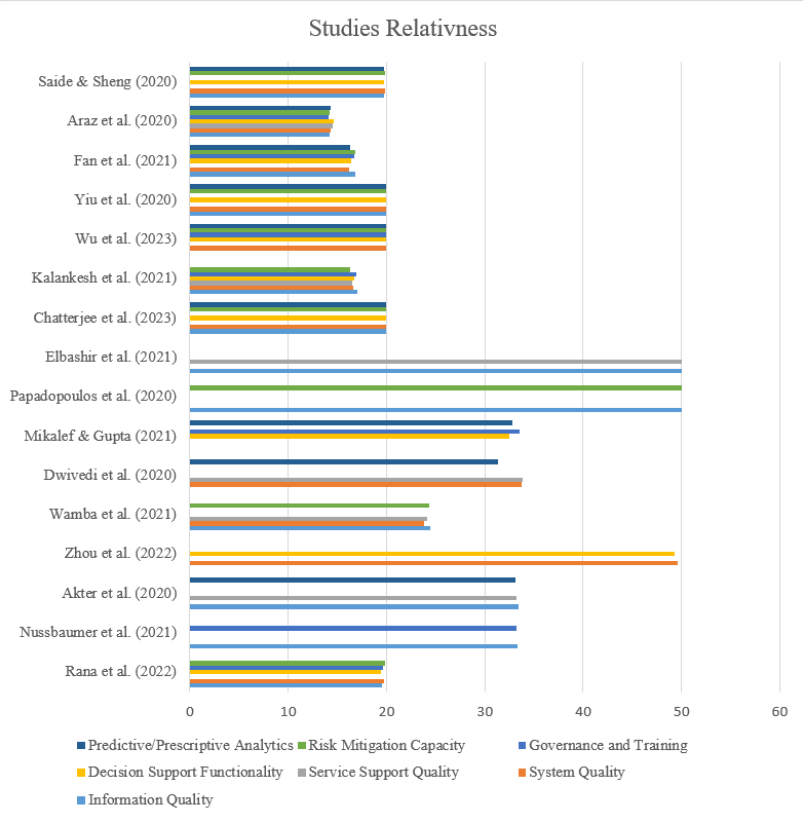
Figure 1
Proposed Research Model



This thematic distribution directly addresses Research Question 1 by identifying the most frequently emphasized and structurally influential quality dimensions across the reviewed literature. The consistent emphasis on information reliability indicates that it functions as a core determinant of how institutions prepare for and respond to crises. System Quality was another dominant theme, particularly in studies focused on real-time systems, user satisfaction, and operational reliability. Zhou and Fang (2020) demonstrated the significance of interface stability and system integration for enabling fast, uninterrupted data flows during emergencies. Dwivedi et al. (2023) and Wamba-Taguimdje et al. (2020) echoed these findings in enterprise and health system contexts, respectively, emphasizing that system design and responsiveness were strongly correlated with improved crisis outcomes. Kalankesh et al. (2020) reinforced this by showing that users in healthcare settings highly valued interface simplicity and ease of access during stressful scenarios.

These findings contribute to Research Question 2, which asks how specific dimensions, such as system responsiveness and user experience, influence institutional readiness and recovery capacity. The role of service support quality was emphasized less frequently but had a strong presence in sectors where technical complexity and user

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dependency were high. Elbashir et al. (2022) highlighted that service continuity, including vendor assistance and troubleshooting, significantly enhanced system sustainability during volatile events. Akter et al. (2020) also showed that well-supported analytics platforms were more likely to be retained and trusted by operational managers. Wamba-Taguimdje et al. (2020) noted that without proper training and ongoing support, the benefits of BI tools could not be fully realized, especially in healthcare settings. These insights align with Research Question 4, highlighting the operational barriers that reduce the effectiveness of BI and MIS tools when support quality is inconsistent or underdeveloped.

Decision support functionality emerged as a high-impact theme in studies dealing with real-time analytics and scenario modeling. Zhou and Fang (2020) illustrated how dynamic dashboards and live data feeds enhanced decision-making under pressure, particularly in public sector disaster responses. Chatterjee et al. (2024) and Wu et al. (2023) found that decision support systems contributed to faster strategy adaptation and resource allocation in times of uncertainty. Mikalef and Gupta (2021) further emphasized that systems designed to support decisions through prescriptive logic were more effective in helping managers take early action. These findings directly relate to Research Question 3, which explores the role of MIS and BI tools across all crisis phases. Strong decision support capabilities clearly facilitate both reactive and proactive crisis strategies.

Governance and training were central to studies highlighting human and institutional factors. Mikalef and Gupta (2021) showed that training, policy design, and digital culture play crucial roles in determining how well BI systems are embedded in institutional workflows. Kalankesh et al. (2020) and Wu, et al. (2023) supported this by showing that systems were only effective when aligned with management protocols and user competencies. Nussbaumer, et al. (2023) also underlined the importance of ethical oversight and policy frameworks, especially in decision support environments that influence public outcomes. These insights reinforce the responses to Research Questions 2 and 4 by emphasizing the human and institutional conditions necessary for successful system implementation during crises.

Studies highlighting risk mitigation capacity stressed the ability of systems to detect, forecast, and guide institutional responses. Papadopoulos et al. (2020) demonstrated that well-structured MIS and BI architectures could map organizational vulnerabilities and simulate recovery strategies. Similarly, Fan et al. (2021) and Araz et al. (2020) used crisis modeling techniques in BI to support organizational planning and logistical coordination. Wamba-Taguimdje et al. (2020) found that healthcare systems equipped with predictive dashboards could trigger early responses before emergencies escalated. These patterns substantiate Research Question 3 by demonstrating how MIS and BI systems operationalize preparedness, response, and recovery mechanisms within institutional crisis cycles.

Finally, Predictive and prescriptive analytics were pivotal in studies focusing on foresight and optimization. Akter et al. (2020), Dwivedi et al. (2023), and Mikalef and Gupta (2021) each emphasized the role of advanced analytics in shaping strategic decisions before, during, and after crises. Wu et al. (2023) and Yiu et al. (2021) found that organizations leveraging prescriptive analytics achieved superior resource planning, especially under constraints. Chatterjee et al. (2024) showed that predictive models supported evidence-based governance in uncertain environments. These findings provide strong support for Research Question 4 by demonstrating how data-driven systems

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enhance immediate crisis response while simultaneously enabling post-crisis adaptation and institutional innovation.

Across the reviewed literature, strategic alignment and crisis readiness emerged as an overarching enabler that integrates all other quality dimensions of MIS and BI. Strategic alignment refers to the degree to which information systems are structurally embedded within institutional crisis management strategies, governance policies, and long-term organizational objectives. Crisis readiness, in turn, reflects the institution's capability to anticipate, absorb, and recover from disruptive events using those systems. Studies such as Mikalef and Gupta (2021) and Kalankesh et al. (2020) emphasized that systems are only as effective as the strategic frameworks that guide their deployment. When MIS and BI tools are aligned with institutional priorities such as emergency planning, risk assessment protocols, and stakeholder coordination, they serve as powerful assets for both operational and strategic response. Conversely, when systems are implemented without strategic coherence or cross-functional integration, their crisis utility becomes fragmented, reactive, and strategically underleveraged, as shown in the findings of Wamba-Taguimdje et al. (2020) and Dwivedi et al. (2023). Moreover, strategic alignment ensures that governance, training, and predictive tools are not standalone features but part of an integrated readiness model. This synthesis addresses elements of Research Questions 2 and 3, confirming that the effectiveness of MIS and BI in crisis management is not only determined by their technical capacity but by their alignment with institutional vision and the preparedness culture of the organization.

D. Alignment of Findings with Research Questions

The thematic synthesis provides structured and evidence-based responses to the four research questions guiding this review. In response to Research Question 1, the most frequently emphasized quality dimensions across the 16 reviewed studies were Information Quality, System Quality, and Decision Support Functionality. These dimensions consistently emerged as foundational attributes underpinning crisis responsiveness and institutional agility. Regarding Research Question 2, the findings demonstrate that real-time processing capabilities, system integration, usability, and data accuracy significantly enhance institutional readiness and response efficiency. Conversely, deficiencies in governance structures, training, and service support significantly constrain system effectiveness during crises. For Research Question 3, the reviewed studies confirm that MIS and BI systems contribute across all phases of crisis management, including preparedness, active response, recovery, and institutional learning. Predictive and prescriptive analytics particularly support anticipatory planning and post-crisis improvement strategies. In addressing Research Question 4, recurring patterns in the literature highlight the importance of strategic alignment, governance integration, user empowerment, and predictive capability as recurring enablers of effective institutional crisis management.

V. DISCUSSION

The discussion synthesizes the findings in direct relation to the study's research questions and confirms that Information Quality, System Quality, and Decision Support Functionality constitute the most influential dimensions shaping institutional crisis

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response. Rather than operating independently, these dimensions function as interdependent components of an integrated crisis capability framework. Their collective strength determines how effectively higher education institutions interpret evolving conditions, coordinate responses, and sustain academic and operational continuity during disruptions. When reinforced by governance structures and user readiness, these dimensions form a cohesive infrastructure for institutional preparedness and resilience across crisis phases.

From a theoretical perspective, this study advances crisis management research by conceptualizing the quality dimensions of Management Information Systems and Business Intelligence as a dynamic and integrated organizational capability that supports institutional readiness and resilience. Rather than treating information quality, system quality, and analytical functionality as isolated technical features, the synthesis demonstrates how these dimensions interact to shape institutional sensemaking, coordination, and adaptive decision-making during crises. This perspective extends existing work by reframing digital system quality as a strategic organizational capability that influences how higher education institutions anticipate, absorb, respond to, and learn from disruptive events.

A. Interpretation of Thematic Insights

Thematic analysis of the 16 studies revealed that the effectiveness of MIS and BI in crisis management is shaped by the distribution and integration of seven key quality dimensions. Among these, Information Quality and System Quality were the most frequently emphasized, particularly in sectors requiring operational precision and responsiveness, such as healthcare and education (Rana et al., 2022; Kalankesh et al., 2020). Decision Support Functionality and Predictive Analytics were dominant in studies focused on dynamic environments where anticipatory capabilities are essential for maintaining agility and competitiveness (Akter et al., 2020; Mikalef and Gupta, 2021; Wu et al., 2023). Less frequently, but still critically, Governance and Training and Service Support Quality were highlighted as foundational elements that enhance user trust and ensure system sustainability (Elbashir et al., 2023; Nussbaumer et al., 2023). The cumulative insight from these patterns confirms that technical sophistication alone is insufficient; systems must be strategically aligned, user supported, and embedded within institutional frameworks to contribute effectively to crisis preparedness and response. These themes directly inform the study's research questions, particularly those concerning the identification of key quality attributes and their role in shaping institutional agility during crises.

B. Alignment with Existing Literature

The findings of this study closely mirror established literature on the strategic role of digital systems in organizational resilience. Previous works have underscored the importance of real-time analytics, data accuracy, and decision support in improving institutional adaptability (Papadopoulos et al., 2020; Chatterjee et al., 2024). The strong presence of Information Quality across reviewed studies supports longstanding claims that crisis response is only as effective as the data it relies on (Akter et al., 2020). Moreover, studies such as those by Wamba-Taguimdje et al. (2020) and Dwivedi et al.

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(2023) reinforce the observed importance of system integration and user-centered design, aligning with this review's finding that system quality and governance are vital for trust and usability. A noteworthy convergence with literature is the increasing emphasis on Predictive and Prescriptive Analytics as tools not just for forecasting but for shaping policy and resource allocation during crises (Yiu et al., 2021; Fan et al., 2021). Thus, this review not only validates prior insights but extends them by linking quality dimensions to sector-specific operational needs and crisis stages.

C. Implications for Crisis Management in HEIs

The implications of these findings for higher education institutions (HEIs) are significant. Universities face unique challenges that demand both strategic foresight and operational flexibility, particularly in areas such as academic continuity, campus safety, and resource distribution. The review suggests that HEIs must prioritize System Quality and Information Accuracy as foundational capabilities to maintain real-time communication and data reliability during disruptions (Kalankesh et al., 2020; Saide and Sheng, 2021). Furthermore, integrating Decision Support Systems and Predictive Analytics can enhance the ability of HEI leaders to simulate scenarios, anticipate bottlenecks, and deploy resources proactively (Rana et al., 2022; Wu et al., 2023) [51]. Institutional readiness also depends heavily on Governance Structures and Training Programs to ensure that technology adoption is inclusive, consistent, and aligned with academic missions (Mikalef and Gupta, 2021). HEIs should therefore adopt a multidimensional approach merging technical capacity with human and strategic infrastructure, to build resilient, data-driven ecosystems capable of withstanding complex crises.

D. The Role of System Quality in Effective Response

Among all dimensions examined, System Quality plays a central and integrative role in enabling effective crisis response. It refers not only to the technical performance of a system, such as speed, stability, and interoperability, but also to its user interface, accessibility, and adaptability under pressure (Zhou and Fang, 2020; Dwivedi et al., 2023). When systems are well designed and intuitive, users are more likely to trust and engage with them, thereby increasing the speed and accuracy of decision-making in emergency scenarios (Rana et al., 2022). In contrast, systems with poor usability or fragmented data flows often contribute to information delays, confusion, and operational paralysis during crises. Several studies affirm that system reliability and seamless integration across departments are key enablers of institutional agility (Wamba-Taguimdje et al., 2020). Therefore, System Quality is not an isolated attribute; it is the backbone that supports other dimensions, such as Information Quality, Risk Mitigation, and Decision Support. This insight addresses Research Question 2, confirming that investments in robust, flexible, and user-centred systems significantly enhance institutional capacity to respond effectively in times of uncertainty.

E. Limitations of the Review

While this systematic review offers a structured and comprehensive synthesis of quality dimensions associated with MIS and BI in crisis management, several limitations must

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be acknowledged (Kamaldeen, 2024). First, the search strategy relied heavily on Google Scholar, which, although broad in scope, is influenced by regional indexing algorithms and user location filters. This means that the visibility and ranking of studies may vary depending on the geographic or cultural zone from which the search is conducted, potentially excluding region-specific research that is highly relevant but not algorithmically prioritized. This introduces a subtle bias toward globally cited, English language literature and may underrepresent localized case studies or culturally specific implementations of MIS and BI in crisis contexts. Second, the review focused on the top 20–25 most cited studies between 2020 and 2025, prioritizing influence over breadth. While this helped ensure quality and relevance, it may have excluded emerging but impactful work, especially from underrepresented regions or newer research streams. Furthermore, the thematic coding was based on reported dimensions within the studies; unreported or indirectly implied quality attributes may not have been captured, particularly in studies with limited methodological transparency. Lastly, while the thematic synthesis was rigorous and triangulated across sources, it was conducted manually using Microsoft Word macros and Excel-based matrices. Although effective, this process is inherently interpretive and may carry subjective bias in the categorization or weighting of themes. Future reviews may benefit from using dedicated qualitative analysis software or mixed-methods integration for greater analytical consistency. Despite these limitations, the review provides a robust foundation for understanding the strategic and operational roles of MIS and BI in crisis management, particularly within higher education and public sector institutions. The insights gained can inform both future empirical research and institutional practice.

VI. CONCLUSION

This study systematically examined the quality dimensions of Management Information Systems (MIS) and Business Intelligence (BI) that contribute to effective crisis management in higher education institutions. Through a systematic review and thematic analysis of 16 high-impact studies published between 2020 and 2025, the research addressed four core questions concerning key quality attributes, their influence on crisis response, their role across crisis phases, and their contribution to institutional resilience.

The findings consistently identify Information Quality, System Quality, and Decision Support Functionality as the most influential and frequently emphasized dimensions in the literature. These attributes underpin institutional readiness by enabling accurate insight generation, real-time information flows, structured decision support, and cross-functional coordination. Predictive and Prescriptive Analytics further strengthen institutional capacity by supporting anticipatory planning and proactive resource allocation. Although Service Support Quality, Governance and Training, and Risk Mitigation Capacity appeared less frequently, they function as essential enablers of system sustainability, trust, and long-term effectiveness.

Collectively, the evidence demonstrates that MIS and BI systems contribute meaningfully across all phases of crisis management, from early detection and active response to recovery and institutional learning. Their effectiveness, however, depends not only on technical capability but on strategic alignment, governance integration, and user readiness. When embedded within coherent institutional frameworks, these systems operate as integrated crisis capabilities rather than isolated technological tools.

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A. Practical Recommendations for Universities and Policymakers

In light of these findings, universities and policymakers should adopt a strategic and multidimensional approach when integrating MIS and BI systems into crisis management frameworks. Institutions should prioritize investments in Information Quality and System Quality to ensure data accuracy, real-time availability, and platform stability. These foundational capabilities are critical for operational responsiveness during disruptive events. Beyond technical deployment, universities must establish governance mechanisms that define clear roles, accountability structures, and usage protocols during crises. Integrating MIS and BI tools into formal emergency planning processes strengthens institutional coordination and decision transparency. Policymakers should support capacity-building initiatives, including staff training, digital literacy development, and cross-departmental simulation exercises, to enhance user competence and confidence in technology-assisted decision-making. Encouraging the adoption of predictive analytics, particularly in resource-constrained contexts, can further support early warning systems and evidence-based interventions. Cross-sector collaboration between universities, government agencies, and technology providers remains essential to ensure interoperability, ethical governance, and scalability.

B. Recommendations for Future Research

Future research should extend this study through empirical investigations within specific higher education contexts, using case study or mixed-method designs to validate and refine the thematic framework presented here. Comparative studies across regions and crisis types may reveal how cultural, institutional, and infrastructural differences influence the implementation and perception of MIS and BI quality dimensions.

Longitudinal research is also needed to assess how system quality evolves and how sustained use shapes institutional resilience and innovation capacity. Further inquiry into the ethical implications of automated and predictive decision support systems is particularly important, especially when such systems influence access, allocation, or prioritization decisions during emergencies. Incorporating perspectives from students, faculty, and IT professionals would provide a more comprehensive understanding of how these systems are experienced and operationalized within institutional environments.

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