DISASTER AID MOBILE PLATFORM FOR THE CITY OF LEGAZPI

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Abstract

This study focused on the development of a Disaster Aid Mobile Platform for the City of Legazpi, designed to provide real-time disaster reporting, emergency information, news updates, first aid guides, safety tips, weather information, and a one-tap SOS function. The platform was developed using the Rapid Application Development (RAD)

The Disaster Aid Mobile Platform successfully integrated all intended features, including secure user authentication, interactive disaster situational reporting, news and updates, emergency contacts, one-tap SOS, first aid guides, safety tips, weather updates, and offline functionality. Evaluation based on ISO/IEC 25010 showed that the system

Based on the findings, the study concluded that the Disaster Aid Mobile Platform was reliable, user-friendly, and effective for disaster management in the City of Legazpi. The system successfully provided secure access, enabled disaster reporting, delivered timely news and

methodology, which included the phases of requirements planning, user design, construction, and cutover. Key system functionalities were guided by stakeholder requirements, and the final product was evaluated using the ISO/IEC 25010 software quality model to ensure reliability, usability, performance, and overall effectiveness.

met the required standards in functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability. The assessment, conducted by ten IT professionals and ten end-users, resulted in an overall rating of 3.5, indicating performance that was "More than what is Expected."

emergency information, facilitated immediate SOS signaling, offered first aid and safety resources, provided weather updates, and functioned offline when necessary. The high evaluation rating confirmed the system's overall quality and readiness for practical use.

It is recommended that the platform be continuously updated to include features such as real-time disaster mapping, push notifications, and integration with local government emergency systems. Regular training and awareness programs for users and stakeholders should be conducted to ensure effective utilization and sustained efficiency. Periodic evaluation and feedback collection from users and IT professionals are advised to identify areas for improvement, while security protocols should be regularly updated to safeguard user data. Additionally, implementing multilingual support and accessibility features for users with disabilities is recommended to make the platform inclusive for all members of the community.

Keywords: Android Application, Cloud Computing, Community Assistance, Crisis Management, Data Management System, Disaster Aid, Disaster Management, Disaster Preparedness, Disaster Relief, Emergency Response, Evacuation Monitoring, First Responders, GIS-based System, Legazpi City, Location-based Services, Mobile Application, Mobile Information System, Mobile Platform, Public Safety, Real-time Reporting, Risk Reduction, SMS/Push Notifications, User Interface (UI), Web and Mobile Integration.

Introduction

Disaster risk management broadly emphasizes strengthening institutional capacity, technological integration, and community participation to enhance preparedness and resilience against hazards. Within this framework, innovative capacity-building strategies play a critical role in improving how risks are assessed, warnings are disseminated, and responses are coordinated, particularly through the use of machine learning, Geographic Information Systems, and Information and Communication Technologies. These technologies support data-driven decision making and improve the efficiency and accuracy of disaster response systems, while supportive policy frameworks and strong institutional backing enable such innovations to be sustained and scaled. At the operational and community levels, active engagement of local stakeholders ensures that capacity-building initiatives remain relevant, context-appropriate, and resilient over time. Moreover, interdisciplinary collaboration among government agencies, non-government organizations, and the private sector strengthens the overall effectiveness of disaster risk management strategies. Collectively, these approaches contribute to enhanced disaster preparedness, improved resilience, and alignment with sustainable development goals (Saputra et al., 2025).

Increasing climate-related disasters have made the accurate dissemination of information crucial for effective disaster management and community resilience. Within this broader concern, the study examined how local capacity building can address the spread of false information in community-based disaster risk management using qualitative methods, secondary data analysis, and an integrative literature review. The findings emphasized that misinformation heightens fear, anxiety, and poor decision-making, underscoring the need for stronger local mechanisms to

counter false disaster-related information. Key responses identified include digital and media literacy education to help individuals evaluate and verify information, community-based training programs focused on disaster preparedness, response, and communication, and the establishment of local communication networks such as community radio and trusted messaging groups as reliable alternatives to social media. The study further highlighted the

Effective disaster preparedness in educational settings relies on reliable communication systems that can inform, guide, and protect school communities before and during hazardous events. In this context, the study evaluated school-based disaster risk reduction and management communication practices in selected schools in the City of Masbate by identifying good practices, assessing the functionality of existing communication mechanisms, and examining challenges encountered by teachers, learners, parents, and DRRM coordinators. Using a qualitative approach supported by quantitative data from interviews, focus group discussions, and surveys, the findings indicated that clear and age-appropriate messaging, timely information dissemination through traditional and digital platforms, the use of SMS and social

Studies have shown the importance of innovative capacity-building strategies, accurate communication, and reliable systems in enhancing disaster preparedness and response. Research has emphasized that technological integration, institutional capacity, and community participation improve risk assessment, information dissemination, and coordinated disaster response, while supportive policies ensure sustainability. Other studies highlighted

role of trusted local leaders, transparent official communication channels, and simulation drills in reinforcing information verification practices and public trust. Overall, strengthening local capacity building through coordinated communication, stakeholder partnerships, and inclusive engagement was found to be essential in improving disaster management practices and enhancing community resilience (Cuadra & Cotoron, 2025).

media, defined stakeholder roles, and multilingual and participatory approaches supported effective preparedness and response. Nevertheless, although these practices demonstrated moderate to high functionality in keeping students and parents informed, limitations in timeliness, consistency, and real-time reliability persisted during actual disasters due to power interruptions, weak connectivity, procedural confusion, and missed communications. These results suggest that while Masbate schools exhibit strong DRRM communication practices, existing infrastructural and procedural gaps constrain overall resilience, highlighting the importance of redundant communication channels, inclusive strategies, and stronger collaboration with local government and community partners (Legal et al., 2024).

that misinformation during disasters increases fear, anxiety, and poor decision-making, pointing to the need for local capacity building, digital and media literacy, community-based training, and trusted communication channels. In educational settings, clear and timely messaging, defined stakeholder roles, inclusive practices, and digital tools improve disaster preparedness, although gaps in connectivity, infrastructure, and

consistent information dissemination can reduce overall system resilience. These studies collectively indicate that, despite progress, existing disaster management and communication systems remain fragmented, limited in functionality, and lack a centralized platform for real-time reporting, coordination, and response. Therefore, the development of a Disaster Aid Mobile Platform for the City of Legazpi is necessary to address these gaps by providing a user-friendly, integrated mobile application that enables disaster reporting, emergency communication, SOS alerts, access to official news and updates, first aid guidance, safety information, and offline functionality. By consolidating these features, the system ensures timely and reliable dissemination of critical information, improves coordination among stakeholders, enhances the efficiency of disaster response, and ultimately supports the safety, preparedness, and resilience of affected communities.

Specific Objectives

Specifically, the study aimed to:

1. To develop a Disaster Aid Mobile Platform for the City of Legazpi with the following features:
   1.1. User Authentication
      1.1.1. Users can register, verify, and log in securely to the mobile application.
   1.2. Disaster Situational Reporting
      1.2.1. Users can submit disaster situational reports that include images, descriptive details, and system-generated location information.
      1.2.2. Users can interact with disaster situational repots to share information and updates.
   1.3. News and Updates
      1.3.1. Users can read official disaster-related news and announcements.
   1.4. Emergency Information
      1.4.1. Users can access official disaster response and emergency hotline numbers, allowing them to quickly contact relevant services.
   1.5. One-Tap SOS Button
      1.5.1. Users can activate a one-tap SOS function to immediately transmit distress signals via SMS to predefined emergency contacts and authorities.
   1.6. First Aid Guides
      1.6.1. Users can look up step-by-step first aid instructions.
   1.7. Safety Tips
      1.7.1. Users can read disaster-specific safety tips.
   1.8. Weather Information
      1.8.1. Users can view real-time weather updates

and forecasts through interactive maps.
1.9.   Offline Functionality
    1.9.1.   Users can still view pre-downloaded information and resources even in the absence of an internet connection.
    1.9.2.   Users can store data locally on the device and perform necessary

processing without relying on the internet.
2.   Evaluate the system based on ISO 25010 in terms of:
    2.1.   Functional Suitability
    2.2.   Reliability
    2.3.   Performance Efficiency
    2.4.   Usability
    2.5.   Security
    2.6.   Compatibility
    2.7.   Maintainability
    2.8.   Portability

Scope and Delimitations

This study aimed to develop a Disaster Aid Mobile Platform for the City of Legazpi to enhance disaster preparedness, information dissemination, and emergency response. The platform integrated key functionalities such as disaster situational reporting, access to official disaster-related news and updates, disaster response and emergency hotlines, first aid guides, safety tips, and weather information, as well as a one-tap SOS feature that transmitted distress signals via SMS, including the user's current geographic location, to predefined emergency contacts. The system also incorporated offline functionality, which enabled users to access pre-downloaded information and resources and perform essential processes without internet connectivity. To further strengthen communication efficiency, the platform included SMS and email notification mechanisms for the timely dissemination of disaster-related updates and alerts. The system was evaluated using the ISO/IEC 25010 software quality standard, focusing on functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability, with feedback obtained from ten (10) information technology experts and ten (10) randomly selected public users.

This study strictly excluded the development of additional features beyond those outlined in the objectives, including advanced data analytics, predictive disaster modelling, multilingual support, and integration with external or national disaster management information systems. The geographic coverage of the system was limited to the City of Legazpi, and its applicability to other local government units was beyond the scope of this study. The study also excluded functionalities related to resources and relief management, evacuee tracking and management, integration with external applications, synchronous coordination among multiple agencies, and features requiring specialized hardware or software beyond standard mobile devices. This narrow focus ensured the project remained aligned with the objectives, avoiding scope creep and unnecessary complexities. Additionally,

the evaluation was confined to the functional and technical aspects of the system, excluding broader organizational, policy, or operational factors that could have influenced disaster management outcomes.

Gap Bridged by the Study

The reviewed related systems were all important in the development of the proposed system. They highlight various critical aspects such as real-time alerts, social media integration, innovative technologies, community-based approaches, and user-friendly mobile applications. Current research emphasizes the need for timely and accurate alerts for specific disasters, yet most systems often focus on single disaster types or limited functionalities. Social media and AI have been shown to enhance situational awareness and community engagement, but these features are not consistently integrated with other essential tools such as emergency contacts, first aid instructions, and offline capabilities. Flood monitoring platforms, school-based early warning systems, and mobile applications targeting specific technologies or user groups are effective but often lack a comprehensive, community-centered, and multi-disaster approach.

The proposed system addresses these limitations by providing a holistic and integrated platform that meets both community-specific and general disaster management needs. The platform incorporates user authentication, disaster situational reporting with images and location data, news and updates, emergency information, a one-tap SOS button, first aid guides, safety tips, weather information, and offline functionality, ensuring accessibility even without internet connectivity. It also supports SMS and email notifications for timely dissemination of critical information. By combining real-time alerts, community engagement, actionable guidance, and offline accessibility, the system enhances situational awareness, promotes rapid response, and supports informed decision-making.

Conceptual Framework

The conceptual framework of the study was anchored on the Input–Process–Output (IPO) model with feedback, illustrating how system requirements were transformed into a functional Disaster Aid Mobile Platform for the City of Legazpi. The inputs of the study consisted of the system's functional features and quality standards. These included user authentication, disaster situational reporting, news and updates, emergency information, a one-tap SOS button, first aid guides, safety tips, weather information, and offline functionality. Collectively, these inputs addressed the need for secure access, real-time information sharing, emergency communication, and continuous access to critical resources, even in areas with limited connectivity. In addition, the ISO/IEC 25010 software quality characteristics - functional suitability, reliability, performance

efficiency, usability, security, compatibility, maintainability, and portability - were incorporated as criteria

The process component followed the Rapid Application Development (RAD) model, which emphasized iterative development and user involvement. The development process began with requirements planning, where system objectives and user needs were identified and analyzed. This was followed by the

The output of the study was the developed Disaster Aid Mobile Platform for the City of Legazpi. The system successfully integrated disaster reporting, emergency communication, weather monitoring, and access to safety-related information into a single mobile

The feedback mechanism played a vital role in the refinement of the system. Feedback gathered from users and evaluators during system testing and ISO/IEC 25010 evaluation was used to identify strengths and areas for

for evaluating the overall quality of the system.

user design phase, during which prototypes were created and refined based on feedback. The construction phase involved coding, feature integration, and continuous testing, while the cutover phase focused on system deployment, final testing, and user readiness to ensure the platform was fully operational.

application. The platform was designed to support disaster preparedness and response by providing timely, accurate, and accessible information to users, thereby enhancing community awareness and resilience during disaster situations.

improvement. This feedback informed necessary revisions and enhancements, ensuring that the system met user expectations, maintained software quality standards, and remained effective in addressing disaster-related needs.

Methodology

The study employed the Rapid Application Development (RAD) methodology to guide the development of the Disaster Aid Mobile Platform for the City of Legazpi. RAD was chosen due to its iterative and user-centered approach, which allowed for rapid prototyping,

The first phase, Requirements Planning, was focused on understanding the system objectives and gathering essential information from stakeholders. During this phase, the researcher collected user requirements, analyzed business needs, defined the project scope, and

continuous feedback, and efficient delivery of a functional system within a limited timeframe. This methodology emphasized active user involvement, flexible design, and incremental development, ensuring that the final system met both user needs and technical requirements.

identified the key stakeholders who would interact with the system. This phase established a clear foundation for development, ensuring that all subsequent activities were aligned with user expectations and project goals.

The User Design phase involved the creation of prototypes to visualize system features and interface layouts. The researcher developed initial prototypes, conducted user feedback sessions, and revised the design based on suggestions and observations. This iterative approach allowed the system to evolve according to user input, ensuring that the user interface was intuitive, functional, and aligned with real-world needs. The phase concluded with the finalization of the user interface design, which served as the blueprint for actual system construction.

During the Construction phase, the researcher developed the application components, integrated them, and conducted individual testing to verify functionality and correctness. This phase transformed the prototypes and design specifications into a fully functional system, addressing both the technical and user requirements identified earlier. Continuous testing ensured that errors were identified and corrected promptly, maintaining the system's reliability and performance.

The final phase, Cutover, involved system deployment and user acceptance testing. During this phase, the researcher ensured that all components were fully operational, migrated data if necessary, and provided training and support to users. User acceptance testing confirmed that the system met all functional and quality requirements, allowing the platform to be deployed for actual use. The Cutover phase marked the completion of the development cycle and validated the system's readiness to serve the community effectively during disaster situations.

Findings

During the development and after testing and evaluation of the developed system the following findings have been established:

1. The Disaster Aid Mobile Platform developed for the City of Legazpi successfully integrated all intended features.

    1.1. User Authentication allowed users to securely register, verify, and log in, ensuring that only authorized individuals accessed the system.
    1.2. Disaster Situational Reporting enabled users to submit reports with images, descriptive details, and system-generated location information, and to interact with reports by sharing updates.
    1.3. News and Updates provided official disaster-related announcements, keeping users informed with accurate and timely information.
    1.4. Emergency Information allowed users to quickly access disaster response contacts and hotline numbers.
    1.5. One-Tap SOS Button facilitated immediate transmission of distress signals via SMS to predefined emergency contacts and authorities.

1.6. First Aid Guides offered step-by-step instructions for providing basic medical care.

1.7. Safety Tips presented disaster-specific guidelines to enhance preparedness and reduce risks.

1.8. Weather Information provided real-time updates and forecasts through interactive maps, assisting users in monitoring conditions.

1.9. Offline Functionality ensured that pre-downloaded information and locally stored data could be accessed and processed even without an internet connection. Collectively, these features made the platform a reliable, user-friendly, and comprehensive tool for disaster management and community support in Legazpi City.

2. The developed Disaster Aid Mobile Platform was evaluated based on the ISO/IEC 25010 software quality model, covering eight key characteristics. 2.1 Functional Suitability demonstrated that the system met the intended functions and performed tasks accurately. 2.2 Reliability showed that the platform consistently operated without errors during normal use. 2.3 Performance Efficiency indicated that the system responded quickly and utilized resources effectively. 2.4 Usability reflected that users could navigate the application easily and complete tasks without difficulty. 2.5 Security confirmed that sensitive data, including user credentials and reports, were adequately protected. 2.6 Compatibility indicated that the system functioned well across different devices and operating environments. 2.7 Maintainability showed that the system could be updated or corrected with relative ease, and 2.8 Portability demonstrated that the platform could be transferred and used in different hardware and software environments. The evaluation, which involved ten IT professionals and ten randomly selected end-users, resulted in an overall rating of 3.5, indicating that the system's performance was "More than what is Expected." These findings confirmed that the Disaster Aid Mobile Platform was both reliable and user-friendly, meeting the quality standards required for effective disaster management in the City of Legazpi.

Conclusions

Based on the findings of this study the following conclusions were formulated:

1. The Disaster Aid Mobile Platform successfully integrated all intended features, allowing users to securely access the system, submit disaster reports, receive news and emergency information, use the one-tap SOS function, access first aid guides and safety tips, view weather updates, and operate offline when needed.

2. The system was evaluated based on ISO/IEC 25010 and received an overall rating of 3.5, indicating

performance that was "More than what is Expected," confirming its reliability, usability, and effectiveness for disaster management in the City of Legazpi.

Recommendations

Based on the conclusions drawn from this study, the following recommendations were formulated:

1. Continuously updated to include additional features such as real-time disaster mapping, push notifications, and integration with local government emergency systems to further enhance user experience and responsiveness.

2. Regular training and awareness programs for users and stakeholders are advised to ensure effective utilization of the platform and to maintain its reliability and efficiency during disaster situations in the City of Legazpi.

3. Periodic evaluation and feedback collection from users and IT professionals should be conducted to identify areas for improvement and ensure the system continues to meet the evolving needs of the comm the system's security protocols should be regularly reviewed and updated to safeguard user data and maintain trust in the platform.

4. Multilingual support and features for users with disabilities, is recommended to make the platform inclusive for all members of the community.

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