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A MODEL OF DISASTER MANAGEMENT FOR PUBLIC SECONDARY SCHOOLS

[1]JOMER G. GANAL, [2]JESICA B. ARENGA

[1 2] DepED Philippines Abroad.

ABSTRACT:

The prime purpose for the conduct of this study is to come up with a model that would tailor-fit to the needs of the public schools when it comes to the implementation of the DRRM. This way, the researcher could determine key dimensions that should be taken into consideration as schools and its personnel fulfill the dual role of being safeguards of children and at the same time role models of resilience for the community. The researcher adheres to the design of quantitative research through the approach proposed under the Structural Equation Modeling (SEM). Using SEM, it can provide a perspective on a model to be developed by using analytical and multivariate techniques (Shaheen et al., 2017). The research emphasized the significance of Disaster Risk Reduction and Mitigation (DRRM) education in fostering a culture of safety and resilience. Integrating DRRM concepts into the curriculum, ensuring access to DRRM services, and providing psychological support following emergencies were recognized as key strategies.

INTRODUCTION

The need for an effective Disaster Risk Reduction and Management in schools is becoming more and more evident as was observed by the Philippine government. With the consideration that schools should be safe spaces for learning and development, it is essential to have preparedness for disasters and to manage the risks. This has been underscored in the Republic Act 10121 or the Philippine Disaster Risk Reduction and Management Act of 2010 which emphasizes the need to establish a comprehensive, multi-sectoral approach to disaster risk management and to build community resilience and institutional capacities for disaster response (Maido, 2023).

The researcher stumbled upon a methodological gap. As defined by Miles (2017), this has taken place because the study on DRRM was done via quantitative and its approaches, qualitative, or mixed methods. Thus, a study on DRRM which expands the concept of disaster management using Structural Equation Modelling (SEM) was opted to be the method of choice by the researcher.

With the abovementioned, the researcher's prime purpose for the conduct of this study is to come up with a model that would tailor-fit to the needs of the public schools when it comes to the implementation of the DRRM. This way, the researcher could determine key dimensions that should be taken into consideration as schools and its personnel fulfill the dual role of being safeguards of children and at the same time role models of resilience for the community.

Statement of the Problem

The researcher was compelled to conduct a study which could provide a more tailor-fit depiction about what and how the DRRM should be introduced and approached in the context of educational institutions and its personnel. To achieve this, the researcher shall consider conducting this study based on the phases below:

- **Phase 1: Literature Review and Interview**
  What are the factors of disaster management model for public secondary schools?
- **Phase 2: Determination of Factors of Disaster Management for Public Schools**
  What are the factors that fits for the disaster management model for public secondary schools?
- **Phase 3: Model Development of the Disaster Management for Public Schools**
  What model can be created for Disaster Management for public secondary schools?
  Following these processes, the researcher would be able to adhere to a robust research procedure and at the same time guarantee the validity and reliability of the components of the model of DRRM for public schools.

Research Design

This study shall adhere to the design of quantitative research through the approach proposed under the Structural Equation Modeling (SEM). Using SEM, it can provide a perspective on a model to be developed by using analytical and multivariate techniques (Shaheen et al., 2017). SEM is a very general statistical modeling technique which can be viewed as a blend between factor analysis and regression or path analysis (Kline, 2023). Usually, SEM is interested on theoretical constructs, which are represented by the latent factors (Hair et al., 2023). What the SEM implies is a structure for the covariances between the observed variables.

Locale of the Study

This study was conducted in the schools of Kidapawan City Division, Cotabato Division, and Sultan Kudarat Division.

Respondents of the Study

The respondents of this study will be individuals who are assigned as coordinators of the Disaster Risk Reduction and Management among schools in the Schools Division Office of Cotabato, Kidapawan City, and Schools Division Office of Sultan Kudarat.

They are chosen as the respondents of this study since they are the ones who can directly give valuable information on the matter. The researcher shall inform them to be the respondents of this study by means of an informed consent form. In this document, the researcher shall make the respondents aware about what the study is about as well as how they were chosen and the reason why they are valuable for this dissertation.

Data Analysis

To analyze the data gathered in this dissertation, the researcher will employ different statistical tools that shall fit the need for the development of the DRRM Model. First, the researcher will employ a qualitative content analysis to properly extract the items from the review of related literature as well as from the responses during the interview. Second, the researcher will use the weighted mean to determine the mean score of the responses of the respondents for the items that were derived theoretically as well as on the items of the survey questionnaire.

Next, the researcher will use the Cronbach's Alpha to rule out items that are not related to the different dimensions that have been identified in the initial framework for the DRRM.

Then, the items that were excluded or were ruled out during the Cronbach's alpha will no longer be included in the next phase of administering the survey. Only the retained items will be subjected to distribution to the next set of respondents. Their responses will then undergo the Exploratory Factor Analysis which strengthens the validity of the items and ensuring that items that have direct bearing to the dimensions will be retained.

Finally, the Confirmatory Factor Analysis will be employed to determine which items are observable and are directly related to the dimensions of the Disaster Management Model. Through this, the researcher could be able to finalize the equation model to be proposed to the different public schools.

RESULTS AND DISCUSSION

Phase 1: Searching for Existing Literature and Conduct of Interview for the identification of factors surrounding Disaster Management

To establish a robust foundation for this research, Phase 1 entails a comprehensive exploration of existing scholarship and firsthand insights pertaining to Disaster Management. This phase commences with an extensive review of current literature, furnishing essential background and context for comprehending the multifaceted nature of Disaster Management. To augment and validate these findings, in-depth interviews were conducted with key participants, facilitating the identification and elucidation of critical factors influencing Disaster Management practices. The integration of literature review and qualitative interviews ensures a comprehensive and nuanced understanding, thereby positioning the study for the subsequent analytical

Phase 2: Determination of Factors of Disaster Management for Public Schools

Building upon the themes identified in Phase 1, the second phase sought to further explore the dimensions of disaster risk reduction management in public schools. This phase employed a quantitative survey instrument to investigate the underlying factors that characterize the actions and preparedness of schools during disasters. The research conducted in this phase focused on identifying the key dimensions of disaster management among the participants and proposed a model that would guide the implementation of disaster risk reduction within school institutions.

Exploratory Factor Analysis (EFA) was initially conducted to identify the underlying constructs present within the observed variables derived from the validated survey instrument. EFA facilitated the grouping of closely related items, transforming a complex dataset into a manageable and comprehensible set of dimensions.

Prior to conducting the exploratory factor analysis (EFA), the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity were employed to ascertain the suitability of the dataset for factor analysis. The KMO value of 0.785 surpassed the conventional threshold of 0.6, indicating adequate sampling adequacy and sufficient data for meaningful factor extraction. Bartlett's Test of Sphericity yielded a highly significant result ($\chi^2(465)$ =

21657.338, $p < 0.001$), suggesting that the correlation matrix deviated from an identity matrix and exhibited substantial correlations among variables. This finding corroborates the existence of underlying factors that warrant extraction.

The Total Variance Explained statistic provided insight into how much of the dataset's variability was accounted for by the extracted factors. Initially, the first four components had eigenvalues greater than 1, explaining a cumulative total of approximately 79.6% of the variance before rotation. After rotation, which redistributes the variance more evenly across factors for better interpretability, these four factors accounted for 79.6% of the cumulative variance, with the first factor explaining 26.2%, the second 19.6%, the third 17.0%, and the fourth 16.9%. This substantial cumulative variance explained by the four factors supports their retention as meaningful underlying dimensions in the data.

A Confirmatory Factor Analysis (CFA) was conducted to validate the structural model identified through exploratory analysis. Specifically, the analysis tested the alignment of observed variables with four hypothesized latent factors. The analysis was based on responses from 322 participants, a sufficient sample size for robust factor modeling. Standardized factor loadings ranged from 0.65 to 0.91, indicating that the observed variables exhibited strong associations with their respective latent constructs. Loadings above 0.70 were predominant, suggesting that the items are reliable indicators of the underlying factors. For instance, several items under Factor 1 demonstrated loadings near 0.90, reinforcing their conceptual clarity and measurement precision. While the factors remain conceptually distinct, these elevated correlations suggest overlap and potential shared variance, which may indicate an overarching construct influencing the factors. Model fit was assessed using several indices. The chi-square test yielded a significant result ($\chi^2 = 3522.27$, $df = 183$, $p < 0.001$), which, though indicative of poor fit, is likely influenced by the large sample size. The RMSEA was 0.238, exceeding the recommended threshold of 0.06 and indicating poor fit. Similarly, the CFI (0.68) and TLI (0.63) fell below the accepted 0.90 cutoff, suggesting inadequacies in model specification. However, the RMR value was low (0.033), and the GFI was 0.58, both pointing to mixed results in terms of absolute fit.

While the observed variables demonstrated strong loadings on their intended factors and the factors were meaningfully interrelated, the overall model fit was suboptimal. These findings suggest that revisions, such as re-examining item-to-factor allocations or exploring alternative factor structures, may enhance the model's ability to accurately represent the underlying data structure.

Dimensions of Disaster Management

Disasters, whether natural or man-made, can have profound impacts on individuals, communities, and entire societies, affecting human life, infrastructure, economies, and the environment. Disaster management encompasses a comprehensive set of strategies and actions aimed at minimizing these impacts through systematic planning, preparedness, response, and recovery efforts. Understanding the various dimensions of disaster management is essential, as it involves a multifaceted approach that integrates risk assessment, mitigation, preparedness, effective response, and long-term recovery, ensuring resilience and the ability to adapt to future hazards.

KMO and Bartlett's Test. Before the proposed 31-item scale for disaster management underwent factor analysis, the Kaiser Meyer-Olkin Measure (KMO) of Sampling Adequacy and Bartlett's test of sphericity were performed. Table 2 shows the results.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.785**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**21657.338**
	df	**465**
	Sig.	**.000**

The KMO value of 0.785 surpassed the acceptable threshold of 0.6, indicating that the sample size was sufficient and adequate for extracting meaningful factors. Bartlett's Test of Sphericity was highly significant ($\chi^2(465) = 21657.338$, $p < 0.001$), suggesting that the correlation matrix was not an identity matrix and that there were substantial correlations among variables. This supports the existence of underlying factors that need to be extracted.

Derivation of Factors of Disaster Management and Total Variance Explained. Table 3 presents the outcomes of a statistical analysis known as Principal Component Analysis (PCA). This analysis facilitates the elucidation of the predominant themes or factors underlying the survey responses pertaining to school disaster preparedness. Essentially, this analysis endeavors to categorize all responses into a reduced number of pertinent categories, referred to as components or factors, that collectively account for most of the responses.

Prior to any adjustments, the sole component alone accounts for a substantial portion of the overall information, comprising approximately 66% of the total variation in the responses. Consequently, a singular significant theme or factor encapsulates the majority of the survey's objectives. The subsequent component contributes nearly 6% more, augmenting the total explained variance to approximately 72%. The third and fourth components, in turn, contribute approximately 4% and 3.7%, respectively. Together, these four components collectively explain nearly 80% (79.6%) of all the disparities in the survey responses. This outcome is highly satisfactory, as it demonstrates that these four factors encompass virtually all the pertinent aspects of school disaster preparedness reflected in the data.

Following the application of a technique known as rotation, which facilitates the interpretation of the results, the variance explained by each factor becomes more equilibrated. Consequently, the first factor now accounts for approximately 26% of the information, the second for approximately 20%, the third for approximately 17%, and the fourth for approximately 17% as well. Despite the preservation of the total amount of explained information (approximately 80%), this adjustment facilitates the distinct separation of the four themes, enabling a more comprehensive understanding of each.

These four factors align well with the survey's focus areas. The first factor pertains to "School Emergency Preparedness," encompassing measures such as automated alert systems, regular equipment inspections, and the assignment of responsibilities for disaster management. The second factor covers "Collaborative Preparedness and Risk Management," involving partnerships with government agencies, student participation in drills, and the updating of emergency plans. The third factor focuses on "Capacity Building and Community Integration," emphasizing the safe storage of crucial school records, community involvement, and the identification of role models for disaster readiness. Lastly, the fourth factor centers on "Communication and Leadership," encompassing the dissemination of risk information in a transparent manner, the education of students and teachers on disaster response, and the maintenance of a safe learning environment.

In summary, Table 3 confirms that the survey responses can be categorized into four distinct and meaningful categories that collectively account for nearly 80% of the information gathered. This demonstrates the survey's effectiveness in capturing the salient areas of school disaster preparedness, ensuring the reliability and usefulness of the findings in understanding how schools manage and prepare for emergencies.

Table 4. Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	20.467	66.024	66.024	8.111	26.163	26.163
2	1.793	5.785	71.808	6.071	19.584	45.748
3	1.271	4.101	75.909	5.271	17.004	62.752
4	1.146	3.698	79.607	5.225	16.855	79.607

Extraction Method: Principal Component Analysis.

Figure 2 presents the Scree Plot, a visual tool employed in Exploratory Factor Analysis (EFA) to ascertain the optimal number of factors to retain. The plot plots the eigenvalues on the y-axis against the component numbers on the x-axis. As evident, there is a pronounced decline in eigenvalues from the first component (eigenvalue = 20.467) to the second component (eigenvalue = 1.793), followed by a gradual stabilization in subsequent components. This abrupt drop generates a distinct "elbow" at the second component, signifying the transition from factors that account for substantial variance to those contributing minimally.

The Total Variance Explained table corroborates this observation. The first component accounts for a substantial 66.02% of the total variance, while the second component contributes an additional 5.79%, resulting in a cumulative variance explained by the first two components of approximately 71.81%. The third and fourth components contribute 4.10% and 3.70%, respectively, increasing the cumulative variance explained to nearly 79.61%. Subsequently, the eigenvalues diminish below 1.0, and the variance explained by additional components becomes marginal.

As stated by Cattell's (1966) scree test criterion, the optimal number of factors to retain is indicated by the point immediately preceding the plot's inflection point, commonly referred to as the "elbow." In this scree plot, the elbow is clearly discernible after the initial component, indicating the potential retention of only one or potentially a very small number of factors as substantive. This visual evidence aligns with the principle that factors situated to the left of the elbow possess substantive validity, while those to the right are likely to be extraneous noise. Consequently, the scree plot suggests that the underlying structure of the data is predominantly governed by a single dominant factor, which should be considered in subsequent analyses and interpretations of the disaster management dimensions in the selected locales.

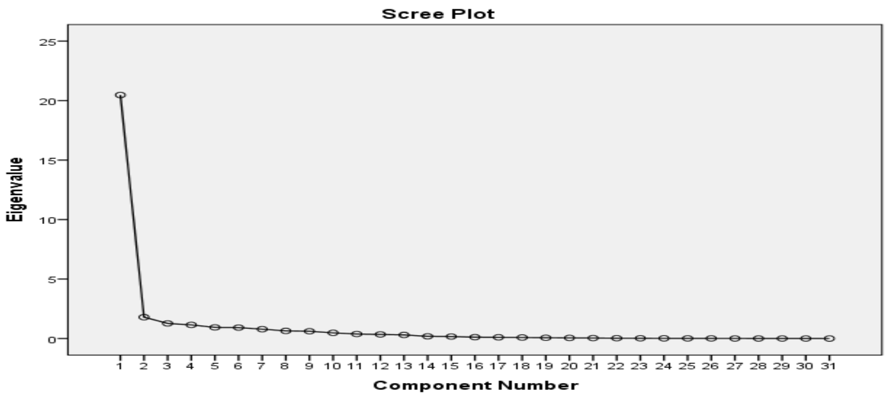

Figure 3. Scree Plot

Dimensions of Disaster Management based on the chosen locales. The chosen locales' disaster management dimensions reflect a comprehensive approach to enhancing school safety and resilience. These dimensions, derived from Exploratory Factor Analysis, focus on technological preparedness, structured protocols, collaborative governance, capacity building, and effective leadership. Each dimension highlights specific practices that contribute to holistic disaster risk reduction and management. Together, they illustrate how schools integrate advanced communication systems, foster shared responsibility, engage communities, and emphasize clear communication and leadership for continuity of learning and safety during emergencies. This nuanced understanding aligns with international standards and best practices in school-level disaster management.

Table 5. EFA Results with Factor Loadings

FACTOR 1 – School Emergency Preparedness	**Factor Loading**
Integrating automated alert systems to quickly notify students about disasters	**.787**
Utilizing technology to disseminate emergency information quickly during emergencies	**.787**
My school has online learning management for long-terms disasters	**.762**
Assigning key individuals to facilitate students and personnel during and after disasters	**.762**
Ensuring that all emergency equipment of the school were regularly checked and maintained for functionality	**.728**
Responsibility has been assigned regarding disaster management in the school	**.691**
Providing the teachers, non-teaching staff, and learners different capacity building activities for DRRM on a regular basis	**.647**
Training teachers and students about first aids is an integral component to manage the risks brought by a disaster	**.641**
Conducting regular check-ups and assessment of devices or materials used in times of disasters	
Helping teachers and students develop resilience	**.589**
Promoting the importance of personal emergency kits among students and teachers as part of preparedness efforts	**.548**
Teaching teachers and students on varied disaster reaction and response for better preparedness	
	.
	.542
FACTOR 2 – Collaborative Preparedness and Risk Management	
Reducing the vulnerability of teachers and students is one of my responsibilities	**.754**
Helping my school develop a system for a disaster risk reduction	**.727**
Enabling students to take an active part in disaster response	**.680**
Creating good partnerships with government agencies and stakeholders for the purpose of effectively responding to emergencies and disasters	**.652**
Coming up with updates of emergency plans to help the school remain prepared for varied disaster scenarios	**.650**
Ensuring that students take part in DRRM drill and practices	**.631**
My school regularly updates and revises its SOPs and contingency plans	**.626**
Disseminating to students and staff about potential hazards in the school	
	.551
FACTOR 3- Capacity Building and Community Integration	
Storing school records and learning materials properly for safekeeping to prevent damage during disasters	**.708**
Having role models (e.g. teachers, coordinators, etc.) in carrying out DRRM practices helps students to become more aware and knowledgeable	**.692**
Reminding students and teachers to take the DRRM practices seriously	**.658**
Teaching teachers and students on varied disaster reaction and response for better preparedness	**.604**
Involving the community in disaster preparedness initiatives to foster a culture of safety and resilience	
	.595

FACTOR 4- Communication and Leadership	
Helping teachers and students develop resilience	**.532**
Coming up with updates of emergency plans to help the school remain prepared for varied disaster scenarios	**.546**
Disseminating risk information is vital to reduce harm and loss when a disaster strikes	**.784**
Developing understanding about DRRM education must be done through simplest and most relevant way for the students	**.709**
Establish appropriate school practices (e.g. drills, simulations) for disaster risk reduction	**.678**
Carrying out my duties of maintaining a safer learning environment to ensure learning continuity for students	**.618**

Phase 3: Model Testing of the Disaster Management for Public Schools

Proposed Model of Disaster Management for Public Schools

The development of the disaster management model for public schools followed a structured two-phase process anchored in robust statistical methodologies. Initially, an Exploratory Factor Analysis (EFA) was conducted to uncover the latent dimensions of disaster preparedness. To validate the proposed framework, Confirmatory Factor Analysis (CFA) was rigorously applied to the data that were collected. Unlike EFA's exploratory nature, CFA serves to test the hypothesized factor structure, ensuring alignment between the observed variables and the theoretical model. This phase confirmed the validity and reliability of the framework, with detailed statistical results provided in the Appendix section.

The 4-factor Model of Disaster Management for Public Schools. Confirmatory factor analysis (CFA) was conducted to assess the validity of the proposed four-factor structure in Model 1. The analysis was conducted based on the responses of 322 participants.
The model fit indices provide important information about how well the hypothesized model matches the actual data. In this case, the chi-square value was quite large (χ^2 = 9963.184, degrees of freedom = 371, $p < .001$), which is not surprising given the large sample size and complex model. However, the ratio of chi-square to degrees of freedom (χ^2/df = 26.86) is much higher than the commonly accepted threshold of 3, indicating that the model does not fit the data as well as desired.

Additional fit indices further corroborate this conclusion. The Root Mean Square Error of Approximation (RMSEA) was 0.284, with a 90% confidence interval ranging from 0.279 to 0.289, and a PCLOSE value of 0.000. Given that RMSEA values below 0.06 are considered indicative of a satisfactory fit, this substantial value strongly suggests a poor correspondence between the model and the data. Similarly, the Comparative Fit Index (CFI) was 0.506, and the Tucker-Lewis Index (TLI) was 0.459, both falling well below the recommended minimum of 0.90 for a well-fitting model. The Goodness of Fit Index (GFI) was also low at 0.442.

In summary, these results indicate that while the model is statistically significant, it does not provide a close fit to the observed data. This suggests that the grouping of items into four factors may not fully capture the underlying structure present in the data. Consequently, further refinement or re-specification of the model may be necessary.
Path Analysis of 4-Factor Model of Disaster Management for Public Schools. Despite the overall model fit being less than ideal, the path analysis reveals that the individual relationships between the latent factors (F1–F4) and their observed items are robust and statistically significant. The standardized regression weights (factor loadings) for the items ranged from 0.564 to 0.947, with most values exceeding 0.80. For instance, items such as Q2 (0.907), Q11 (0.889), Q4 (0.890), and Q16 (0.905) exhibit strong connections to their respective factors. Consequently, at the item level, the observed questions serve as reliable indicators of the underlying concepts they are intended to measure.

Furthermore, the correlations between the four factors were also substantial, ranging from 0.830 to 0.889. This suggests that while the factors are distinct, they are closely related and may share common elements or influence each other.

In summary, while the overall model fit is not optimal, the robust factor loadings and significant correlations between factors indicate that the four-factor structure effectively captures important relationships among the items. However, the model may benefit from further refinement to enhance its fit and more accurately represent the intricacies of the data.

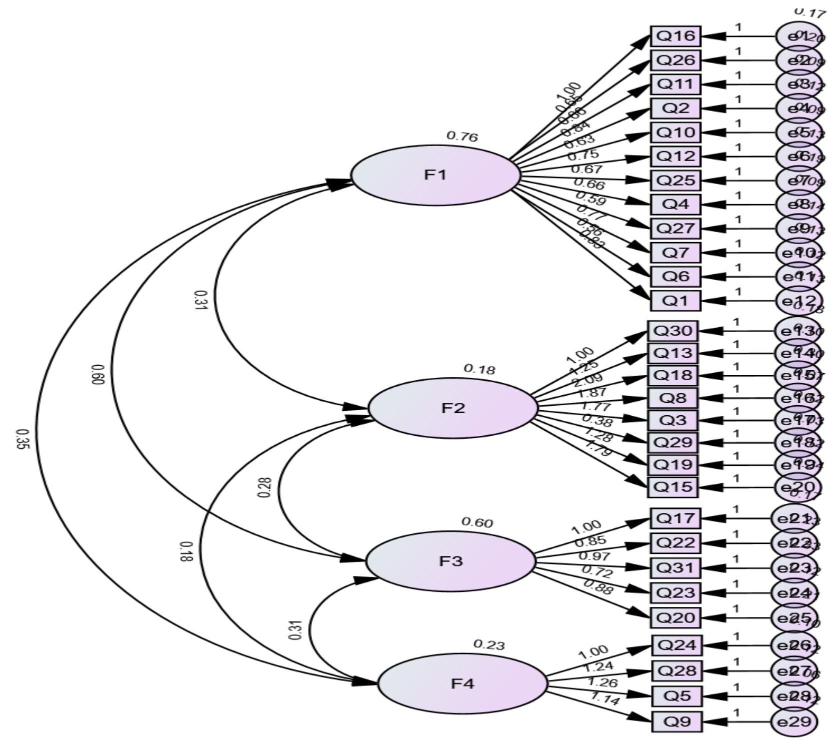

Figure 4. Path Analysis for 4-factor Model on Disaster Management for Public Schools

- Legend: Factor 1: School Emergency Preparedness and Response
  Factor 2: Collaborative Preparedness and Risk Management
  Factor 3: Capacity Building and Community Integration
  Factor 4: Communication and Leadership

The 4-factor Model of Disaster Management for Public Schools.

Confirmatory factor analysis (CFA) was conducted to evaluate the adequacy of the proposed four-factor model, which comprises 21 observed variables categorized into four latent factors, each representing a distinct underlying construct.

The overall fit of the model was assessed using various statistical indices. The chi-square test yielded a value of 3522.269 with 183 degrees of freedom, which was statistically significant ($p < .001$). While a significant chi-square often indicates poor fit, it is crucial to acknowledge that this test is highly sensitive to large sample sizes and complex models, so significance alone does not necessarily imply a deficient model.

The ratio of chi-square to degrees of freedom (χ^2/df) was 19.25, exceeding the generally accepted threshold of 3, suggesting that the model deviates from the optimal fit to the data.

The Root Mean Square Error of Approximation (RMSEA) was 0.238, with a 90% confidence interval ranging from 0.232 to 0.245, and a PCLOSE value of 0.000. Since RMSEA values below 0.06 are considered indicative of a satisfactory fit, this high value indicates that the model does not closely approximate the population data.

Additional fit indices, including the Comparative Fit Index (CFI = 0.679), Tucker-Lewis Index (TLI = 0.631), and Normed Fit Index (NFI = 0.668), all fell below the recommended threshold of 0.90, further suggesting that the model's fit is suboptimal.

The Goodness of Fit Index (GFI) was 0.584, which is below the preferred value of 0.90. However, the Root Mean Square Residual (RMR) was low at 0.033, indicating that the average residuals between observed and predicted correlations were relatively small.

In summary, these indices collectively suggest that while the model captures certain aspects of the data structure, it does not provide an optimal fit and may necessitate further modifications or refinements.

Path Analysis of 4-Factor Model of Disaster Management for Public Schools.

Despite the less-than-ideal overall model fit, the path analysis reveals robust and statistically significant relationships between the latent factors and their corresponding observed variables. The standardized factor loadings ranged from 0.664 to 0.972, with most values exceeding 0.80, indicating that the observed items are reliable indicators of their respective factors.

For instance, items such as Q11 (0.909), Q2 (0.889), Q10 (0.895), and Q12 (0.883) exhibited exceptionally strong loadings on Factor 1, while items like Q8 (0.936), Q3 (0.930), and Q15 (0.848) loaded strongly on Factor 2. Factor 3 was effectively represented by items such as Q17 (0.868) and Q20 (0.818), and Factor 4 exhibited strong loadings from items Q5 (0.972) and Q28 (0.867).

Furthermore, the correlations among the four factors were also high, ranging from 0.770 to 0.902, suggesting that while the factors represent distinct constructs, they are closely interconnected and may influence each other.

In summary, the robust factor loadings and significant inter-factor correlations support the validity of the four-factor structure at the item level. However, the overall model fit indices indicate that the model could be enhanced, potentially by revising the factor structure, incorporating or removing items, or exploring alternative models that better capture the intricacies of the data.

In essence, the confirmatory factor analysis (CFA) results for Model 2 demonstrate the robustness of the four-factor model at the item level but necessitate further refinement to achieve an optimal overall fit. These findings provide a valuable foundation for future research endeavors and model development.

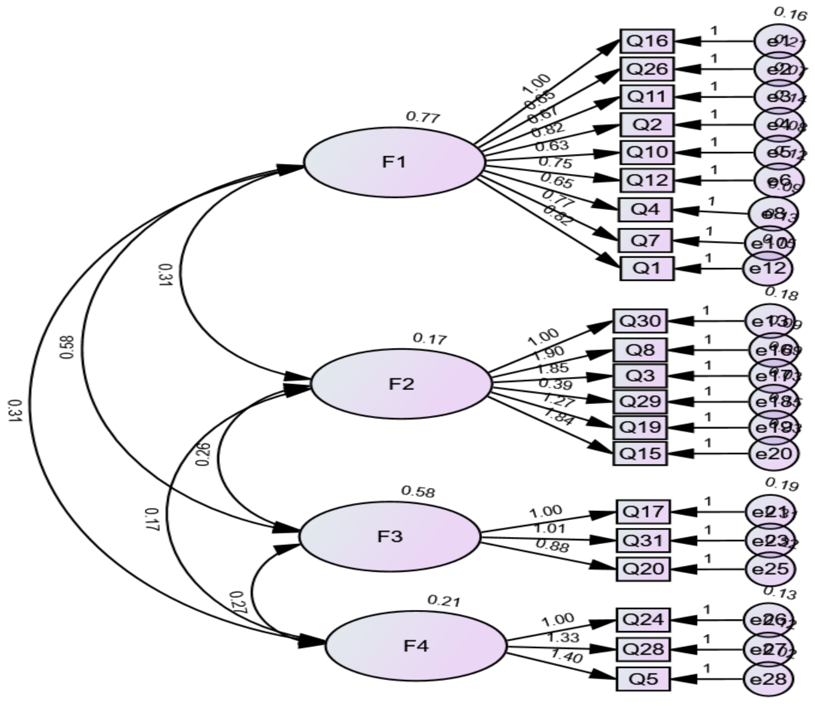

Figure 5. Path Analysis for 4-factor Model on Disaster Management for Public Schools

- Legend: Factor 1: School Emergency Preparedness and Response
  Factor 2: Collaborative Preparedness and Risk Management
  Factor 3: Capacity Building and Community Integration
  Factor 4: Communication and Leadership

Model Comparison and Justification of the Best Model

In comparing the two confirmatory factor analysis (CFA) models tested in this study, Model 1 (the full model) and Model 2 (the refined model), it is evident that both models exhibit robust item-level relationships. However, they differ in terms of overall model fit and parsimony.

Model 1, which incorporated 29 observed variables, yielded a chi-square value of 9963.184 with 371 degrees of freedom ($\chi^2/df = 26.86$), an RMSEA of 0.284, CFI of 0.506, and TLI of 0.459. The Goodness of Fit Index (GFI) was 0.442. These indices indicate that while the individual factor loadings were substantial (most exceeding 0.80), the overall fit of the model was inadequate. The high chi-square to degrees of freedom ratio and elevated RMSEA suggest that the model did not adequately capture the underlying structure of the data. Furthermore, the relatively low CFI and TLI values further underscore the model's inadequacy.

Model 2, a more parsimonious version with 21 observed variables, exhibited some improvement in model fit indices. The chi-square value was 3522.269 with 183 degrees of freedom ($\chi^2/df = 19.25$), RMSEA was 0.238, CFI was 0.679, and TLI was 0.631. The GFI also improved to 0.584. While these indices still fall short of ideal standards, Model 2 demonstrates superior fit and greater parsimony compared to Model 1. Notably, the standardized factor loadings in Model 2 remained robust, with most exceeding 0.80 and several exceeding 0.90, indicating that the observed items continue to be reliable indicators of their respective latent factors.

In terms of parsimony, Model 2 is more efficient, utilizing fewer observed variables and estimated parameters while maintaining strong relationships between factors and items. The reduction in the number of variables and parameters likely contributed to the improvement in fit indices, even though the overall fit still falls short of optimal standards.

Despite neither model achieving an optimal fit according to conventional criteria (such as RMSEA < 0.06 and CFI/TLI > 0.90), Model 2 is justified as the superior model due to its enhanced fit indices, reduced complexity, and equally robust item-factor relationships. The refined Model 2 strikes a more optimal balance between explanatory power and parsimony, rendering it the more suitable choice for representing the underlying structure of the data in this context. Future research may further refine the model to attain even superior fit, but Model 2 currently provides the most defensible and justifiable solution among the models tested.

Final Scale of Disaster Management for Public Schools. Table 5 presents the final items in the Model of Disaster Management for Public Schools, structured into four core factors. Each factor addresses a critical dimension of disaster risk reduction and management (DRRM) in the school context, reflecting both global best practices and locally relevant strategies.

Table 5. Final items in the Model of Disaster Management for Public Schools

- FACTOR 1 School Emergency Preparedness and Response
- Integrating automated alert systems to quickly notify students and staff about disasters
- Utilizing technology to disseminate emergency information quickly during emergencies.
- My school has online learning management for long-term disaster.
- Assigning key individuals to facilitate students and personnel during and after disasters
- Ensuring that all emergency equipment of the school were regularly checked and maintained for functionality.
- Responsibility has been assigned regarding disaster management in the school.
- Providing the teachers, non-teaching staff, and learners different capacity building activities for DRRM on a regular basis.
- Conducting regular check-ups and assessment of devices or materials used in times of disasters
- Promoting the importance of personal emergency kits among students and teachers as part of preparedness efforts.
- FACTOR 2 Collaborative Preparedness and Risk Management
- Reducing the vulnerability of teachers and students is one of my responsibilities.
- Creating good partnerships with government agencies and stakeholders for the purpose of effectively responding to emergencies and disasters
- Coming up with updates of emergency plans to help the school remain prepared for varied disaster scenarios
- Ensuring that students take part in DRRM drills and practices
- My school regularly updates and revises its SOPs and contingency plans
- Disseminating to students and staff about potential hazards in the school
- FACTOR 3 Capacity Building and Community Integration
- Strong school records and learning materials, properly for safekeeping to prevent damage during disasters
- Reminding students and teachers to take the DRRM practices seriously
- Involving the community in disaster preparedness initiatives to foster a culture of safety and resilience
- FACTOR 4 Communication and Leadership
- Disseminating risk information is vital to reduce harm and loss when a disaster strikes
- Developing understanding about DRRM education must be done through simplest and most relevant way for the students
- Establish appropriate school practices (e.g. drill, simulations) for Disaster Risk Reduction

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

The study underscored the paramount importance of disaster risk reduction as a proactive measure to minimize exposure to hazards and mitigate vulnerabilities. Interview participants emphasized the significance of equipping students with practical knowledge pertaining to local disasters, establishing school safety committees, and conducting structural integrity assessments of school buildings. Disaster risk management, in contrast, entails the systematic planning and implementation of policies and strategies to prevent and manage disaster risks. This encompasses eliminating hazards within the school vicinity, proposing resilient infrastructure, and conducting hazard mapping. Schools assume a pivotal role in developing disaster management plans, training staff and students, and conducting regular safety drills to ensure preparedness and swift recovery.

Conclusively, the research emphasized the significance of Disaster Risk Reduction and Mitigation (DRRM) education in fostering a culture of safety and resilience. Integrating DRRM concepts into the curriculum, ensuring access to DRRM services, and providing psychological support following emergencies were recognized as key strategies. By empowering students with knowledge and practical skills, schools not only enhance individual preparedness but also contribute to community-wide resilience. The integration of these five themes is indispensable for effective disaster management within educational institutions, ultimately safeguarding lives and ensuring the continuity of education during and after disaster events.

Conclusion

The confirmatory factor analysis demonstrated strong relationships between observed variables and latent constructs, the overall model fit suggested the need for further refinement of the measurement model. In summary, these findings provide a robust, empirically supported framework that elucidates the multifaceted nature of disaster management in educational institutions. This framework serves as a foundation for developing targeted policies and interventions, ultimately contributing to safer and more resilient educational environments. Furthermore, the study emphasizes the imperative for ongoing research to enhance measurement accuracy, validate the framework across diverse educational contexts, and evaluate the practical impact of disaster management programs. This research will ultimately contribute to safer and more resilient educational environments.

Recommendations

Based on the study's findings, school administrators may prioritize the integration of comprehensive disaster management strategies into the core operations and culture of their institutions. Teachers play a pivotal role in cultivating a culture of preparedness and resilience among students. They may actively participate in disaster management training, integrate disaster risk reduction and management (DRRM) education into their curricula, and encourage student participation in safety committees and emergency drills.

Future researchers may refine and validate the disaster management framework developed in this study, addressing any limitations in measurement or model fit. Expanding research to include diverse educational settings, such as private schools, higher education institutions, or schools in different regions, will help test the generalizability of the findings. Additionally, researchers should explore the integration of emerging technologies and innovative practices in disaster preparedness and response, contributing to the continuous improvement of disaster management in educational institutions.

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