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# MANAGEMENT INFORMATION SYSTEMS AND CRISIS MANAGEMENT IN HIGHER EDUCATION: EVIDENCE FROM PALESTINE TECHNICAL UNIVERSITY-KADOORIE

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**ABSTRACT**

In an era characterized by constant technological progress and inherent uncertainty, the importance of Management Information Systems (MIS) in building organizational resilience has become a critical theme. Although previous studies have investigated the connection between digital transformation, information systems, and resilience in the context of higher education, few empirical studies have examined the role that management information systems (MIS) play in the various phases of crisis management, specifically crisis preparedness, crisis response, and crisis recovery, in higher education institutions facing conflicts. This research aims to explore the role of Management Information Systems (MIS) in supporting crisis management at Palestine Technical University-Kadoorie, with specific emphasis given to their contribution to crisis preparedness, crisis response, and crisis recovery. The rationale behind the current study stems from the premise that Palestinian higher education organizations function in a setting characterized by continuous uncertainty and vulnerability and subject to institutional restrictions, where successful information exchange and coordination become essential factors for managing crises effectively. This research adopts a quantitative research approach with a cross-sectional research design. Data were collected through an online questionnaire created using Google Forms. This research found that the proposed model was supported by the data, with the results showing that MIS has a positive and statistically significant impact on crisis preparedness, crisis response, and crisis recovery. The findings also indicate that crisis preparedness has a positive and statistically significant impact on crisis response and that crisis response has a positive and statistically significant impact on crisis recovery. The uniqueness of the research is seen in the fact that the relationship between MIS effectiveness and three stages of crisis management results has been described, thus revealing its contribution at different stages. The findings further indicate that MIS is not only an important organizational tool but also strategic for building organizational resilience. Additionally, the study contributes new knowledge, as it shows how management information systems (MIS) may increase resilience through information visibility, rapid communication, coordination, and learning after crises in the case of Palestinian higher education institutions. This research adds value to the body of knowledge in MIS-driven crisis management through empirical analysis conducted at Palestine Technical University-Kadoorie. The paper ends with suggestions that can help enhance resilience within organizations in the higher education sector facing uncertainties.

**Keywords:** *Management Information Systems; Crisis Management; Crisis Preparedness; Crisis Response; Crisis Recovery; Higher Education; Palestine; Institutional Resilience*.

## 1. INTRODUCTION

Crisis events have emerged as the dominant condition in contemporary higher education, which has shifted from being treated as exceptional to becoming routine. There is pressure on institutions of higher learning to deal adequately with complex crises such as health pandemics, cyber threats, infrastructural collapse, and politically driven instability.

Recent research on higher education institutions has come to view resilience as an individual coping capacity, as well as an organizational capacity aimed at preparing for disruption, sustaining institutional operations during disruption, and recovering from

disruption in a way that supports long-term institutional continuity and renewal [1, 2].

Within the context of higher education institutions, crisis management can be seen as an important strategic and process-oriented capability, rather than just an emergency response approach. This is because crisis management in higher education institutions is heavily dependent on information quality, decision speed, coordination mechanisms, and communication reliability.

Information Technology (IT) infrastructures, as well as Management Information Systems (MIS) infrastructures, offer the architecture through which higher education institutions can collect, integrate, analyze, and communicate information. Recent open-access research on higher education institutions reveals the potential of digital and information systems in enhancing administrative efficiency, stakeholder communication, and decision-making; however, their potential is dependent on institutional readiness, governance quality, stakeholder competencies, and the capacity for technology integration in [3-5].

This strategic function of MIS is even more critical in conflict- and resource-constrained environments, where crises tend to be multidimensional and chronic rather than episodic. Digital technologies, in such environments, are clearly more than instruments of efficiency. Rather, as recent evidence from the Palestinian experience has shown, digital transformation in higher education can indeed improve educational access, resilience, and administrative efficiency, particularly in terms of ensuring continuity in mobility restrictions.

However, there are critical structural barriers, such as fragmented governance, limited infrastructures, and enabling environments, which make the Palestinian experience an important case for an examination of MIS, not only as an operational support system but also as an instrument for strategic crisis preparedness, crisis response, and crisis recovery [6].

Despite the recent surge in literature on digital transformation, educational administration, and organizational resilience, it is evident from recent reviews of literature that, currently, there is an overarching tendency to treat these critical themes in very general terms.

Recent reviews of literature on organizational resilience, for instance, pointed to both the fragmentation of resilience literature in the context of higher education and the relative lack of empirical work on organizational capabilities, particularly in environments with compounded structural constraints. In terms of literature on digital administration, there is an evident tendency to treat efficiency and communication gains without necessarily highlighting the strategic role of MIS in terms of crisis management phases.

Thus, there is an evident need for more contextualized and empirical literature to explore how MIS can contribute to crisis preparedness, crisis response, and crisis recovery in the context of higher education, particularly in environments with chronic levels of uncertainty [2-5].

There are several reasons why this study is needed. Firstly, most of the studies focusing on digital transformation in higher education have been concerned with administrative efficiency, continuity of digital learning, and technological advancement, and the strategic capability of management information systems in relation to crisis management has largely been neglected. Secondly, the literature on crisis management generally discusses crisis preparedness, response, and recovery as institutional processes that have not been well-articulated in terms of the role played by information systems through these processes, such as information visibility, decision-making, quick communication, and coordination. Finally, although there is some evidence of digital transformation and administrative efficiency, the Palestinian higher education sector has received scant attention from both MIS and crisis management literatures, especially considering the challenges faced by universities in that region, such as disruptions, vulnerabilities, and resource constraints.

Against this background, the core research problem is that limited prior scholarly work has explicitly examined the role played by MIS in the different but related phases of crisis management. While previous research has explored issues such as digital transformation, administrative efficiency, educational continuity, and organizational resilience, the connection between the concept of management information systems and the phases of crisis management has been ignored. The lack of knowledge about the link between the two concepts has been even more pronounced in the context of Palestinian universities that operate in the face of many uncertainties and fragilities, among others.

In light of the above discussion, the research questions are as follows: What role does MIS play in crisis preparedness at Palestine Technical

University–Kadoorie? What role does MIS play in crisis response? What role does MIS play in crisis recovery? What is the relationship between crisis preparedness and crisis response? What is the relationship between crisis response and crisis recovery?

The current research is based on the theoretical background of crisis management at Palestine Technical University–Kadoorie, and specifically, it seeks to analyze the importance of Management Information Systems (MIS) from a strategic perspective. More precisely, this paper studies the impact of MIS on crisis preparedness, crisis response, and crisis recovery, taking into consideration the organizational and infrastructural environment, in which such connections take place.

Three dependent variables were chosen for the analysis, namely crisis preparedness, crisis response, and crisis recovery. It should be noted that in this research, the chosen constructs are considered as stages of crisis management in sequence and dependence. Moreover, the research differs from the others by its perception of MIS, where the system is viewed not only as an administrative tool, but also as a means of information and coordination for crisis management in the conflict environment.

In defining the extent of the research topic, this current research will only focus on the impact of MIS on enhancing crisis preparedness, crisis response, and crisis recovery at Palestine Technical University-Kadoorie. This research will not cover other concepts such as digital transformation, effectiveness of e-learning, cybersecurity resilience, crisis leadership, financial resilience, or psychological resilience. Besides, the research does not cover a technical audit of the university's MIS capacity, nor does it compare the capabilities of MIS at Palestine Technical University-Kadoorie with those of other Palestinian or international universities. Thus, MIS is considered as a university information and coordination mechanism that might contribute to decision-making and communication during crises.

The study is based on a number of assumptions and limitations. First, it is assumed that the perceptions of academic and administrative staff serve as reliable evidence concerning the contribution of MIS to institutional activities in terms of crisis management. Since the study is conducted using a cross-sectional survey design, its conclusions should be viewed as statistically confirmed associations, but not causal relationships.

In addition, since MIS capabilities of a single Palestinian university are considered based on self-reported data, the generalizability of findings to other higher education institutions is quite limited.

## 2. LITERATURE REVIEW

### 2.1 Management Information Systems and Organizational Decision-Making

Management Information Systems (MIS) are normally defined as a socio-technical system for collecting, processing, storing, and disseminating information for planning, controlling, and decision-making in organizations [7].

In modern organizations, it is recommended that MIS should not be viewed as mere information reporting tools but rather as strategic tools for linking information with organizational interests and for improving the quality, speed, and transparency of managerial decisions. In the case of higher education organizations, recent reviews on open-access literature have shown that digital information systems have the potential for improving organizational efficiency, automating processes, improving communication flows, and allowing managers to focus more on strategic planning and improving organizational performance [3, 4].

Additional evidence on the value of digital information systems in organizations has shown that it is not just the availability of digital information systems in organizations but also the usability, efficiency, and sustainability of digital information systems in organizations that have a significant impact on organizational efficiency and effectiveness.

In the case of higher education organizations, recent findings from Gulf University have shown that the Zoho digital information system is highly effective in completing tasks, has a low workload, is highly useful for mastering skills, and has high usability in terms of teaching HRIS systems. In addition, recent studies have shown that the sustainability of digital information systems in organizations is influenced by expectation confirmation, usefulness, satisfaction, and features of digital information systems in organizations [8, 9].

The strategic importance of Management Information Systems (MIS) is increased in crisis-prone environments. Some of the major features of MIS include real-time information, inter-departmental coordination, better communication mechanisms, and early identification of potential problems in the operation of the business.

In this regard, previous studies have highlighted the importance of an integrated campus crisis management system in terms of continuity, information aggregation, and stakeholder communication in crisis situations [10]. Similarly, digital maturity has also been linked with increased adaptability in the face of external shocks [5]. More recent studies have also highlighted the importance of information technology in terms of infrastructure capability, human capability, and business capability in developing organizational resilience in both proactive and reactive ways [5]. In this regard, it is argued that MIS can be seen as a basic capability for translating information into actions.

### 2.2 Crisis Management and the Role of Information Systems

Crisis management has been conceptualized as a process which consists of mitigation, preparedness, response, and recovery. From the point of view of information systems, the success of crisis management depends on the availability of reliable information, constant communication, and the capacity for coordinating activities across organizational boundaries.

Recent studies in the higher education domain emphasize the role of information systems in crisis management. The literature has emphasized the role of information systems in crisis management in terms of enabling environmental scanning, risk monitoring, early warning systems, rapid communication systems, and post-crisis learning.

The recent literature has reinforced the role of information systems in crisis management in the higher education sector. The literature has emphasized the role of infrastructure readiness, communication and cooperation mechanisms, human resource readiness, and process-oriented coordination models in the crisis management process in the higher education sector.

Moreover, the literature has emphasized the role of information systems in crisis management in the higher education sector in terms of enabling crisis response and crisis recovery. The literature has emphasized the role of infrastructure readiness, communication and cooperation mechanisms, human resource readiness, and process-oriented coordination models in the crisis management process in the higher education sector.

However, the literature has emphasized the lack of theorization of crisis resilience in the higher education sector from the organizational point of view. The recent scoping review has emphasized the lack of theorization of crisis resilience in the higher education sector from the organizational point of view.

The literature has emphasized the lack of theorization of crisis resilience in the higher education sector from the organizational point of view. The recent scoping review has emphasized the focus of the higher education resilience literature on individuals such as students rather than the organizational system. Crisis resilience in the higher education sector cannot be sustained by the adaptation capacity of individuals such as students.

In support of the above argument, Mahmood, Chadhar [11] developed a framework for digital resilience in the higher education and research sector, emphasizing the significance of cybersecurity awareness, role clarification, risk management tools, supportive policies, external partnerships, and technological reconfiguration in crisis situations. However, in the context of Palestine, a developing country, the absence of adequate data integration, insufficient training for employees, and poor digital infrastructure have been identified as limitations to the effective functioning of such digital tools [6, 12, 13].

At the user engagement level, the effectiveness of digital tools might also depend on the user's information-related perceptions, such as control, privacy, and trust. Research on social commerce in Palestine has revealed the positive impact of information control on user intentions and the negative impact of information privacy on user intentions in the context of Palestine. Evidence on Arabic-speaking contexts in the context of digital marketing has also revealed the indirect impact of language localization on customer intentions via the user's perception of trust [14, 15].

### 2.3 The Palestinian Context

The Palestinian higher education institutions function in a highly constrained environment characterized by political volatility, infrastructural susceptibility, financial constraints, and periodic disturbances in connectivity and service delivery.

In this sense, the role of Management Information Systems (MIS) goes beyond the utilitarian concerns to include issues related to continuity, coordination, and robustness. In the recent past, Palestine Technical University-Kadoorie has made significant strides in digital transformation in terms of the expansion of e-learning platforms, digital records, and electronic communication systems.

Recent open-access evidence from Palestine indicates that digital transformation has the potential

to improve continuity in education, enhance administrative processes, and improve sustainability in the higher education environment in crisis situations [6].

Earlier open-access evidence from Palestine indicates that digital interaction in terms of university portals, official websites, social network sites, and e-learning has become salient in the Palestinian higher education environment.

Research carried out in the Palestinian environment indicates that the image of universities among students can be constructed through digital communication in terms of social network sites, while another study indicates the salience of social network site acceptability in e-learning environments in Palestine Technical University-Kadoorie.

This indicates that Palestinian higher education institutions have made significant strides in developing a digital communication and interaction base in the recent past, even before the focus on crisis resilience and system integration in the digital environment [16, 17].

Despite these developments, there are still gaps in terms of structure and management. This description of the Palestinian environment is also in line with the general research on digital adoption in Palestine, which has found that digital technology adoption in the Palestinian environment is influenced by a combination of utility-based and experiential factors.

For instance, recent research on digital technology adoption in the Palestinian environment has found that gamification, perceived mobility, and perceived enjoyment are significant in the Palestinian banking environment, in addition to technology acceptance variables. The characterization of the Palestinian environment provided above is consistent with the argument that the effectiveness of digital technology in this environment should be examined through an ecosystem lens, including the preparedness of users, the nature of digital technologies themselves, and environmental constraints [18].

The existing literature has found that there are still challenges in the Palestinian higher education environment in terms of infrastructural challenges, fragmented implementation, and the absence of integrated digital technology-based governance mechanisms [6, 13].

More specifically, the existing literature has not sufficiently examined the strategic contribution of MIS in the different phases of crisis management in the Palestinian higher education environment. This study will empirically examine the contribution of MIS to crisis management at Palestine Technical University-Kadoorie, while considering the broader Palestinian higher education context.

### 2.4 Digital Resilience and Institutional Resilience in Higher Education

Digital resilience has emerged as an increasingly relevant framework for understanding how higher education institutions cope with continuity in the face of disruptive events. While earlier literature on resilience was limited to an organization's ability to bounce back from untoward events, contemporary literature views resilience as an organizational meta-capacity through which an organization can cope with disruptive events and adjust its organizational structure to suit its needs.

The importance of this framework is particularly evident in the field of higher education, as universities are known to function through highly interconnected systems. Thus, organizational resilience is not only about leadership and organizational policies but also about how an organization can mobilize information, coordinate, and maintain quality of decision-making in an uncertain world.

In this context, MIS can be viewed as an organizational capacity through which an organization can cope with disruptive events and improve its organizational adaptability [19, 20].

Recent research has also found that the construct of digital resilience is not necessarily generated by the deployment of technology but by the strategic integration of digital infrastructure, organizational culture, learning, and managerial capabilities. Further research in the context of higher education institutions provides additional support to the argument that resilience is not necessarily generated by the deployment of technology but by the strategic integration of technological tools, tasks, and users' readiness.

Specifically, research on the deployment of smartphone-based learning technologies in the context of higher education institutions found that task characteristics, personal innovativeness, and optimism positively affect task-technology fit, which then positively affects academic performance. This means that the strategic value of digital resilience is generated by the deployment of technology and not by the strategic alignment of technology with users' needs and tasks [21].

Research on information technology capabilities found that organizations become more resilient by

leveraging robust information technologies, competent information technology professionals, and effective business and information technology integration [5].

Research in the context of higher education institutions found that digital maturity is positively related to the scope and effectiveness of implementing digital transformation initiatives, while adaptive organizational culture is positively related to organizational resilience through the enabling role of digital transformation [22-24]. This means that the strategic value of MIS is not necessarily generated by the deployment of information technologies but by the ability to detect risk, coordinate, and adapt to changing circumstances.

Higher education also represents a crisis situation where the process of digital resilience needs to be operationalized in the form of institution-specific capabilities. For instance, Li, Zhou [10] provides empirical evidence to support the proposition that a crisis management architecture in a higher education setting needs to be operationalized in a manner where mechanisms for environmental sensing, knowledge sharing, and stakeholder management are integrated in order to reduce uncertainty and enable informed action in the context of disruptive events.

Following a similar research trajectory, Pharaoh and Visser [25] provide empirical evidence to support the proposition that crisis management in a higher education setting depends on the capabilities associated with communication, planning, strategic thinking, coordination, and trust.

Expanding the above research trajectory, Jin, Coombs [26] proposes the proposition that crisis management in a higher education setting depends on the capabilities associated with organizational clearness, training, and access to essential resources. Mahmood, Chadhar [11] provide empirical evidence to support the proposition that the conditions associated with cybersecurity awareness, policy support, technological transformation, and stakeholder management are essential to operationalize the process of digital resilience in a higher education setting.

These research contributions provide a rationale to propose the proposition that digital resilience in a higher education setting represents a multidimensional concept where information competence, crisis management, organizational learning, and digital governance provide the foundation to operationalize the process. This rationale provides a stronger case to examine MIS as a strategic enabler in the context of crisis management in Palestinian higher education settings.

On the basis of the above discussion, digital resilience and institutional resilience in higher education can be seen as products of an institution's ability to develop timely information, coordinate decisions, and maintain operational continuity in the face of disruptions.

On these grounds, therefore, it can be argued that the role of MIS in crisis management cannot be seen as merely providing administrative support to institutions; instead, it can be seen as providing strategic support to institutions so as to develop crisis preparedness through information awareness and timeliness, crisis response through timely communication and decision-making coordination, and crisis recovery through documentation and learning support.

Moreover, on the grounds of the above discussion on institutional resilience and crisis management, it can be argued that crisis management phases are both analytically distinct and operationally linked to one another in such a way that improved crisis preparedness can yield improved crisis response and that improved crisis response can yield improved crisis management stages.

On these grounds, therefore, the role of MIS in crisis management can be argued as having a positive influence on crisis preparedness, crisis response, and crisis recovery, as well as on the interrelationship between crisis preparedness and crisis response.

## 3. RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

### 3.1 Conceptual Model

Based on the above theoretical arguments, this study theorizes MIS as an exogenous latent construct with three endogenous dimensions of crisis management: crisis preparedness, crisis response, and crisis recovery. As presented in Figure 1 above, the proposed model theorizes that MIS effectiveness enables organizational access to information in a timely manner, facilitates the speed of communication, and improves the effectiveness of cross-functional coordination.

The model theorizes further that crisis management is not fragmented but rather processual in nature. Therefore, crisis preparedness leads to crisis response, which in turn leads to crisis recovery. This theorization is consistent with the capability-based resilience theory, which theorizes the three concepts of anticipation, coping, and adaptation as integrated concepts of organizational resilience.

The theorization of the proposed model is also consistent with the campus crisis management literature, which has emphasized the need for integrated systems in aggregating information, coordinating organizational activities, and supporting organizational decision-making in the face of uncertainty [10, 20, 27].

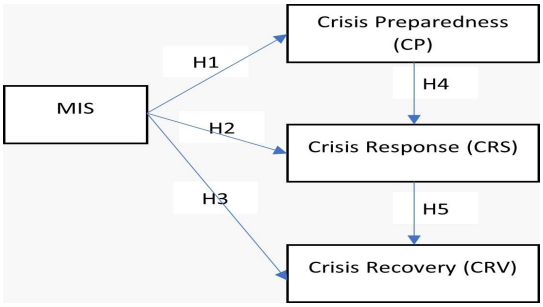


Fig. 1. Proposed conceptual model of the relationships between Management Information Systems, Crisis Preparedness, Crisis Response, and Crisis Recovery.

### 3.2 Hypotheses Development

MIS is expected to contribute to the enhancement of crisis preparedness since the latter is seen as depending on the timely availability of information, early sense-making, planning support, and procedural coordination.

The literature on the resilience of organizations highlights the importance of anticipation/preparation as key capabilities of organizations, while the recent literature in the study of crisis argues that preparedness is not only about the availability of tools and planning but is also about the capacity of an organization to timely identify potential crises and launch coordinated preparatory responses.

Therefore, in the context of universities, more integrated MIS is likely to contribute to the enhancement of preparedness through more coordinated monitoring, planning, and preventive coordination in both academic and administrative spheres [20, 26]. The following hypothesis is advanced:

**H1:** MIS positively affects crisis preparedness.

MIS are deemed to improve crisis response because the quality of the response depends on the quality of communication, coordination, and decision-making in the face of uncertainty. Empirical studies on crisis management competence in the university context point to the importance of communication, planning, judgment, flexibility, and coordination as basic crisis competence. At the same time, studies on crisis management systems in the university context point to the role of integrated dashboards, portals, and knowledge-sharing systems in reducing uncertainty and responding in a more integrated way in real-time. Therefore, universities with more advanced MIS systems are deemed to be better positioned to respond more quickly and effectively in the face of crises [10, 25]. Therefore, the following hypothesis is proposed:

**H2:** MIS positively affects crisis response.

MIS are also anticipated to contribute to improving crisis recovery since recovery involves information continuity, service restoration, documentation, and learning. In the theory of resilience, learning and adaptation are critical capabilities that organizations exhibit post-crisis.

Recent research on management control and integrated information systems indicates that organizations can recover and sustain their resilience by connecting information and coordination mechanisms during crises. In the context of higher education institutions, MIS can thus contribute to recovery by supporting restoration, tracking recovery actions, and learning to improve [20, 27, 28]. Therefore, the following hypothesis is proposed:

**H3:** MIS positively affects crisis recovery.

Crisis preparedness is assumed to have a positive impact on crisis response as it reduces ambiguities during disruption through prior planning, clear role definition, and readiness mechanisms. Crisis studies in contemporary theory highlight readiness as a core concept influencing the quality of organizational response in the active phase of a crisis, while resilience theory similarly suggests that pre-existing proactive capabilities influence concurrent coping capacity.

In practice, universities that are more prepared are assumed to have a greater capacity to coordinate response actions in a timely and consistent manner during a crisis [20, 26]. Thus, the following hypothesis is developed:

**H4:** Crisis preparedness positively affects crisis response.

This is because the quality of actions taken during the crisis is expected to affect the disruption, the maintenance of institutional resources, and the conditions for recovery after the crisis. Research on resilience-oriented management has emphasized the sequentially related nature of coping and adaptation, while research on crisis-system design has emphasized the relatedness of coordinated actions and uncertainty reduction during the crisis. Consequently, better crisis response is expected to

support better recovery at Palestine Technical University-Kadoorie [10, 27]. Thus, the following hypothesis is proposed:

**H5:** Crisis response positively affects crisis recovery.

## 4. METHODOLOGY

### 4.1 Research Design

This study followed a quantitative approach based on a cross-sectional survey design to investigate the relationships between Management Information Systems (MIS), Crisis Preparedness, Crisis Response, and Crisis Recovery at Palestine Technical University-Kadoorie. The data were collected through an online structured questionnaire created with Google Forms.

The quantitative approach was relevant for this study since it sought to investigate theoretically derived relationships between latent variables and estimate the strength and significance of these relationships through statistical methods.

To investigate the proposed research model, PLS-SEM with SmartPLS was adopted as an appropriate approach. PLS-SEM is relevant when the main purpose is to predict relationships between latent variables, evaluate both measurement and structural models, and accommodate complex models with relatively medium-sized samples [29, 30].

### 4.2 Population and Sample

The population sample comprised 744 academic and administrative staff working at Palestine Technical University-Kadoorie, according to the Human Resource Department. In relation to the research objectives, which focused on investigating the role of management information systems in crisis management among higher education institutions, the participants were chosen based on their involvement in information processing and coordination. This comprised staff working in the academic affairs department, the administrative department, information technology departments, e-learning departments, and crisis and risk-related committees.

The survey was administered electronically to the target population, yielding 190 returned questionnaires. Following data cleaning and screening for completeness and analytical suitability, 150 valid responses were retained for the final analysis.

Based on the sample size guideline commonly attributed to Sekaran [31], a population of approximately 750 would generally require a sample of around 254 cases. While the final usable sample in the present study fell below this benchmark, it was considered acceptable for the purposes of analysis because PLS-SEM has been widely recognized as appropriate for prediction-oriented research and for estimating relatively complex models with comparatively small sample sizes, provided that minimum sample size requirements are satisfied [32, 33].

Nonetheless, the smaller-than-guideline sample should be recognized as a limitation of the study, particularly with regard to statistical representativeness and the external generalizability of the findings.

### 4.3 Instrument Development and Measurement

Data was collected through a structured self-administered questionnaire with various sections. Background information was collected through the first section, including questions about institution, faculty/unit, department, job title, gender, age group, years of experience, and qualification. Section two was about research ethics and participation consent. This section was clear and explicit about voluntary participation, confidentiality, no disclosure of information, and the right to skip questions that made respondents uncomfortable.

Section three provided information about how to answer questions based on a five-point Likert scale with responses ranging from 1 = strongly disagree to 5 = strongly agree. Online questionnaire administration is considered appropriate if the questionnaire is clear, user-friendly, and ethical [34].

The questionnaire developed to collect data was based on the research questions and focused on measuring four latent variables. These variables were very important to the research. Four questions measured the construct of Management Information System (MIS). These questions were about information accuracy, information integration across departments, information monitoring in real-time, and information support during urgent situations. Four questions measured the construct of Crisis Preparedness (CP). These questions were about crisis procedures, staff training, early warning, and the regular update of preparedness plans. Four questions measured the construct of Crisis Response (CRS). These questions were about rapid communication, information accuracy to aid immediate decisions, coordination with crisis response teams, and the efficiency of crisis response. Four questions measured the construct of Crisis Recovery (CRV).

These questions were about restoring academic and administrative functions, documenting events during crises, assessing the effectiveness of the response to crises, and long-term institution resilience. In summary, the questionnaire was based on a total of 16 reflective questions measuring four constructs. Table 1 shows the study constructs, the wording of the measurement items, and the major sources of literature.

*Table 1. Constructs, items, and sources*

| Construct | Items Used | Key Sources |
|---|---|---|
| Management Information Systems (MIS) | MIS1: The university's MIS provides precise information to aid the decision-making process.<br>MIS2: The university's MIS demonstrates an effective integration with various departments.<br>MIS3: Real-time monitoring is made possible through the use of MIS tools by the university.<br>MIS4: The university's MIS is useful for improving communication and coordination during critical situations. | [7, 10, 35] |
| Crisis Preparedness (CP) | CP1: The university has clear procedures for dealing with potential crises.<br>CP2: The staff are provided with training on how to use the MIS to improve their readiness for crises.<br>CP3: The MIS provides early warning indicators for potential risks.<br>CP4: The university updates and revises its plans for crisis readiness. | [20, 25, 26, 35] |
| Crisis Response (CRS) | CRS1: MIS enables fast communication in the face of crisis situations.<br>CRS2: MIS provides the exact information necessary for decision-making.<br>CRS3: MIS improves coordination between crisis response teams.<br>CRS4: MIS reduces confusion and improves response efficiency | [10, 25, 35] |
| Crisis Recovery (CRV) | CRV1: Management Information Systems (MIS) can aid in the restoration of academic and administrative activities after a crisis.<br>CRV2: Management Information Systems (MIS) can provide precise records of crisis occurrence.<br>CRV3: Management Information Systems (MIS) can aid in the assessment of the effectiveness of actions undertaken to respond to a crisis.<br>CRV4: Management Information Systems (MIS) can aid in building the university Long-term resilience | [10, 11, 20, 35] |

Note: The items in the questionnaire were conceptually developed based on the prior research on management information systems, crisis management, crisis readiness, and digital resilience in higher education. The sources cited provide the primary conceptual foundation for the operationalization of the measures and should not be construed to indicate that the questions were adopted verbatim from a prior published scale.

### 4.4 Data Collection Procedure

The questionnaire was administered through electronic means by utilizing Google Forms. This was advantageous since it ensured the easy circulation and collection of the questionnaire. Before proceeding to the main questions, participants were given the section where their consent to take part in the research was sought.

They were then asked to tick whether they agreed to take part in the research. This was an appropriate method since it eliminated logistical problems, and participants were able to take the questionnaire at their own convenience. This method was efficient since it ensured that the data collected was efficiently managed [34].

### 4.5 Data Analysis Procedure

For the data analysis, the SmartPLS software was employed following the conventional two-stage approach in PLS-SEM. In the first stage of the analysis, the measurement model was examined in terms of the loadings of the indicators, the internal consistency reliability of the constructs, and the convergent validity. The internal consistency

reliability was examined in terms of Cronbach's Alpha and composite reliability.

The convergent validity was examined in terms of the average variance extracted. According to the conventional approach in reporting the results obtained from the PLS-SEM approach, the loadings of the indicators should be 0.70 or above, composite reliability should be 0.70 or above, and the average variance extracted should be 0.50 or above. These criteria are considered to be satisfactory from the measurement model point of view in the PLS-SEM approach [29, 30].

In the second stage of the analysis, the structural model was examined in terms of the path coefficients of the hypothesized structural paths between the constructs of MIS, Crisis Preparedness, Crisis Response, and Crisis Recovery. The significance of the path coefficients was examined in terms of the results obtained from the bootstrapping approach in the SmartPLS software. The use of the bootstrapping approach in the PLS-SEM approach has been highly recommended in the literature. The standardized root mean square residual was considered as an additional measure in examining the model's adequacy.

### 4.6 Ethical Considerations

The questionnaire included an explicit section on ethics and participation, in which it was made clear that the study was voluntary, confidentiality would be maintained, and no identifying information would be disclosed in the study's report. Participants were also made aware of the fact that they could choose not to answer a question if they felt uncomfortable with it. This is in line with the ethical standards in online survey research, especially in terms of informed consent, confidentiality, and respondent autonomy [34].

## 5. RESULTS

### 5.1 Measurement Model Assessment

The measurement model was assessed in terms of its indicators' loading, composite reliability (CR), and AVE. As presented in Table 2, all item loadings exceeded 0.70, indicating satisfactory indicator reliability. In addition, the CR values for all constructs ranged from 0.87 to 0.91, exceeding the recommended threshold of 0.70, while the AVE values ranged from 0.61 to 0.69, surpassing the minimum threshold of 0.50.

These findings provide adequate evidence of internal consistency reliability and convergent validity for all reflective constructs included in the model [29, 30].

*Table 2. Factor Loadings, Composite Reliability, and AVE*

| Construct | Item | Loading | CR | AVE |
|---|---|---|---|---|
| MIS | MIS1 | 0.81 | 0.89 | 0.68 |
| | MIS2 | 0.84 | | |
| | MIS3 | 0.79 | | |
| | MIS4 | 0.85 | | |
| Crisis Preparedness (CP) | CP1 | 0.73 | 0.87 | 0.61 |
| | CP2 | 0.82 | | |
| | CP3 | 0.78 | | |
| | CP4 | 0.80 | | |
| Crisis Response (CRS) | CRS1 | 0.76 | 0.91 | 0.67 |
| | CRS2 | 0.84 | | |
| | CRS3 | 0.88 | | |
| | CRS4 | 0.79 | | |
| Crisis Recovery (CRV) | CRV1 | 0.80 | 0.90 | 0.69 |
| | CRV2 | 0.85 | | |
| | CRV3 | 0.83 | | |
| | CRV4 | 0.78 | | |

### 5.2 Structural Model Assessment

After establishing the adequacy of the measurement model, the structural model was assessed using the bootstrapping procedure in SmartPLS. The results indicate that all hypothesized relationships are positive and statistically significant. Specifically, MIS has a positive effect on Crisis Preparedness ($\beta = 0.47$, $p = 0.002$), Crisis Response ($\beta = 0.42$, $p = 0.006$), and Crisis Recovery ($\beta = 0.38$, $p = 0.009$).

In addition, Crisis Preparedness positively influences Crisis Response ($\beta = 0.31$, $p = 0.014$), while Crisis Response positively influences Crisis Recovery ($\beta = 0.44$, $p = 0.003$). Accordingly, H1 through H5 are all supported. In PLS-SEM, bootstrapped path coefficients and their significance levels provide the primary basis for assessing the proposed structural relationships [29, 30].

The structural results further indicate that MIS contributes positively to all three dimensions of crisis management. Among the direct effects, the strongest path was observed for the effect of MIS on crisis preparedness ($\beta = 0.47$), suggesting that MIS is particularly important at the preparedness stage of crisis management. In addition, the relatively strong effect of Crisis Response on Crisis Recovery ($\beta = 0.44$) indicates that effective crisis response is a critical condition for successful institutional recovery. Overall, the results support the view that MIS functions as a strategic enabler of institutional readiness, coordinated response, and recovery at Palestine Technical University-Kadoorie.

*Table 3. Path Coefficients*

| Hypothesis | Path | β | p-value | Result |
|---|---|---|---|---|
| H1 | MIS → CP | 0.47 | 0.002 | Supported |
| H2 | MIS → CRS | 0.42 | 0.006 | Supported |
| H3 | MIS → CRV | 0.38 | 0.009 | Supported |
| H4 | CP → CRS | 0.31 | 0.014 | Supported |
| H5 | CRS → CRV | 0.44 | 0.003 | Supported |

### 5.3 Supplementary Model Evaluation

As an additional model diagnostic tool, the standardized root mean square residual was found to be 0.05. This shows an adequate level of residual discrepancy in the observed correlations compared to the model-implied correlations. Since the analysis was done via the SmartPLS software, the main focus was on the measurement quality indicators and the bootstrap results for the structural paths. Therefore, the provided results in terms of outer loadings, composite reliability, AVE, and path coefficients can be considered the main basis for assessing the appropriateness of the proposed model.

## 6. DISCUSSION

The findings of the study confirm the idea that Management Information Systems (MIS) represent an important institutional capability in the strategic management of crises at Palestine Technical University-Kadoorie. More specifically, the study's findings confirm the idea that MIS has a positive impact on crisis preparedness, crisis response, and crisis recovery.

The above finding can be interpreted in the context of the idea that MIS is not limited to the management of routine administrative tasks in the context of institutional operations but is linked with more general institutional capabilities in the management of crisis situations [5].

One of the more significant findings of the study is the idea that the strongest direct effect was found in the relationship between MIS and crisis preparedness. The above finding can be interpreted in the context of the idea that the strategic importance of MIS is more significant in the context of the anticipatory stage of crisis management at Palestine Technical University-Kadoorie.

Crisis preparedness is not limited to the existence of formal institutional capabilities in the management of crisis situations at Palestine Technical University-Kadoorie; it is more significant in the context of the idea that Palestine Technical University-Kadoorie has the capacity to produce relevant information in the management of crisis situations. From this point of view, the present finding supports the notion that digital information infrastructure improves crisis readiness in terms of planning capacity, procedural alignment, and institutional awareness.

This interpretation of the present finding is theoretically consistent with the resilience approach to crises, which considers organizational capacity in terms of anticipation and preparation as the foundation of organizational capabilities rather than secondary administrative capabilities [20]. Moreover, the present finding is consistent with the recent notion of crisis readiness in universities depending on the communication capability, role clarity, and institutional coordination [25].

The positive effect of MIS on crisis response further supports the notion that information systems in universities maintain their strategic importance in the active phase of crisis response. Crisis response effectiveness in universities depends on the rapid flow of accurate information, the coordination of academic and administrative units, and the capability of decision-making authorities to operate in the face of ambiguity.

The present finding indicates that MIS contributes to crisis response effectiveness in terms of reducing ambiguity, improving communication, and enabling more synchronized institutional action. Rather than acting as a technical support tool for crisis response in universities, MIS seems to operate as an operational platform through which universities navigate the complexities of crises. This interpretation of the present finding is consistent with the recent notion of crisis response in higher education depending on integrated communication structures, institutional competence, and information exchange rather than fragmented technological tools such as MIS [10, 25].

The findings also reveal that MIS has a positive impact on crisis recovery; therefore, the strategic importance of MIS is not limited to the crisis management stage. As far as the recovery process in higher education institutions is concerned, not only is the service restored, but coordination is re-established, the process is documented, the response

is evaluated in terms of adequacy, and the knowledge is retained.

The present finding is important in the sense that the recovery process is not seen as a passive process in the context of the study of resilience; instead, it is conceptualized as an adaptive process in which the recovery process is significantly influenced by the quality of information mechanisms, coordination mechanisms, and learning mechanisms available in the organization [5, 27].

The sequential relationship identified by the model will add to the value of the study. For example, the positive relationship identified between crisis preparedness and crisis response suggests that institutions with high capacity to prepare for crises will be better positioned to respond to crises. Similarly, the positive relationship identified between crisis response and crisis recovery suggests that recovery is not only dependent on resources available to an institution after a crisis but is also dependent on the quality of decisions and actions made during the crisis.

This is consistent with a process view of crisis management where preparedness, response, and recovery are analytically distinct but institutionally related phases. This view is consistent with the resilience theory and crisis research, which have emphasized that preparedness, coping, and recovery are mutually reinforcing aspects of organizational performance during crises [20, 26, 27].

In the context of the Palestinian higher education system, the above findings take on a different layer of meaning. In particular, the positive but not overly large effect size found in the above results suggests that MIS is valuable in the higher education system of Palestine, particularly because of its potential strategic importance under the right conditions. Indeed, the context in which Palestinian universities and other higher education institutions function has been marked by a series of instabilities. These instabilities notwithstanding, the above findings and the context in which they take place would suggest that the value of information systems in crisis management would depend on the context in which they function.

However, as the above factors were not operationalized in the above model, they would be best understood in the context of the more recent research on the impact of digital transformation in the context of the Palestinian higher education system in crisis conditions. Indeed, the above research has demonstrated the impact of information systems in the context of the Palestinian higher education system to depend on a series of factors, including the conditions of governance [6].

The above discussion would thus serve to support the suggestion that the value of MIS to the Palestinian higher education system would lie in the fact that it would be best understood as a strategic factor, as opposed to a utility.

## 7. THE THEORETICAL AND PRACTICAL SIGNIFICANCE OF THE RESEARCH

The present study is theoretically significant inasmuch as it contributes to the deeper understanding of how Management Information Systems (MIS) play an essential role as an organizational strategic capability within crisis situations. While most studies tend to treat MIS as an organizational administrative support tool, this particular study views it as an organizational resource for better crisis preparedness, crisis response, and crisis recovery within higher educational institutions. In this manner, it attempts to integrate three streams of literature, namely, MIS, crisis management, and organizational resilience, within a single framework.

In terms of its practical significance, it contributes to the literature on higher educational institutions by providing an account of crisis management from a process point of view. The present study has shown how MIS is not limited to any particular stage of crisis management but is spread over several interconnected stages of crisis preparedness, crisis response, and crisis recovery. This is practically significant from a theoretical point of view since it attempts to shift the focus from fragmented views of crisis management to a more dynamic approach to how MIS can play an essential role in supporting organizational resilience within crisis situations. Furthermore, it is practically significant inasmuch as it provides an account of how MIS is particularly relevant within the Palestinian higher education context, which is characterized by an uncertain and fragile infrastructural setup.

The study has significant implications for various stakeholders in higher education in Palestine, including those in charge of universities, information technology departments, planners, and policymakers. The practical contribution of the study can be summarized as the significance of considering MIS as a conceptual strategic tool for crisis management and sustainability, rather than considering it from a technical and managerial perspective. For instance, the study demonstrates the

potential for improving crisis management in universities where there is better integration of information systems in planning, communication, coordination, and decision-making processes.

From an operational perspective, the study demonstrates the importance of improving the integration of information systems, access to information in real-time, crisis communication, and preparing staff for crisis situations in information technology.

This study is highly relevant in the Palestinian context because higher education institutions in the country have often operated in unstable environments and have faced resource constraints. In such an environment, the potential for universities to count on information systems is significant for crisis management. Therefore, the study has implications for Palestinian universities operating in similar contexts seeking to improve crisis management by developing strategic information systems.

## 8. LIMITATIONS AND FUTURE RESEARCH

This research needs to be seen in the context of a number of limitations. Firstly, there is a limitation in terms of a longitudinal perspective on how the role of Management Information Systems (MIS) may change in terms of different stages of crisis development. Thus, while relationships are clearly identified in terms of the model developed here, there are limitations in terms of understanding how institutional processes may change and develop in terms of different stages of crisis development.

Secondly, there is a limitation in terms of a self-administered online questionnaire used as a data collection method. Thus, while perceptions are clearly important here, there are limitations in terms of understanding whether or not these perceptions are based on objective measures of institutional performance.

Thirdly, there is a limitation in terms of empirical focus on Palestine Technical University-Kadoorie. Thus, while there are clear strengths in terms of contextual relevance here, there are limitations in terms of generalizing these results to other higher education systems that may be characterized by different organizational, technological, or political factors.

Finally, while there are clear strengths in terms of understanding the direct role of Management Information Systems (MIS) in terms of crisis preparedness, response, and recovery, there are limitations in terms of understanding contextual factors such as infrastructure quality, digital maturity, governance readiness, or leadership support. These factors are seen as potentially important contextual influences on relationships identified here but are not tested as variables in the model developed here.

Future research can build on the present study by exploring different avenues. Firstly, longitudinal research can be undertaken to better understand the change in the MIS factor over time, prior to, during, and after crisis occurrence. This will enable the identification of any change in the relative contribution of MIS at different stages of the crisis. Further research can be undertaken by employing different research methodologies, like mixed research methods, which can integrate both survey research and other research approaches like interviews, institutional data, etc. Moreover, research can be undertaken on different university systems or countries or regions of higher education systems to assess the generalizability of the present research findings.

Further research can be undertaken by incorporating different variables like digital competence, organizational culture, commitment of the university administration, quality of governance, etc., as mediators or moderators of the relationship between MIS and crisis management capabilities, which can provide deeper insights into the relationship between MIS and crisis management capabilities. Further research can be undertaken by exploring digital literacy as a moderating factor between the relationship between MIS and crisis management capabilities. Research on Palestinian SMEs has shown the moderating impact of digital literacy on the relationship between digital technology like AI and organizational value [36].

## 9. CONCLUSION

The aim of this research was to investigate the strategic role of Management Information Systems (MIS) in crisis management at Palestine Technical University-Kadoorie. The findings indicate that MIS has a positive impact on crisis preparedness, crisis response, and crisis recovery. This indicates that information systems are not limited to their traditional role but can be strategic to the institution. This means that information systems can be an important tool for information visibility, coordination, and decision-making across the major stages of crisis management. The findings also

indicate that crisis management is a unified process in which preparedness enhances response and response enhances recovery.

First, the main contribution of this research to the existing body of knowledge on Management Information Systems (MIS), crisis management, and institutional resilience in higher education lies in expanding MIS literature by conceptualizing MIS not only as an instrumental tool for managing an institution but also as a strategically important capability that supports crisis-related information visibility, communication, coordination, and decision-making.

Second, the research makes a significant contribution to crisis management literature through the empirical validation of three distinct but sequential outcome dimensions of crisis management, namely crisis preparedness, crisis response, and crisis recovery. Thus, the study offers a process-oriented perspective on crisis management rather than focusing on crisis management as a single holistic construct, as in previous studies. The present paper represents a valuable contribution to resilience studies within higher education by providing empirical evidence on the influence of MIS effectiveness on institutional resilience at higher education institutions located within Palestinian Territories in the face of constant threat to stability and resource availability.

The existing state of the art suggests that contemporary higher education relies on digital transformation, information systems, and crisis management as key components for success. At the same time, empirical research focused on the impact of MIS effectiveness on higher education crisis management remains rather limited. Specifically, the present study attempts to fill this gap by analyzing the effect of MIS effectiveness throughout different stages of crisis management. As the results show, MIS effectiveness is positively associated with preparedness, response, and recovery. Moreover, preparedness affects response and the latter influences recovery. Thus, the current research contributes to theory development by providing insights into the relationship between MIS effectiveness and institutional crisis management process.

The present research adds to knowledge about the importance and role of information systems and crisis management practices for higher education institutions. It concerns the expanded view on information systems that implies not only their use for performing certain tasks but also ensuring organizational sustainability. This aspect is especially relevant in regard to Palestinian higher education institutions due to the fact that they operate in a constantly uncertain environment. From the practical viewpoint, the research is expected to contribute to higher education institutions' success as well as to enhance their crisis management.

As far as practical implications are concerned, they imply that higher education institutions are to implement MIS as a part of their crisis management plans. In particular, increased MIS effectiveness is possible through integration of MIS into organizational processes, real-time information sharing, establishment of crisis communication channels, and training programs.

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