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論文題目	INTEGRATING PREPAREDNESS ACTIVITIES AND DECISION-MAKING PROCESSES USING A NETWORK ANALYTICAL APPROACH FOR DISASTER MANAGEMENT（ネットワーク分析を用いた災害対策行動と意思決定プロセスの統合）		
（論文内容の要旨） Disaster management involves coordinated efforts to mitigate the impacts of disasters on affected communities, ensuring timely assistance and supporting recovery. This study proposes an integrated framework for disaster management that highlights the critical interdependencies between preparedness activities and decision-making processes. Preparedness activities, which involve proactive measures to enhance resilience, and decision-making processes, which enable rapid and informed actions during disasters, are both essential for effective disaster management. The study explores how these two components interact to optimize disaster management efforts and improve overall disaster management outcomes. Preparedness activities, such as the selection of evacuation shelters, are essential for mitigating disaster impacts. This study evaluates shelter suitability through a combination of topological network analysis, fuzzy Analytic Hierarchy Process (AHP), and Geographic Information System (GIS) applications. The analysis focuses on assessing evacuation shelters based on criteria such as accessibility, reachability, and other critical factors within the network. A case study utilizing an evacuation network with 2,797 nodes identifies four officially designated shelters and five additional potential shelters. This approach offers a systematic method for selecting appropriate shelters, aiding decision-making in evacuation planning. Decision-making processes, such as the issuance of evacuation instructions, are crucial for ensuring the safety of individuals during a disaster. These processes require swift actions based on information from multiple stakeholders. In this study, the decision-making process is analyzed through network analysis, focusing on the types of stakeholders and information involved in issuing evacuation orders. A case study of 215 disaster events identifies 18 stakeholders and 20 types of information essential for evacuation decision-making. The analysis uncovers the nonlinear interdependencies between stakeholders and information, mapping these relationships in a network of 18 nodes and 200 links. This network analysis highlights the significance of efficient information flow and the roles of key stakeholders in making timely evacuation decisions. The integrated framework is conceptualized as an interdependent disaster management network, where the outputs of preparedness activities (e.g., shelter suitability analysis) serve as inputs to decision-making processes (e.g., evacuation instructions), and vice versa. The robustness of the integrated framework is assessed through network properties such as node degree, density, and diameter, as well as by simulating the incremental removal of nodes from the largest components in the network to evaluate operational durability. The results demonstrate that the integrated framework outperforms non-integrated frameworks in terms of connectivity, density, and resilience. Specifically, the integrated framework exhibits			

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a more robust giant component, with nodes more closely connected, indicating a more effective disaster management, particularly in issuing evacuation orders. Furthermore, the integrated framework remains operational for a longer period than non-integrated frameworks when subjected to simulated disruptions. Overall, the study demonstrates that integrating preparedness activities and decision-making processes significantly strengthens disaster management. The proposed framework facilitates better coordination, more efficient information flow, and faster decision-making—key factors for an effective disaster management. By creating a more cohesive link between disaster planning and action, the integrated framework provides a more robust approach to disaster management, ultimately enhancing the efficiency of disaster response and recovery efforts. This dissertation consists of six chapters. Chapter 1 describes the research background to highlight the importance of preparedness activities and decision-making processes in disaster response, tailored to the needs and circumstances of the affected area. It also discusses the research question, aims, and objectives. Additionally, this chapter presents the research methodology, including data collection, incident chain formation, and the network analysis approach. Chapter 2 reviews existing research on disaster management, focusing on preparedness activities and decision-making processes. It identifies research gaps and limitations, laying the foundation for the study's motivation and challenges. Chapter 3 proposes a modeling framework using a topological network and analytic hierarchy process (AHP) to assess evacuation shelter suitability. The framework evaluates shelters based on accessibility, reachability, and other criteria, factoring in uncertainties through AHP to support informed decision-making. A case study illustrates its practical application. Chapter 4 introduces an information network analysis framework to analyze decision-making in disaster management. It defines stakeholder roles and the flow of information necessary for issuing evacuation instructions, identifying key elements that influence decision-making. This framework visualizes information flow and interdependencies, aiding in the understanding of evacuation instruction issuance. A case study demonstrates its application. Chapter 5 presents an integrated framework that combines preparedness activities and decision-making processes, modeling the interaction between disaster planning and decision-making across sectors. The framework uses network graph theory and statistical methods to provide a comprehensive approach to disaster management. Finally, Chapter 6 summarizes the key findings of the study, discusses its limitations, and suggests directions for future research. The dissertation provides valuable frameworks to improve evacuation planning and decision-making in disaster management.			