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# Implementation, Success, and Challenges of LGU San Jose Disaster Risk Reduction and Management

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***Abstract*: This descriptive study investigated the extent of implementation, success, and challenges of DRRM strategies of LGU San Jose, Occidental Mindoro by using stratified random sampling among 154 respondents who are members of the Barangay Disaster Risk Reduction and Management Councils (BDRRMCs). This covered the implementation in terms of prevention and mitigation, preparedness, response, and rehabilitation and recovery; level of success in reduction in disaster impact, community awareness and participation and resilience and quick recovery; and extent of challenges in education and information, manpower, equipment and facilities, and institutional coordination. This also analyzed the relationship between implementation, success, and challenges of the DRRM of LGU San Jose. Weighted mean and correlation analyses were utilized in the study. The research instrument is a survey questionnaire crafted by the author and validated by experts. The study revealed that the extent of implementation of DRRM is high in all areas but highest in rehabilitation and recovery phase. In addition, the level of success is high in all indicators but highest in reduction in disaster impact. However, the level of challenges is also high in all factors and highest in the equipment and facilities. Lastly, the study found out that there is a significant relationship between all the variables which demonstrates that as the DRRM strategies are implemented, the level of success also elevates, however the level of challenges also increases which is inherent in implementation.**

***Keywords*: Disaster risk reduction and management, challenges, implementation, success.**

## 1. Introduction

### *A. Background of the Study*

According to World Risk Report 2023, Philippines ranked as the highest disaster risk country worldwide (Bündnis Entwicklung Hilft, 2023) considering its exposure, vulnerability, susceptibility, and lack of coping and adaptive capacities.

The frequency and intensity of natural disasters have increased significantly through time, posing grave threats to human lives, infrastructure, and socio-economic stability worldwide. The devastating impacts of disasters such as earthquakes, floods, tsunamis, and typhoons highlight the urgent need for effective disaster risk reduction and management (DRRM) strategies. DRRM encompasses a range of proactive measures and strategies designed to anticipate, mitigate, prepare for, respond to, and recover from disasters. Effective implementation of DRRM involves the integration of scientific knowledge, policy frameworks, community engagement, and institutional capacities to build resilience and reduce vulnerabilities. However, despite the growing recognition of its importance, the successful execution of DRRM initiatives remains a complex challenge influenced by various factors including socio-economic conditions, governance structures, cultural dynamics, and environmental factors.

Globally, frameworks such as the Sendai Framework for Disaster Risk Reduction (2015–2030) have emphasized a proactive and holistic approach that integrates risk assessment, early warning systems, institutional capacity-building, community participation, and resilient infrastructure. The aim is to shift from reactive, short-term responses to long-term, sustainable solutions that reduce vulnerabilities and enhance adaptive capacity.

In the Philippine context, where geographic and socio-economic factors contribute to high disaster risk, DRRM has been institutionalized through frameworks such as the Philippine Disaster Risk Reduction and Management Act of 2010. However, Local government units (LGUs), particularly in geographically isolated and disadvantaged areas, often lack the technical expertise, funding, equipment, and personnel needed to fully implement DRRM policies. Geographic constraints—such as mountainous terrains, island barangays, and remote communities—compound these limitations by restricting mobility, communication, and access to essential services and rescue operations. In addition, there are ongoing issues related to the integration of scientific knowledge, community participation, and technological innovation into local DRRM strategies.

Given these concerns, it is imperative to analyze the existing DRRM programs and activities and to investigate new inclusive solutions that are context-specific and drive community interests. The involvement of local stakeholders, the incorporation of indigenous knowledge systems, and the utilization of modern tools such as geographic information

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systems (GIS), early warning technologies, and social media platforms become increasingly useful in augmenting disaster preparedness and response. Increasingly, disaster risk reduction is also expected to be integrated into all governance sectors from education and infrastructure to health and environmental management for informed-decision making.

This study explores the implementation of disaster risk reduction measures as crucial initiatives aimed at mitigating the adverse effects of disasters and enhancing community resilience of San Jose, Occidental Mindoro. This also seeks to contribute to the existing body of knowledge by evaluating best practices, identifying gaps in current DRRM implementation strategies, and contribute evidence-based recommendations. By exploring both successes and challenges, this research aims to provide insights into how DRRM can be effectively integrated into policy frameworks and operationalized to achieve sustainable disaster resilience.

### *B. Statement of the Problem*

This study was conducted to identify the level of performance of Municipal Disaster Risk Reduction and Management in San Jose. It intended to answer the following questions:

1. What is the extent of implementation of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of:
   a. Disaster Prevention and Mitigation;
   b. Disaster Preparedness;
   c. Disaster Response and;
   d. Disaster Rehabilitation and Recovery?
2. What is the extent of success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of:
   a. Reduction in Disaster Impact;
   b. Community Awareness and Participation; and
   c. Resilience and Quick Recovery?
3. What is the extent of challenges encountered in the implementation of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of:
   a. Education and Information;
   b. Manpower;
   c. Equipment and Facilities and;
   d. Institutional Coordination?
4. Is there a significant relationship between implementation and success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro?
5. Is there a significant relationship between the success and challenges encountered of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro?
6. Is there a significant relationship between implementation and challenges encountered of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro?

### *C. Statement of Objectives*

The general objective of this research study is to determine the extent of implementation of the Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro. Specifically, this study aimed to:

1. Describe the extent of implementation of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of:
   a. Disaster Prevention and Mitigation;
   b. Disaster Preparedness;
   c. Disaster Response and;
   d. Disaster Rehabilitation and Recovery.
2. Describe the extent of success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of:
   a. Reduction in Disaster Impact;
   b. Community Awareness and Participation; and
   c. Resilience and Quick Recovery.
3. Describe the extent of challenges encountered in the implementation of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of:
   a. Education and Information;
   b. Manpower;
   c. Equipment and Facilities;
   d. Institutional Coordination.
4. Test the relationship between implementation and success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro.
5. Test the relationship between the success and challenges encountered of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro.
6. Test the relationship between implementation and challenges encountered and of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro.

### *D. Hypotheses*

The following hypotheses were tested in the study:

1. There is no significant relationship between implementation and success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro.
2. There is no significant relationship between the success and challenges encountered of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro.
3. There is no significant relationship between implementation and challenges encountered and of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro.

### *E. Significance of the Study*

The results of the study will be beneficial to the following:

National Disaster Risk Reduction and Management Council (NDRRMC). This study shall provide an assessment of the

implementation of DRRM at the municipal level, particularly in San Jose, which was part of their monitoring and evaluation.

LGU San Jose, Occidental Mindoro. This study will provide significant information, and recommendations to attain the full potential of the law, as well as identify the possible gaps that may affect the success of the program.

Barangay Government Units of San Jose, Occidental Mindoro. Barangay as the smallest form of government shall be informed of the status of implementation, increase their awareness, and encourage them to do their part as mandated by law.

Policy Makers. This study can be a guide in making policies in order to address gaps in the implementation of DRRM.

Other Concerned Agencies. This study shall identify the gaps in the implementation of the law and encourage other agencies concerned to take action regarding these.

General Public. This study will serve as a guide for feedback mechanisms, and eye-opener, and encourage the public to participate because, without their cooperation, this law will not attain its goals.

Other Researchers. This will serve as a reference to researchers for their future studies which involve assessment of the implementation of DRRM at the municipal level.

### *F. Scope and Limitations of the Study*

The study focuses on LGU San Jose's disaster risk reduction and management implementation, success, and challenges, gathering data through purposive sampling from the members of Barangay Disaster Risk Reduction Councils and Chairpersons of Sangguniang Kabataan among 39 barangays in San Jose, Occidental Mindoro.

The scope of the implementation includes (1) disaster prevention and mitigation, (2) disaster preparedness, (3) disaster response, and (4) disaster rehabilitation and recovery, while the success includes (1) reduction in disaster impact, (2) community awareness and participation, and (3) resilience and quick recovery, whereas in the challenges include (1) education and information, (2) manpower, (3) equipment and facilities, and (4) institutional coordination.

The study is limited to San Jose, Occidental Mindoro, and may not fully represent other areas. The accuracy and reliability of the data collected rely on the self-reporting of Barangay Disaster Risk Reduction Council Chairperson and members as well as the Sangguniang Kabataan Chairpersons. The study does not include the perspectives of other stakeholders, such as community members, other government officials, or non-governmental organizations. It also does not evaluate the effectiveness of specific measures in disaster risk reduction and management in San Jose. Furthermore, the findings and recommendations may not be generalizable to other contexts or regions.

## 2. Review of Related Literature

This chapter includes the related literature and studies both in foreign and local settings. It also presents the theoretical and conceptual frameworks of the study to provide a better understanding of the conducted research.

Republic Act No. 10121 otherwise known as the "*Philippine Disaster Risk Reduction and Management Act of 2010,"* institutionalized the National Risk Reduction and Management Plan and outlined the activities identified to manage risks and strengthen the capacities of the national down to the local levels. The core of this law is to have safer, adaptive, and resilient communities through the four thematic areas – disaster prevention and mitigation, disaster preparedness, disaster response, and disaster rehabilitation and recovery. Under the response area, safe and timely evacuation is mandated to the LGUs concerned.

Advocacy and Information, Education, and Communication (IEC) have been one of the strategies established by the NDRRMC to achieve the desired results of each thematic pillar of DRRM. According to Domingo (2016), issues can be dissected and significant insights highlighted by looking deeper into institutional arrangements and applicable platforms; knowledge and science application; regional and local cooperation; human capital and capacity building; accounting and administrative processes; and monitoring and evaluation options. Institutional assignments have to be revisited and regularly reviewed. The division of work or responsibilities within the four pillars, and the weak coordination among institutional stakeholders make it difficult to integrate and deliver optimal results. Local government compliance to the mandates of DRRM is critical and the non-compliance or gross negligence of the local officials may even lead to removal from the office.

The lack of permanent personnel makes capacity building within LGUs more difficult. Building up capacity among local workers will progress slowly if task assignments are arbitrary. Lack of or inadequate number of dedicated personnel at the local level also compromises the government's drive to raise awareness among people about the risks and vulnerabilities that they are confronted with. There is the Local Government Academy, which is in charge of training on governance and DRR. The Philippine Public Safety College has also launched a master's degree course on crisis and disaster risk management for government officers. The DILG has also been trying to partner with as many universities as possible for technical augmentation. The Office of the Civil Defense (OCD) and other institutional partners have been sending people abroad for training in both local and international venues (on disaster management, forecasting, search rescue, and retrieval, etc.), but there have little attempts to impart learnings to other agencies (particularly on technical matters). DSWD suggested that OCD should prioritize attending trainings on coordination, leadership, partnership, or the type that would bring stakeholders together. Others requiring technical expertise should target training with added value. There must be a culture of sharing among DRR institutions to promote mutual progression. The Department of Interior and Local Government (DILG) commented that the Philippines, as one of those highly vulnerable countries in the world, cannot continue to have a focal disaster agency that only has coordinative functions. DRRM-related tasks and responsibilities are effectively passed on to the different departments which are occupied with

different primary mandates. It may be time to look at other institutional arrangements for dealing more committedly with DRRM as it perennially suffers from competition with other departmental missions. The Department of Social Welfare and Development (DSWD) recommended having a unified disaster management agency that will be responsible for all phases of DRR, not only in terms of coordination but also in ensuring that everything is grounded/implemented. Indonesia is a good example of having separate authority on disaster management. They established a commission for the recovery; accountable and responsible for the recovery. It was given support, authority, and clear mandates (Domingo, 2016).

For the monitoring and evaluation, the Office of the Civil Defense (OCD) as the secretariat of the NDRRMC was directed to monitor and coordinate with institutional agencies, however, this area has been seen as a weakness in the implementation thus tapping local partners, particularly the universities, maybe a good option in augmenting capacity for monitoring and evaluation per the recommendation of Domingo (2016).

### *A. Implementation of Disaster Risk Reduction and Management*

Implementation of Disaster Risk Reduction Management (DRRM) is a crucial endeavor aimed at mitigating the adverse impacts of natural and human-induced disasters on communities, infrastructure, and ecosystems (Ravago, et al., 2020). Tuhkanen et al. (2018) shared that DRRM involves a comprehensive and systematic approach to identifying, assessing, and reducing vulnerabilities, thereby enhancing resilience and preparedness for potential disasters.

DRRM implementation begins with a thorough risk assessment and mapping exercise to understand the specific hazards, vulnerabilities, and exposure factors within a given region (Ravago, et al., 2020). Robielos, et al. (2020). This information serves as the foundation for developing tailored strategies and plans to reduce these risks effectively. Identifying key stakeholders, including government agencies, local communities, and non-governmental organizations, is essential for collaborative efforts and resource allocation (Cuaton, & Su, 2020).

### *B. Disaster Prevention and Mitigation*

Disaster prevention and mitigation are critical aspects of ensuring the safety and well-being of communities and nations around the world (Asio, 2020). The study reiterated that prevention involves taking proactive measures to reduce the likelihood of disasters occurring in the first place. This can include zoning regulations to limit construction in flood-prone areas, enforcing building codes to ensure structural integrity, and implementing early warning systems to alert people to potential threats like hurricanes or wildfires (Walch, 2018). By investing in prevention, the government and communities can significantly reduce the human and economic toll of disasters (Domingo, & Manejar, 2018).

Mitigation, on the other hand, focuses on minimizing the impact of disasters when they do occur. This involves strategies such as disaster-resistant construction techniques, creating defensible spaces around homes in wildfire-prone areas, and developing evacuation plans and shelters for communities at risk. Mitigation efforts not only save lives but also reduce long-term recovery and rebuilding costs. It is essential to continually assess and update mitigation strategies to adapt to evolving risks, such as those driven by climate change (Fitriani, Zulkarnaen, & Bagianto, 2021).

Ultimately, disaster prevention and mitigation go hand in hand, forming a comprehensive approach to disaster risk reduction. By combining proactive measures to prevent disasters with strategies to minimize their impact when they occur, societies can build resilience and protect their citizens and infrastructure from the devastating effects of natural and human-made disasters. These efforts require collaboration between governments, communities, and international organizations to ensure a coordinated and effective response to the ever-present threat of disasters (Munawar, et al., 2021).

### *C. Disaster Preparedness*

Disaster preparedness plays a crucial role in mitigating the impact of natural and man-made disasters. In the case of San Jose, Occidental Mindoro, a municipality located in the Philippines, understanding the local context and specific challenges is essential for effective disaster preparedness. This review of related literature aims to provide an overview of the existing research and studies on disaster preparedness in San Jose, Occidental Mindoro, highlighting key findings and recommendations.

Early warning systems are essential in disaster preparedness, providing timely and accurate information to at-risk communities. Dela Cruz (2021) focused on the effectiveness of early warning systems in San Jose, Occidental Mindoro which emphasized the need for improved infrastructure and communication channels to ensure that early warning messages reach the target population promptly, it also recommended the integration of technology, such as mobile phone alerts and community-based sirens, to enhance the effectiveness of early warning systems.

### *D. Disaster Response*

An effective early warning system is crucial for disaster response. According to a study by Garcia et al. (2018), implementing early warning systems in San Jose, Occidental Mindoro has significantly improved disaster preparedness and response. Thus, the study revealed that community participation in the development and maintenance of early warning systems is an important factor.

Building the capacity of local communities and government agencies is essential for effective disaster response. The significance of training programs and workshops in San Jose, Occidental Mindoro, have enhanced the skills and knowledge of the local population in disaster response. The study suggests that continuous capacity-building efforts are necessary to strengthen disaster response mechanisms (Santos et al., 2019).

Disaster response requires collaboration and coordination among various stakeholders. In their study, Dela Cruz et al. (2020) emphasized the importance of inter-agency coordination

in San Jose, Occidental Mindoro; and the need for regular meetings, joint planning, and information sharing among different government agencies, non-governmental organizations, and community groups.

San Jose, Occidental Mindoro faces challenges in terms of limited resources for disaster response. Reyes et al. (2017) identify insufficient funding, inadequate equipment, and shortages of skilled personnel as major obstacles. The research suggests the need for increased investment in disaster response infrastructure and resources.

Effective communication and information sharing are vital during disaster response. However, a study conducted by Tan et al. (2018) reveals that communication breakdowns and lack of information sharing among stakeholders hindered disaster response efforts in San Jose, Occidental Mindoro, consequently recommending the use of reliable communication systems and improved coordination among response agencies.

Effective disaster response in San Jose, Occidental Mindoro requires the implementation of strategies such as early warning systems, capacity building, and collaboration among stakeholders. However, challenges related to limited resources and communication breakdowns need to be addressed. By enhancing preparedness, investing in resources, and implementing information management systems, the disaster response capabilities in San Jose, Occidental Mindoro can be improved.

### *E. Disaster Rehabilitation and Recovery*

Disaster rehabilitation and recovery represent critical phases in the aftermath of natural disasters. These processes aim to restore affected communities and individuals to a state of normalcy and resilience.

The first phase, rehabilitation, involves immediate actions to provide relief, such as medical assistance, shelter, food, and water. This phase focuses on addressing the urgent needs of survivors, ensuring their safety, and preventing further harm. Rehabilitation also includes assessing the extent of damage and identifying priority areas for recovery efforts (Gilbuena Jr., et al., 2019).

The second phase, recovery, is a more extended and comprehensive process. It entails rebuilding infrastructure, restoring essential services, and supporting affected individuals in their journey toward rebuilding their lives (Bollettino, et al., 2018). Recovery efforts may include constructing damaged homes, repairing roads and utilities, and providing counseling and mental health services to those traumatized by the disaster (Chan, Man, & Lam, 2019). Additionally, recovery often emphasizes community engagement, fostering resilience, and implementing mitigation measures to reduce the impact of future disasters. It is a collaborative and long-term endeavor that requires coordination between government, non-governmental organizations, and the communities.

In conclusion, disaster rehabilitation and recovery are indispensable components of disaster management. These phases are vital in not only addressing immediate needs but also in helping communities bounce back stronger and more prepared for future challenges. Effective rehabilitation and recovery efforts rely on robust planning, resource allocation, and community involvement, all aimed at facilitating the recovery and rebuilding of lives and infrastructure after a disaster strike.

### *F. Success in the Implementation of Disaster Risk Reduction and Management*

Success in the implementation of disaster risk reduction and management (DRRM) is paramount for the safety and resilience of communities and the country. Firstly, effective leadership and governance play a crucial role in achieving success in DRRM. Strong political commitment and clear policies are essential to prioritize disaster preparedness, allocate resources, and ensure the integration of DRRM into development plans. Success stories often feature leaders who championed DRRM initiatives, engaged with stakeholders, and fostered a culture of resilience within their communities (Valenzuela, et al., 2020). Secondly, Valenzuela, et al. (2020) expressed community engagement and capacity-building are vital elements in DRRM success. Empowering local communities to take ownership of their disaster risk reduction efforts fosters a sense of responsibility and resilience.

According to Bhutia (2024), the local communities play a crucial role in addressing the immediate needs, during and after a disaster. Community involvement and participation has thus become increasingly important in the disaster mitigation process. Kamarudin, Rashid, and Chong (2024), in their book "Community Resilience and Disaster Risk Reduction in Changing Environment," the development of community-based disaster preparedness is important in increasing the community's resilience to natural disasters. They emphasize the identification of community capitals, the role of local knowledge, and the responses to natural disasters as important elements in mainstreaming the disaster risk reduction agenda.

Successfully implementing community-based disaster risk reduction (CBDRR) programs requires several critical elements to ensure long-term resilience. The most important of these is active community involvement at every stage—planning, execution, and evaluation. This involvement taps into local knowledge, fosters a sense of ownership, and enhances the sustainability of the programs. In addition to community participation, strong institutional support from local authorities, NGOs, and other stakeholders is essential. This support provides the necessary policies, financial resources, and technical assistance, which strengthens the community's capacity to manage risks and recover effectively. Building community capacity through training and education on disaster preparedness, first aid, risk assessment, and emergency response is another vital aspect. These programs help communities take a proactive approach to disaster management, reducing the overall impact of disasters. Inclusivity is also crucial; addressing the needs of vulnerable groups, such as women, children, the elderly, and people with disabilities, ensures that the programs are comprehensive and effective. Failure to include these groups can lead to ineffective solutions and greater risks for the entire community. Effective communication and information sharing are key to the success

of CBDRR initiatives. Clear, timely communication about risks, resources, and protective measures enables quicker responses and more efficient resource mobilization during disasters. For sustainability, CBDRR programs must prioritize long-term planning and integration into daily activities and development plans. Programs should evolve based on ongoing risk assessments, ensuring they remain relevant and effective. Lastly, regular monitoring and evaluation are essential for adapting to changing conditions and community needs. Continuous feedback helps refine the programs, identify areas for improvement, and maintain their long-term relevance in enhancing community resilience against disaster risks. (Cvetković, 2024)

### *G. Reduction in Disaster Impact*

The importance of decreasing casualties in disaster risk reduction and management is underscored by the significant loss of life and economic impact of disasters, particularly in densely populated regions (Bali, 2022). This underscores the need for community awareness and preparedness, as well as the responsibility of states in disaster risk reduction (Kumar, 2018). Creating awareness among the public about disaster situations and the need for effective evacuation plans in minimizing casualties (Chaturvedi, 2016) is the key. Furthermore, the use of models to set a baseline and measure progress in reducing disaster casualties can provide a more accurate assessment of the effectiveness of risk reduction efforts (Muir-Wood, 2019).

The economic impact of disasters, including both direct damage to infrastructure and production loss, is significant and far-reaching. Lenzen (2018) and Tangkudung (2019) both highlight the substantial job and income losses, as well as negative changes in macroeconomic indicators, that result from such events. Kelly (2015) emphasizes the importance of accurately estimating economic loss, particularly in the context of cascading infrastructure failure, and suggests the use of input-output analysis and other models to capture the complexity of these interdependencies. Noy (2009) further underscores the role of various factors, such as literacy rate, institutions, and financial conditions, in mitigating the adverse macroeconomic output costs of disasters. These studies collectively underscore the importance of addressing both the direct and indirect economic impacts of disasters, and the need for effective strategies to minimize these losses.

Evacuation planning and compliance are crucial in disaster management, as they can significantly reduce the impact of natural or human-made disasters (Qiu 2007, Atalay 2020). Evacuation behavior is a complex phenomenon, but it is a powerful tool for managing the uncertain environment (Lindell 1991). Identifying the best evacuation routes is also crucial, and a web-based application has been proposed for this purpose (Phyo 2017).

A range of studies have explored methods for mitigating environmental damage caused by disasters. Quan-dian (2003) emphasizes the need for a comprehensive legal framework to address this issue, while Hossain (2012) highlights the potential of controlled demolition technologies in reducing disaster effects. Shin (2013) and Surjan (2014) both focus on the role of environmental management in disaster risk reduction, with Shin specifically examining the potential of coastal forests in minimizing damage from coastal disasters. These studies collectively underscore the importance of legal, technological, and environmental approaches in addressing environmental damage due to disasters.

Research indicates that the duration of interruption of essential services during disaster instances has been notably reduced. Brink (2012) found that post-earthquake water service interruptions in Los Angeles can be minimized through the implementation of specific restoration strategies. Pollock (1986) highlighted the role of computerized fault service in reducing interruption times. Laachemi (2017) emphasized the importance of modern technology, particularly web services, in disaster management and risk reduction. Lastly, Yu (2020) underscored the need for optimized distribution of emergency response stations to mitigate the impact of natural disasters on first responders.

The community's response to early warning information is crucial in disaster preparedness and mitigation (Glago, 2019). To improve this response, community-centered warning systems that provide individual guidance are needed (Meissen, 2014). The use of third revolution digital technology, such as mobile and internet-based platforms, can enhance the effectiveness of early warning systems (Silva, 2016). However, a qualitative analysis of the early warning process is also necessary to identify and address potential bottlenecks (Horita, 2016).

The timely restoration of normal living and economic conditions post-disaster is necessary, as it can significantly impact recovery. Rouhanizadeh (2019) emphasizes the need to identify and address policy and legal barriers that can delay recovery, while Cohen (2019) highlights the importance of restoring housing and financial resources to reduce the burden of post-traumatic stress disorder. Hosoya (2016) and Patel (2010) both stress the need for efficient recovery strategies, with Hosoya focusing on economic recovery and Patel proposing a protocol for the rapid construction of post-disaster homes. These studies collectively underscore the importance of a decreased post-disaster recovery timeline in restoring normal living and economic conditions.

A shift towards increased community participation in disaster risk management activities has been observed, indicating heightened awareness and proactive attitudes towards disaster resilience (Nirupama, 2011). This trend is influenced by various factors, including social and disaster-specific factors (Hashimoto, 2018), the role of the government in encouraging community involvement (Rahman, 2018), and the importance of community awareness and preparedness in disaster risk reduction (Bali, 2022). These studies collectively underscore the significance of community engagement in building resilient communities and reducing the impact of disasters.

### *H. Community Awareness and Participation*

Community awareness and education are imperative in disaster risk reduction (Nirupama, 2011; King, 2000; Parkash,

2013; Kangabam, 2012). However, vulnerable groups may lack awareness of potential threats (Nirupama, 2011), and there is often a lack of preparedness for predictable hazards (King, 2000). To address this, targeted education and awareness campaigns are needed (King, 2000; Parkash, 2013), with a focus on local resources and community-based disaster preparedness (Kangabam, 2012). These efforts can enhance community resilience and reduce the impact of disasters.

Studies have shown that various factors influence local residents' participation in disaster risk reduction and management (DRRM) activities. Olawuni (2020) found that age, education, and length of residence were key determinants of participation in Lagos, Nigeria. Similarly, Cui (2018) identified volunteering, disaster education, and higher income as factors associated with higher community resilience in a post-earthquake rural community in China. However, Nkombi (2022) highlighted the challenge of public participation in DRRM initiatives in Katlehong township, South Africa, due to stakeholder reluctance. Klimeš (2019) emphasized the importance of community participation in landslide risk reduction in the Peruvian Andes, achieved through collaboration between scientists and the local community. These studies collectively underscore the need for tailored approaches to enhance local residents' engagement in DRRM activities.

The usage of early warning systems by community members is on the rise, driven by the need for more personalized and location-specific alerts (Meissen, 2014). However, challenges remain in ensuring effective communication to large communities and international visitors (Neussner, 2014). To address these issues, there is a growing emphasis on community participation in the design and implementation of these systems (Baudoin, 2014). This is further supported by the development of gamified platforms that encourage civic engagement in early warning activities (Romano, 2018).

The enforcement and adherence to ordinances related to disaster mitigation, such as illegal logging prevention, solid waste management, and building restrictions in hazard-prone areas, are critical for sustainable development and environmental factors. Local government bodies play a key role in implementing these ordinances and raising public awareness about disaster mitigation (Pachuau, 2019). Law enforcement is essential in preventing illegal logging, with strict implementation of environmental laws and socialization efforts to educate the community (Boerhan, 2020; Hasan, 2023). The Semarang City Government of Indonesia has issued regulations to manage tree felling in public green spaces, with legal actions against illegal loggers (Kismartini, 2020). These studies highlight the importance of community involvement and effective law enforcement in disaster mitigation and environmental protection.

The active involvement of residents in co-developing and updating barangay disaster risk reduction and management plans is a key factor in their effective execution. This participation is facilitated by the sustained efforts of local officials and the community, leading to a high level of performance in plan implementation (Matunhay, 2019). Residents' hazard experiences and risk reduction initiatives, including the development of hazard maps, further contribute to the effectiveness of these plans (Cipriano, 2019). However, there are variations in the level of implementation of these plans, with some barangays needing to improve their capabilities in certain areas (Misaen, 2014).

The community's active engagement in capacity-building initiatives for disaster risk reduction and management is evident in various studies. Hariyani (2019) and Koem (2019) both highlight the establishment of Disaster Risk Management forums and Community Disaster Preparedness Teams as key components of these initiatives. Vega-Cuza (2013) and Kurita (2007) emphasize the importance of community involvement and hands-on training in these programs, with the latter specifically focusing on the role of local trainers in educating their communities. These studies collectively underscore the significance of community-driven approaches in enhancing disaster preparedness and resilience.

### *I. Challenges in Disaster Risk Reduction and Management*

#### *1) Education and Information*

Education and information play pivotal roles in disaster risk reduction and management (DRRM). Firstly, education is the cornerstone of building resilient communities. When individuals are well-informed about the potential hazards in their region and understand the measures to mitigate risks, they are better equipped to make informed decisions before, during, and after disasters (Canlas, & Karpudewan, 2020). Schools and educational institutions serve as platforms for imparting this knowledge, ensuring that the younger generation is prepared to handle future challenges. Additionally, education fosters a culture of preparedness and encourages community engagement, leading to collective efforts in disaster response and recovery.

Seddighi et al. (2022) emphasized that information dissemination is vital in DRRM, particularly in the age of technology and communication. Timely and accurate information empowers individuals and communities to take appropriate actions, such as evacuating or seeking shelter. Modern technology, including mobile apps, social media, and early warning systems, has revolutionized the way information is shared during emergencies, providing real-time updates and improving the overall effectiveness of disaster response efforts (Walch, 2018). Governments and organizations must invest in robust communication infrastructure and public awareness campaigns to ensure that information reaches every corner of the community.

#### *2) Manpower*

Manpower plays a crucial role in DRRM, encompassing the human resources and capabilities required to effectively respond to and mitigate the impact of disasters. In the context of DRRM, manpower involves the coordination and deployment of skilled individuals across various sectors such as emergency response, healthcare, engineering, and social services. These personnel are essential for executing pre-disaster preparedness plans, conducting risk assessments, and implementing strategies to enhance community resilience

(Follosco – Aspiras & Santiago, 2016).

The first aspect of manpower in DRRM involves the establishment of well-trained and adequately equipped response teams. These teams are consist of professionals who specialize in disaster management, including emergency medical personnel, search and rescue experts, and logistical support staff (Enriquez, Caleda, & Bunao, 2018). Their expertise is critical in swiftly addressing the immediate aftermath of a disaster, providing medical assistance, evacuating affected individuals, and restoring basic services. Additionally, manpower in DRRM extends to the training of local communities, empowering residents with the knowledge and skills needed to respond effectively during emergencies (Bacus, 2020).

Challenges in human resources in disaster risk reduction and management are multifaceted and pose significant obstacles to effective disaster preparedness and response efforts. Firstly, there is often a shortage of trained personnel in this field. Many regions and countries lack a sufficient number of professionals with expertise in disaster risk reduction, emergency management, and related fields (Superio, 2019). This shortage is exacerbated by the complexity of disasters, which require a diverse set of skills, from meteorology and geology to logistics and community engagement. As a result, there is often a mismatch between the demand for skilled manpower and the available workforce, hindering the timely and coordinated response to disasters (Munasinghe, & Matsui, 2019).

Secondly, turnover and retention of trained personnel can be a major challenge; working in disaster risk reduction and management can be physically and emotionally taxing, leading to burnout and high turnover rates among professionals. Additionally, the allure of better-paying jobs in other sectors can lead to a constant loss of experienced personnel from the said field. This turnover not only disrupts the continuity of disaster management efforts but also hampers the development of institutional knowledge and expertise (Gabriel, Santiago, & Casimiro, 2021).

Lastly, disparities in manpower distribution between urban and rural areas can be a critical issue. Often, urban centers have more resources and trained personnel, while rural and remote areas are left with limited manpower and infrastructure for disaster management. This imbalance can result in slower response times and less effective disaster risk reduction efforts in vulnerable communities. Addressing these disparities requires a targeted effort to ensure that all regions have access to the necessary manpower and resources to build resilience and respond to disasters effectively.

*3) Equipment and Facilities*

Essential to this process is the use of specialized equipment designed to respond effectively to various types of emergencies. This equipment encompasses a wide range of tools and resources, such as search and rescue gear, communication devices, medical supplies, and vehicles (Batista, 2023). Search and rescue equipment, including cutting-edge technologies like drones and thermal imaging devices, play a vital role in locating and aiding residents affected by disasters. Communication tools facilitate efficient coordination among response teams and enable timely dissemination of information to the public. Medical supplies are essential for providing immediate assistance to those injured during disasters, while vehicles ensure swift and organized movement of response teams to affected areas. The proper deployment and utilization of this equipment are essential for the success of DRRM initiatives (Manlinguez, Dela Cruz, & Malinguez, 2023).

In addition to specialized equipment, the establishment and maintenance of adequate facilities are fundamental components of effective DRRM strategies. Emergency response centers serve as command hubs for coordinating rescue operations and disseminating critical information (Cipres, 2023). These centers are equipped with communication systems, information technology infrastructure, and trained personnel to handle various aspects of disaster response. Evacuation centers provide temporary shelter for displaced individuals, equipped with necessities such as food, water, and sanitation facilities. Properly designed and strategically located evacuation centers contribute significantly to the safety and well-being of the affected population. Additionally, training facilities play a key role in preparing response teams and community members for effective disaster management, providing hands-on simulations and educational programs to enhance their skills and awareness (Tabangcura, et al., 2023).

Facilities must be strategically located and resilient to withstand potential hazards, ensuring their availability when needed most. Overall, the integration of well-maintained equipment and facilities within a comprehensive DRRM framework is essential for building resilient communities capable of effectively mitigating and responding to disasters (Gaudiel, 2023).

Secondly, the rapid advancements in technology pose both opportunities and challenges; while modern technology offers sophisticated tools for disaster prediction, response, and recovery, not all regions have access to these resources. Furthermore, maintaining and upgrading these technologies can be expensive, making it difficult for some areas to keep pace with evolving disaster management requirements.

Lastly, the long-term sustainability of equipment and facilities is a persistent challenge. Maintaining and replenishing resources in the aftermath of a disaster can be costly and often diverts funds from other essential services. Additionally, climate change is altering the nature and frequency of disasters, necessitating constant adaptation and investment in new equipment and facilities.

*4) Institutional Coordination*

Institutional coordination plays a pivotal role in DRRM by fostering collaboration among various organizations, agencies, and stakeholders involved in mitigating and responding to disasters. The first key aspect of institutional coordination lies in the establishment of effective communication channels and mechanisms (Baluran, 2023). This involves creating platforms for information sharing, regular meetings, and joint planning sessions among relevant entities. When different institutions are on the same page, it ensures a more cohesive and efficient response to disasters, reducing duplication of efforts and maximizing resources (Dipon, 2023).

Furthermore, institutional coordination enhances the overall effectiveness of DRRM policies and strategies. By bringing together diverse expertise and perspectives, coordination helps identify gaps in existing approaches and promotes the development of comprehensive and inclusive plans. This collaborative effort ensures that the response to disasters is not only timely but also well-informed, taking into account the unique challenges and vulnerabilities of the affected communities. It also facilitates the integration of innovative technologies and methodologies, enhancing the overall resilience of the region in the face of potential hazards (Mutseekwa & Razuwika, 2023).

Lastly, institutional coordination is essential for fostering a culture of resilience within communities. When government agencies, non-governmental organizations, and local communities work hand in hand, it empowers individuals to actively participate in DRRM initiatives. This community engagement aspect is crucial for building awareness, promoting preparedness, and implementing sustainable practices that contribute to long-term resilience. In summary, institutional coordination in DRRM is a multifaceted approach that not only streamlines response efforts but also strengthens the foundation for a more resilient and disaster-ready society (Gomez & Pamittan, 2023).

The establishment of clear policies, regulations, and legal frameworks is paramount. These frameworks provide the necessary authority and guidance for DRRM initiatives, ensuring that they are integrated into national and local development plans (Walch, 2018). Effective governance and coordination mechanisms are crucial to ensure that DRRM efforts are coherent and that responsibilities are clearly defined among various stakeholders (Ravago, et al., 2020).

According to the publication of Baybay and Hindmarsh (2019), community engagement and capacity-building are central to successful DRRM implementation. Local communities are often the first responders to disasters and play a pivotal role in reducing risks. Education and awareness programs empower individuals and communities to understand their vulnerabilities and take proactive measures. Additionally, capacity-building initiatives equip responders with the necessary skills and resources to effectively manage disaster situations.

Barua, Islam, and Ansary (2020) went about investing in the resilience of infrastructure and sustainable land use planning as a critical aspect of DRRM. Building structures that can withstand natural disasters, such as earthquakes or floods, helps protect lives and property. Furthermore, sound land use planning, which considers disaster risk reduction, can prevent the construction of buildings and settlements in high-risk areas (Uy & Tapnio, 2021).

Continuous monitoring, evaluation, and adaptation are essential components of DRRM implementation. Regular assessments of the effectiveness of risk reduction measures enable adjustments and improvements to be made over time. This iterative process ensures that DRRM strategies remain relevant and responsive to evolving risks and challenges following the findings of Gabriel, Santiago, and Casimiro (2021).

One of the objectives of the MDRRM Plan of LGU San Jose is to provide support and strengthen coordination mechanisms among various sectors and stakeholders that will ensure the success of the operations. This strategic partnership includes national government agencies, disaster management focal points, national, regional, and local NGOs, traditional institutions and leaders, the private sector/business community, researchers, civil society organizations, faith-based organizations, and security and emergency services.

Institutional coordination in disaster risk reduction and management is a critical aspect in ensuring the safety and resilience of communities in the face of natural disasters. However, it is fraught with numerous challenges that can hinder effective preparedness and response efforts. Walch (2018) found out that one significant challenge is the fragmentation of responsibilities across different government agencies and levels of government. In many countries, disaster management is the responsibility of multiple ministries and agencies, each with its own priorities, mandates, and funding sources. This fragmentation often leads to confusion, duplication of efforts, and gaps in coordination during disaster events. Streamlining and harmonizing these diverse institutions is essential for efficient disaster risk reduction (Hung, et al., 2021).

Another challenge in institutional coordination is the lack of clear communication and information-sharing mechanisms. Effective coordination requires the timely exchange of information and data among various stakeholders, including government agencies, non-governmental organizations, and the private sector (Jovita., et al., 2018; Bhandari, et al., 2020; Lin, et al., 2020). However, many institutions struggle to establish standardized communication protocols and information-sharing platforms. This can result in delays in decision-making and response efforts, potentially increasing the impact of disasters on affected communities (Geekiyanage, Fernando, & Keraminiyage, 2020).

Lastly, resource constraints pose a significant hurdle to institutional coordination in disaster risk reduction and management. Government agencies and organizations involved in disaster management often face budget limitations, which can limit their capacity to develop and maintain robust coordination mechanisms. This can affect their ability to invest in training, technology, and infrastructure needed for effective coordination. Furthermore, competing priorities for limited resources can divert attention away from disaster risk reduction, leaving communities more vulnerable to disasters (Badoc-Gonzales, Mandigma, & Tan, 2021).

### *J. Theoretical Framework*

The Hyogo Framework for Action (HFA) serves as a pivotal reference point for LGU San Jose's disaster risk reduction and management (DRRM) initiatives. Adopted in 2005, the HFA was a global initiative that outlined a comprehensive strategy for reducing disaster risks and enhancing resilience over ten years. By adhering to the principles and priorities outlined in the HFA, LGU San Jose can align its efforts with internationally recognized best practices. This alignment is crucial for ensuring

that the local strategies not only meet the specific needs of the community but also contribute to broader global goals in disaster risk reduction (Kouamé & Kouassi, 2023). Additionally, the Sendai Framework for Disaster Risk Reduction 2015-2030 is a significant global initiative that builds upon the work done under the Hyogo Framework for Action (HFA) and introduces several innovations to strengthen disaster risk reduction efforts.

In the context of DRRM in the Philippines, several theoretical frameworks are commonly utilized to guide research and practice. A notable example is the integration of the Vulnerability and Capacity Assessment (VCA) framework, which examines how social, economic, and environmental factors contribute to a community's vulnerability to disasters, while also assessing the strengths and resources available within the community to cope with and recover from such events. Additionally, the Community-Based Disaster Risk Management (CBDRM) model emphasizes the active involvement of local communities in the entire disaster management cycle, from risk assessment to recovery, highlighting the importance of grassroots participation and local knowledge. The Disaster Management Cycle, encompassing preparedness, response, recovery, and mitigation, provides a structured approach to managing disasters, ensuring that each phase is addressed comprehensively. Furthermore, institutional theory examines how formal and informal rules, regulations, and structures influence disaster management practices, shedding light on the effectiveness of policies implemented by national and local government units. These frameworks collectively offer a comprehensive understanding of DRRM, emphasizing the interplay between community dynamics, institutional structures, and disaster management processes.

### *K. Conceptual Framework*

This study is primarily hinged on the premise of Republic Act No. 10121 otherwise known as the Philippine Risk Reduction and Management Act of 2010 which provides for a multi-sectoral, community-based, and comprehensive approach to disaster risk management. The four thematic areas of the law are disaster prevention and mitigation, disaster preparedness, disaster response, and disaster rehabilitation and recovery; served as a guideline in the implementation of the law through the institutional cooperation of all the agencies concerned to achieve safer, adaptive, and resilient Filipino communities. The Act transformed the government responds to disasters from reaction to preparation and encouraged the development of disaster management capacities at the individual, organizational, and institutional levels (Gaudiel, 2023).

The conceptual framework for this study on the implementation, success, and challenges of DRRM in San Jose, Occidental Mindoro shown in Figure 1. The first box that represents the independent variable of the study is the implementation of DRRM that includes disaster prevention and mitigation, disaster preparedness, disaster response, and disaster rehabilitation and recovery. The second and third boxes connoted as dependent variables are success and challenges encountered in DRRM. The parameters of success include reduction in disaster impact, community awareness and participation, and resilience and quick recovery, while the parameters of challenges include education and information, manpower, equipment and facilities. The arrows on the framework represent the correlation analysis that tends to test the significant relationship between implementation and challenges, implementation and success, and success and challenges.

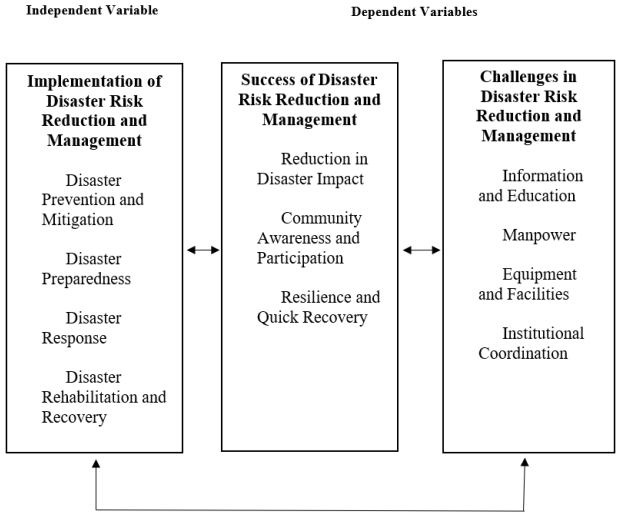


Fig. 1. Research paradigm

### *L. Operational Definition of Terms*

*Disaster Risk Reduction and Management (DRRM)* – pertains to the systematic and strategic measures taken to minimize the impact of potential disasters, such as natural hazards or emergencies, on the community, its infrastructure, and its residents. This includes activities aimed at reducing the vulnerability of the area and enhancing its resilience.

*Disaster Prevention and Mitigation* – pertains to the actions taken to assess, and mitigate potential disaster risks in San Jose, Occidental Mindoro as identified by the LGU. This includes activities aimed at minimizing or preventing the occurrence of disasters and reducing the impact on the community.

*Disaster Preparedness* – pertains to the readiness and preparedness of MDRRMC to respond and effectively manage disasters, includes the development and implementation of emergency response plans, early warning systems, trainings, and drills to enhance preparedness.

*Disaster Response* – pertains to the immediate actions and activities undertaken by the MDRRMC to address the immediate aftermath of a disaster and provide assistance, support, and relief services to affected individuals and communities. This includes search and rescue operations, emergency medical services, and the provision of relief assistance during and after disasters.

*Disaster Rehabilitation and Recovery* – pertains to the efforts and success in rebuilding and restoring affected communities after a disaster, includes post-disaster assessments, resource allocation for recovery and reconstruction, livelihood support, and social support systems.

*Reduction in Disaster Impact* – pertains to the success of MDRRMC in terms of mitigating the negative consequences of disasters, such as minimizing casualties, injuries, damage to infrastructure, and disruptions to essential services.

*Community Awareness and Participation* – pertains to the success of the MDRRMC to raise the level of knowledge, understanding, and engagement of community members in disaster risk reduction activities and initiatives. This encompasses the extent to which the community is aware of risks, preparedness measures, and actively participates in disaster management activities.

*Resilience and Quick Recovery* – pertains to the success of MDRRMC to capacitate the communities and systems to bounce back and recover from the impact of disasters swiftly, includes the ability to withstand and adapt to shocks, build back better, and restore normalcy in the aftermath of a disaster.

*Information and Education* – pertains to the availability, effectiveness, and dissemination of accurate and relevant information and educational programs aimed at raising awareness and knowledge of disaster risks and preparedness measures, includes initiatives to educate and inform the community about disaster risk reduction and management.

*Manpower* – pertains to the human resources, including personnel or staff, involved in the implementation of DRRM, includes the assessment of the number, skills, and capabilities of personnel engaged in disaster risk reduction and management

*Equipment and Facilities* – pertains to the availability, functionality, and adequacy of equipment, tools, and infrastructure necessary to support effective disaster risk reduction and management efforts, including assessing the presence and condition of rescue equipment, communication systems, evacuation centers, emergency shelters, and other relevant facilities.

*Institutional Coordination* – pertains to the level of cooperation, collaboration, and effective coordination among different government agencies, organizations, and stakeholders involved in DRRM. This includes evaluating the degree of information sharing, joint planning, collective decision-making, and overall interagency coordination to support disaster risk reduction and management efforts.

*Extent of Implementation* – refers to the degree or level to which the Municipal Disaster Risk Reduction and Management (MDRRM) measures and strategies are effectively implemented and put into practice. This includes the implementation of disaster prevention and mitigation, disaster preparedness, disaster response, and disaster rehabilitation and recovery activities within the barangays of San Jose, Occidental Mindoro.

*Extent of Success* – refers to the level or degree to which the objectives and goals of DRRM have been achieved. This includes the reduction in disaster impact, community awareness and participation, and the resilience and quick recovery of the barangays following a disaster event.

*Extent of Challenges* – refers to the degree or level of difficulties, obstacles, or limitations encountered in the implementation of DRRM, includes challenges related to education and information dissemination, manpower limitations, adequacy of equipment and facilities, and coordination among different institutions involved in disaster risk reduction.

## 3. Methodology

### *A. Research Design*

The study used the descriptive research design in which the data were gathered using a structured survey instrument to collect firsthand information from the Barangay Disaster Risk Reduction Council Members and Sangguniang Kabataan Chairpersons.

### *B. Time and Place of the Study*

The study was conducted among the thirty-nine (39) barangays of the municipality of San Jose, Occidental Mindoro in April 2024 in order to gauge the DRRM implementation in the municipality.

The municipality is located about 259 aerial kilometers southwest of Manila, the capital of the Philippines, and is part of Region IV-B (MIMAROPA). It is bounded by the Municipality of Rizal on the North, the province of Oriental Mindoro on the East, the Municipality of Magsaysay on the South, and Mindoro Strait on the West. The Municipality of San Jose is a first-class municipality, having a total land area of 67,068.61 hectares which is 11.41% of the total land area of Occidental Mindoro Province. Per Community-Based Monitoring System (CBMS) Data from 2013-2014, the total population of the Municipality of San Jose is 125,861 with an average growth rate of 2.04%.


Fig. 2. Research site (Source: en.wikipedia.org)

### *C. Respondents and Sampling Techniques*

The study aims to include a total of 154 respondents. This sample size was calculated using the Raosoft calculator, considering a 5% margin error, a 90% confidence level, and a 50% response distribution. The total population size of interest is 351 individuals, which represents the population of the BDDMRCs in the 39 barangays of San Jose, Occidental Mindoro. The sampling technique employed in this research is

a stratified random sampling using Neyman allocation formula. Stratified random sampling involves dividing the population into distinct subgroups or strata based on certain characteristics related to the research objectives. In this case, the barangays serve as the strata. The Neyman allocation formula helps determine the appropriate number of respondents to be selected from each stratum based on the proportionate representation of the population. By utilizing stratified random sampling with Neyman allocation, the research aims to ensure the inclusion of respondents from different barangays in San Jose, Occidental Mindoro, while maintaining proportional representation based on the population size of each barangay. These include the respondents from coastal, mainland, and upland barangays, respectively, to capture the general response of the population from different geographic settings.

### *D. Research Instrument*

The research instrument is a researcher-made through the available literature; the survey questionnaire is divided into three parts; the first part assesses the extent of implementation of DRRM in terms of disaster prevention and mitigation, disaster preparedness, disaster response, and disaster rehabilitation and recovery; the second part examines the extent of success of implementation of DRRM, focusing on reduction in disaster impact, community awareness and participation, and resilience and quick recovery; the last part explores the challenges encountered in the implementation of DRRM, including education and information, manpower, equipment and facilities, and institutional coordination.

The research instrument involves rating statements on a scale to measure the different aspects of implementation, success, and challenges. By employing this instrument, the study aims to gather data on the extent to which DRRM is implemented, its success, and challenges in San Jose, Occidental Mindoro.

The draft of the questionnaire was presented for critical review by the research experts to test its validity and reliability to produce the desired result, also, their comments and suggestions were taken into consideration for the finalization of the survey questionnaire.

### *E. Data Gathering Procedure*

Prior to data collection, a pre-test was conducted with a small group similar to the target population. The purpose of the pre-test is to assess the questionnaire's clarity, relevance, and validity. Revisions were made based on the feedback received. Data collection was carried out by obtaining permission from the Barangay Disaster Risk Reduction and Management Council, particularly the Punong Barangay who also serves as the BDRRMC Chairperson. The researcher prepared communication letters addressed to the respective heads of agencies involved to ask permission to conduct the study together with the Endorsement Letter from Occidental Mindoro State College (OMSC) Graduate School.

Informed consent was obtained from all participants before data collection. Participants were fully informed about the purpose of the study, their rights as participants, the voluntary nature of participation, and how their data would be used and kept confidential. Measures were taken to ensure the confidentiality of participants' personal information and responses. Data collection and storage procedures were implemented to secure the data and restrict access to authorized personnel. Identifying information was removed to ensure anonymity. Participants were given the choice to participate or not without any negative consequences. It was assured to them that their decision to participate or not would not affect their relationship with the barangay or any other entity. The research was conducted with honesty, integrity, and objectivity. All activities were carried out in compliance with ethical guidelines and standards, respecting the rights and well-being of participants.

Necessary approvals and permissions were obtained from relevant authorities, including the Barangay Disaster Risk Reduction and Management Council and barangay personnel before conducting the research. All regulations or guidelines set forth by these authorities were adhered to. Face-to-face surveys were employed based on feasibility and accessibility. The author administered the questionnaire to the selected respondents, providing clear instructions.

### *F. Data Analysis*

After the data collection, the questionnaire responses were coded and entered into a SPSS. Descriptive statistics were employed to summarize and describe the data with frequencies, percentages, and mean scores computed for each component of the questionnaire. This process assessed the extent of implementation, success, and challenges encountered in Disaster Risk Reduction and Management of the municipality. A 4-point Likert scale was used intentionally to omit a neutral middle option, and encouraged the respondents to choose based on their knowledge and experience.

Additionally, to understand the relationship between the implementation and success, the success and challenges, and challenges and implementation encountered in Municipal Disaster Risk Reduction and Management, a correlation analysis was undertaken. This analysis provided insights into the significant relationships among these aspects. Based on the findings, inferences were drawn, and the results were synthesized and interpreted.

## 4. Results and Discussions

This section presents the results and findings of the data gathered including its analysis and interpretation on the following questions stated on the statement of the problem.

### *A. Extent of Implementation of Disaster Risk Reduction and Management*

Table 4 shows the generally high extent of implementation (mean=3.15, SD=0.489) of DRRM in San Jose, Occidental Mindoro in terms of disaster preparation, disaster prevention and mitigation, disaster response, and disaster rehabilitation and recovery.

#### *1) Disaster Preparation*

Preparedness to a disaster is crucial. As the country is highly susceptible to natural hazards, including tropical cyclones,

earthquakes, and volcanic risks, preparedness is of importance. The nation faces significant challenges in managing and mitigating the impact of these disasters. Evidently, disaster preparation is highly implemented (mean=3.24, SD=0.570) in the municipality as indicated by the availability of plans with local risk maps prepared by the Municipal Disaster Risk and Reduction and Management Council (MDRRMC) to update the residents. This suggests that the Council proactively prepares comprehensive disaster plans and maps, and disseminates risk information to the community, aiding in disaster readiness (Kjellgren, 2013). These maps act as valuable tool for raising awareness and providing guidance in local risk situation.

To further make people capable and responsive in case of emergencies, contingency plans are rehearsed to equip residents with knowledge on what to do before, during, and after a disaster. These community awareness programs are regularly initiated to educate residents about preparedness. Drills are conducted, and early warning system is established. Moreover, food and water supply as well as first aid kits are readily available. Evacuation routes are regularly inspected for any obstructions or potential hazards. Disaster-related signage, markers and directional signs are also displayed in strategic locations. However, this registered the relatively lowest rating (mean=2.98, SD=0.946) which suggests the need for improvement in the signages, which must be clear, easy to understand, and can easily be seen particularly at nights with power and internet outage. Comprehension and interpretation of warning signs may be hurdle in DRRM implementation (Aucote, Miner & Dahlhaus, 2012), hence improvement is imperative.

*2) Disaster Prevention and Mitigation*

The overall mean of 3.17 (SD=0.570) supports the high

Table 1
Extent of implementation of DRRM programs and activities for disaster preparation in the municipality of San Jose, Occidental Mindoro

| Indicators | Mean | Std. Deviation | Description |
|---|---|---|---|
| The MDRRMC prepared plans with local risk map to update the residents. | 3.44 | 0.604 | High |
| Contingency plans were rehearsed and disseminated for the residents to have ideas in case of emergencies. | 3.32 | 0.613 | High |
| Drills conducted to test the contingency plan to find out its effectiveness. | 3.23 | 0.694 | High |
| Disaster-related signage, markers and directional signs displayed in strategic locations. | 2.98 | 0.946 | High |
| Established early warning system to alarm the residents in case of calamity. | 3.19 | 0.768 | High |
| Regular community awareness programs are initiated to educate residents about disaster preparedness. | 3.21 | 0.544 | High |
| Essential resources and supplies such as food, water, and first aid kits are pre-allocated and replenished regularly to ensure readiness in the event of a disaster. | 3.27 | 0.616 | High |
| Evacuation routes are clearly defined and regularly inspected for any obstructions or potential hazards | 3.27 | 0.667 | High |
| **Overall Mean** | **3.24** | **0.507** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 2
Extent of implementation of DRRM programs and activities for disaster prevention and mitigation in the municipality of San Jose, Occidental Mindoro

| Indicators | Mean | Std. Deviation | Description |
|---|---|---|---|
| Identification of hazards and risks to determine the potential calamity that may occur. | 3.19 | 0.667 | High |
| Hazard resistant projects were implemented in order to lessen possible damages in the locality. | 3.16 | 0.733 | High |
| Building resilience of residents to disasters for them to survive in case of catastrophic events. | 3.21 | 0.646 | High |
| Implementation of safety standards for the residents to be always aware and ready of any natural or man-made calamity. | 3.17 | 0.665 | High |
| Information and warning systems were implemented to keep the residents updated on the situation. | 3.16 | 0.804 | High |
| Regular inspections of infrastructure are conducted to ensure adherence to safety standards and assess vulnerability to disasters. | 3.11 | 0.662 | High |
| Environmental protection measures are integrated into disaster risk reduction planning to mitigate hazards related to changes in the natural environment. | 3.16 | 0.610 | High |
| Regular and comprehensive risk assessments are conducted that consider a range of disaster scenarios to increase proactive mitigation efforts. | 3.16 | 0.678 | High |
| **Overall Mean** | **3.17** | **0.520** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 3
Extent of implementation of DRRM programs and activities for disaster response in the municipality of San Jose, Occidental Mindoro

| Disaster Response | Mean | Std. Deviation | Description |
|---|---|---|---|
| Mobilization of volunteers to provide quick actions on the eminent threats in the locality. | 3.08 | 0.737 | High |
| Search and rescue operations and appropriate actions to save life in the most affected areas. | 3.20 | 0.651 | High |
| Evacuation of affected population purposely to relocate and keep them safe. | 3.23 | 0.684 | High |
| Implementation of emergency shelter for the affected residents and to gradually return to normal condition. | 3.19 | 0.684 | High |
| Medical operations to provide immediate attention to restore normal health conditions of the affected residents. | 3.15 | 0.693 | High |
| Provision of psychological therapy and emotional support services to affected individuals to aid in their mental and emotional recovery. | 3.04 | 0.704 | High |
| Implementation of post-disaster evaluation methods to analyze the efficiency of the response and improve future strategies. | 3.13 | 0.693 | High |
| Establishment and operation of donation and aid distribution centers to ensure affected residents receive necessary supplies and support. | 3.06 | 0.639 | High |
| **Overall Weighted Mean** | **3.14** | **0.570** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 4
Extent of implementation of DRRM programs and activities for disaster rehabilitation and recovery in the municipality of San Jose, Occidental

| Disaster Rehabilitation and Recovery | Mean | Std. Deviation | Description |
|---|---|---|---|
| Distribution of relief goods services to the affected residents for them to continue living a normal life. | 3.21 | 0.673 | High |
| Relocation and health care projects for the residents to attain and improve their well-being. | 3.10 | 0.668 | High |
| Infrastructure and rehabilitation projects to restore normal economic flow of the residents and the whole community. | 2.98 | 0.739 | High |
| Price control monitoring to pre-empt hoarding of prime commodities in the market. | 2.99 | 0.767 | High |
| Livelihood projects for affected populace to uplift economic conditions and sustain their basic needs. | 2.97 | 0.690 | High |
| Educational programs are initiated to rebuild and strengthen the capabilities of residents to adapt and recover from future disasters. | 3.10 | 0.634 | High |
| Environmental rehabilitation efforts are carried out to restore damaged ecosystems and mitigate the impacts of future disasters. | 3.01 | 0.676 | High |
| Collaborations with local and international NGOs and government agencies are fostered to provide additional funding, resources, and expertise in rehabilitation initiatives. | 3.02 | 0.745 | High |
| **Overall Weighted Mean** | **3.05** | **0.571** | **High** |
| **Grand Mean** | **3.15** | **0.489** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 5
Extent of success of DRRM programs and activities for reduction of disaster impact in the municipality of San Jose, Occidental Mindoro

| Indicators | Mean | Std. Deviation | Description |
|---|---|---|---|
| Reduction in Disaster Impact | | | |
| 1.The number of human casualties (fatalities and injuries) during disaster occurrences decreases every year. | 2.67 | 0.991 | High |
| 2. The overall economic loss attributable to disasters, considering both the damaged infrastructure and loss in production, is declining annually. | 2.68 | 0.968 | High |
| 3. The frequency of evacuation due to disaster threats has significantly lowered down in the past years. | 2.78 | 0.924 | High |
| 4. The extent of environmental damage (like deforestation, soil erosion, habitat destruction) due to disasters is controlled and steadily decreasing. | 2.72 | 0.967 | High |
| 5. The duration of interruption of essential services (power, water, communication etc.) during disaster instances has notably reduced. | 2.73 | 0.825 | High |
| 6. The community demonstrates improved understanding and response towards early warning information, resulting in proactive action during disaster events. | 2.93 | 0.687 | High |
| 7. Post-disaster recovery timeline, in terms of restoring normal living and economic conditions, has notably decreased over the years. | 2.90 | 0.802 | High |
| 8. Increased community participation in disaster risk management activities, indicating heightened awareness and proactive attitudes towards disaster resilience. | 2.98 | 0.700 | High |
| **Overall Weighted Mean** | **2.80** | **0.734** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

implementation of program and activities for disaster prevention and mitigation and ensure human safety and well-being (Asio, 2020). In contrast to preparedness, prevention ensures that human action or natural phenomena do not result in disaster or emergency and aimed at significantly reduce the human and economic toll (Domingo & Manejar, 2018). Mitigation is a sustained action that reduces or eliminates long-term risk to people and property from natural hazards and their effects (Fitriani, Zulkarnaen & Bagianto, 2021). Both measures are employed to eliminate or reduce the incidence of severity.

Specifically, there are programs and activities implemented at a high extent (mean=3.21) to build among residents the resilience to disasters. This is for them to survive in case of catastrophic events. By demography, residents also vary in terms of awareness and resilience. These should be addressed by the MDRRMC by fitting their programs to the specific needs. Better educated households tend to be more aware of their risk and invest more into mitigating these risks (Bollettino, Alcayna, Enriquez & Vinck, 2018).

In addition, the hazards and risks in the specific places are identified to determine the possibility of occurrence of a disaster. Safety standards are likewise implemented for the residents' awareness and readiness for any natural or man-made calamities. For instance, a set of regulations and associated standards are intended to control aspects of the design, construction, materials, alteration and occupancy of structures and are necessary to ensure human safety and welfare, including resistance to collapse and damage (UNISDR, 2009). Cognizant of these, the local government became apparently cautious about the hazard resistance of the construction projects. Information and warning systems are implemented, and environmental protection measures are integrated into disaster risk reduction planning. Comprehensive risk assessments are conducted. Infrastructures are inspected for safety and vulnerability to disasters. However, this obtained the lowest rating (mean=3.11), indicating the need for further improvement. Result of inspection and assessment determine the need and urgency of reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards. These are fundamentals for critical infrastructure protection and resilience (Zio, 2016).

*3) Disaster Response*

Disaster Response received an overall mean of 3.14 (SD = 0.570) indicates a high level of implementation and ascertain that different ranges of emergency responses are imposed. Emergency actions start through assessment, development of strategy, plan implementation, often without knowing the full extent until after the event (Baker & Refsgaard, 2007).

Notably, several programs are at a high extent (mean=3.23)

Table 6
Extent of success of DRRM programs and activities for community awareness and participation in the municipality of San Jose, Occidental Mindoro

| **Community Awareness and Participation** | | | |
|---|---|---|---|
| The community members are aware of the potential disasters that may occur and are educated about measures to mitigate their impact. | 3.16 | 0.648 | High |
| Local residents actively participate in DRRM activities like drills, community meetings, and volunteering in disaster response. | 3.06 | 0.643 | High |
| There is an increase in the usage of early warning systems by community members. | 2.96 | 0.774 | High |
| The community members enforce and adhere to ordinances related to disaster mitigation, such as illegal logging prevention, waste management, or building restrictions in hazard-prone zones. | 3.15 | 0.721 | High |
| The residents co-develop their barangay disaster risk reduction and management plans and participate in constant updating and refining of these plans. | 3.12 | 0.714 | High |
| The community actively engages in capacity-building initiatives, such as training programs and workshops, to enhance their knowledge and skills in disaster risk reduction and management. | 3.03 | 0.666 | High |
| Community-based early warning systems are established, wherein local residents play a key role in disseminating timely and accurate information to their fellow community members. | 2.99 | 0.667 | High |
| The community actively participates in post-disaster assessment and evaluation processes, providing valuable feedback and insights for future disaster risk reduction and management planning. | 3.06 | 0.612 | High |
| **Overall Weighted Mean** | **3.07** | **0.531** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 7
Extent of success of DRRM programs and activities for resilience and quick recovery in the municipality of San Jose, Occidental Mindoro

| **Resilience and Quick Recovery** | | | |
|---|---|---|---|
| The community's critical infrastructure (hospitals, schools, bridges, etc.) can withstand the effects of disasters and remain functional. | 3.13 | 0.634 | High |
| After the disaster occurs, the community can restore essential services back to normal within a reasonable period. | 3.14 | 0.610 | High |
| Following a disaster, people are able to return to their homes and regular livelihood within a certain timeframe. | 3.16 | 0.641 | High |
| Psychological support and mental health services are readily available post-disaster, supporting the community in returning to normalcy faster. | 3.02 | 0.690 | High |
| The city has an established and efficient process for managing and allocating disaster recovery and reconstruction funds, making sure resources are well-utilized for rehabilitation efforts. | 3.15 | 0.624 | High |
| The community has established partnerships and collaborations with neighboring barangays, fostering mutual support and collective resilience in times of disasters. | 3.09 | 0.640 | High |
| The community has developed and implemented a comprehensive early recovery plan that includes clear strategies and actions to expedite the recovery process after a disaster. | 3.06 | 0.586 | High |
| The local government and community actively engage in post-disaster assessments to identify lessons learned and implement improvements in their disaster risk reduction and management strategies. | 3.06 | 0.639 | High |
| **Overall Weighted Mean** | **3.10** | **0.454** | **High** |
| **Grand Weighted Mean** | **2.99** | **0.507** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

such as evacuation of affected population to relocate and keep them safe. Such response is crucial to keep the residents safe, however not all residents are cooperative regarding this which may be caused by their experiential knowledge and lack of trust in the public officials or community leaders (Martinez-Villegas et al., 2021).

Moreover, search and rescue operations and appropriate actions to save life in the most affected areas are being conducted particularly during large scale disasters. Emergency shelter for the affected residents and to gradually return to normal condition are also implemented. Also, medical operations for the affected residents are immediately provided and further actions on severe cases are also being arranged for them. The establishment and operation of donation and aid distribution centers is engaged with the mobilization of volunteers to hasten the movement. Post-disaster evaluation methods to analyze the efficiency of the response and improve future strategies are also being done by the responders. Nevertheless, the provision of psychological therapy and emotional support services to affected individuals to aid in their mental and emotional recovery got the lowest rating (mean=3.04) and even though it is within the high range, it reveals a potential area for improvement. Psychological therapy and emotional support are essential for holistic disaster response, suggesting that further focus on mental health services is required to ensure complete recovery from disaster impacts but it is not a single intervention, but a continuous process (Rao, 2006).

*4) Disaster Rehabilitation and Recovery*

The overall mean score for Disaster Rehabilitation and Recovery is 3.05 (SD = 0.571), reflects a high level of implementation. It involves the restoration, reconstruction, and execution of development measures that will help affected localities and communities to return to a state of normalcy and enhance their resilience against the impact of future disasters (National Economic and Development Authority, 2020).

There are some programs at a high extent to enable the affected residents to continue living a normal life particularly the distribution of relief goods (mean=3.21) to alleviate their suffering. But distribution is sometimes questioned with fairness, speed of delivery, also, the demands are diverse and sometimes supplies tend to be in short supply (Chen, 2021). Vast quantities of goods are being needed post disaster thus this shall be addressed by the council.

Additionally, health care projects to improve the well-being of residents are vital. Price control monitoring of prime commodities is paramount in maintaining peace and order post disaster. Communication, Education & Public Awareness (CEPA) and collaboration with NGOs and other government agencies help in building community resiliency as well as restore damaged ecosystems. Furthermore, disaster resilient infrastructure and rehabilitation projects are implemented. Even

so, livelihood projects for the affected population got the lowest rating (mean=2.97) which needs more focus. Strengthening livelihood projects can contribute significantly to the long-term recovery and resilience of affected communities as it holds the key to sustained income generation and economic development (Sina, Yan Chang-Richards, Wilkinson, & Potangaroa, 2018).

### *B. Extent of Success of Disaster Risk Reduction and Management*

Table 7 shows the generally high extent of success (mean=2.99, SD=0.507) of DRRM in San Jose, Occidental Mindoro in terms of reduction in disaster impact, community awareness and participation, and resilience and recovery.

#### *1) Reduction in Disaster Impact*

The overall mean 2.80 (SD=0.734) supports the high level of success of DRRM projects intended to ensure the reduction of disaster impact in the municipality. The success of these measures emanates secondary effects such as poverty reduction and improvement of economic conditions in the long-term course (Okuda & Kawasaki, 2022).

There are programs in high extent which are evident through the increased community participation that heighten awareness and actions towards disaster resilience (mean=2.98). However, there are stakeholder classification based on three distinctive stakeholder attributes; power, legitimacy and urgency that helps planners create better mitigation plans by utilizing diverse knowledge, policies, and perspectives, leading to improved plan performance and increased public participation (Mojtahedi & Oo, 2016). This diversification shall be addressed and managed by the council in order for all the stakeholders to participate in the process not only the proactive ones which will further increase the community resilience.

In addition, there is an improved understanding and response towards early warning information, post-disaster recovery timeline has decreased over the years which means the delivery of services became faster, and the frequency of evacuation has significantly lowered down through time which may be attributed to the lower exposure and vulnerability of stakeholders over time. The duration of interruption of essential services during disaster has notably reduced, the extent of environmental damage is controlled and decreasing, and the overall economic loss attributable to disasters is declining annually which shows the success of DRRM programs and activities.

In spite of that, the number of human casualties during disaster occurrences decreases every year got the lowest rating (m=2.67). This may be due to the stronger natural phenomena that hits the country through time, as well as population growth and urbanization (Doocy, Daniels, Murray, & Kirsch, 2013) that even if the community has increased resilience, there are still casualties every year and even the increase in socio-economic development do not have a direct relation in mortality rate (Jonkman, 2005). Improved land use planning is, however, recommended.

#### *2) Community Awareness and Participation*

The overall mean 3.07 (SD=0.531) supports the high level of success of DRRM strategies intended to ensure the awareness of the community regarding disasters and how they can participate actively in all aspects. It is one of the key aspects in order to achieve community resiliency but orientations are essential in order to define the tasks of the public thus promote awareness (Valibeigi, Feshari, Zivari, & Motamedi, 2019).

There are strategies at high extent which is evident through the awareness of the community on potential disaster/s that may occur and the mitigation measures that shall be done to reduce the impact (m=3.16). However, it is not solely based on education but on distance, household composition, income, occupation of the household and social network type one belonged to, meaning the population is responding to their individual needs first before anything else which often led to 'wait-and-see' culture (Okayo, Odera, & Omuterema, 2015). This must be studied by the council in order to address the issues and strategize regarding this.

Furthermore, the residents adhere to ordinances related to disaster mitigation as well as co-develop their barangay disaster risk reduction and management plans and updating. Also, the community actively participates in post-disaster assessment and evaluation processes, drills, capacity-building initiatives, and community-based early warning systems are established wherein local residents can disseminate timely and accurate information to their fellow community members.

Even so, an increase in the usage of early warning systems by community members got the lowest rating (m=2.96). This might be because of the lack of community engagement in early warning systems due to prioritization of livelihood and lack of integration of local knowledge and materials which are key factors in engaging the residents (Sufri, Dwirahmadi, Phung, & Rutherford, 2020). Efforts on the integration of scientific knowledge and use of native materials shall be enforced to encourage community participation and empower them towards disaster resilience.

#### *3) Resilience and Quick Recovery*

The overall mean 3.10 (SD=0.454) supports the high level of success of DRRM strategies intended to ensure community resilience and quick recovery since this aspect is the key determinant because it describes the capability of a system or community to restore its performance after a disruption (Cassottana, Shen, & Tang, 2019).

There are programs at high extent which is apparent with the people being able to return to their homes and regular livelihood within a certain timeframe after a disaster which shows their resiliency (m=3.16). However, there are three factors based on local knowledge that should be considered, particularly, affected residents' perceptions, capacity/strength, and how attainable the resources are (He, 2019). This must be addressed by the council to improve the delivery of services post-disaster.

Moreover, the funds for rehabilitation are readily available, essential services are restored quickly, critical infrastructures are resilient to disasters, barangays have effective recovery plans, and post-disaster evaluation is done in order to improve the DRRM strategies.

But still, psychological support and mental health services are readily available post-disaster to support the community to return to normalcy faster got the lowest rating (m=3.02). This

Table 8
Extent of challenges in the implementation of disaster risk reduction and management in terms of education and information in the municipality of San Jose, Occidental Mindoro

| Indicators | Mean | Std. Deviation | Description |
|---|---|---|---|
| Education and Information | | | |
| There was a lack of Information, Education, and Communication (IEC) Campaigns to raise public awareness. | 2.71 | 0.814 | High |
| There were no training and seminars for local officials regarding emergency response in order to improve their knowledge and skills. | 2.73 | 0.834 | High |
| Information/notifications through personal devices in times of emergency is not easily accessible to stakeholders. | 2.77 | 0.799 | High |
| The stakeholders are not well-informed regarding the community emergency action plan. | 2.66 | 0.866 | High |
| Early warning announcements and information dissemination to prepare for upcoming typhoon/s are not being conducted by the local officials. | 2.64 | 0.869 | High |
| Limited access to reliable and up-to-date disaster risk information hampers effective decision-making and response. | 2.66 | 0.744 | High |
| Insufficient dissemination of educational materials and resources on disaster preparedness to the community. | 2.58 | 0.799 | High |
| Lack of collaboration and coordination among different government agencies and stakeholders in sharing disaster-related information. | 2.60 | 0.836 | High |
| **Overall Weighted Mean** | **2.67** | **0.690** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 9
Extent of challenges in the implementation of disaster risk reduction and management in terms of manpower in the municipality of San Jose, Occidental Mindoro

| Manpower | | | |
|---|---|---|---|
| Insufficient permanent staff for DRRM services. | 2.66 | 0.786 | High |
| The stakeholders do not participate well in any DRRM related activities. | 2.69 | 0.803 | High |
| The personnel involved in DRRM are not technically knowledgeable. | 2.55 | 0.817 | High |
| The officials are not capacitated in all aspects of DRRM. | 2.63 | 0.808 | High |
| Frequent personnel changes or detailing of personnel to other offices. | 2.66 | 0.760 | High |
| Inadequate staffing levels and high turnover rate hinder the continuity and effectiveness of DRRM initiatives. | 2.60 | 0.813 | High |
| Limited training and capacity-building opportunities for DRRM personnel result in insufficient skills and knowledge. | 2.56 | 0.816 | High |
| Inadequate support and resources for recruiting and retaining qualified DRRM personnel. | 2.56 | 0.775 | High |
| Overall Weighted Mean | 2.62 | 0.701 | High |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

reveals an opportunity for improvement in providing adequate mental health services. While the community may recover physically and economically, mental and emotional well-being requires more focus. Implementing more robust psychological support services could help ensure a more holistic approach to disaster recovery (Labaria, Acosta, & Gotangco, 2020).

### *C. Extent of Challenges Encountered by Municipal Disaster Risk Reduction and Management*

Table 11 shows the generally high extent of challenges (mean=2.62, SD=0.638) of DRRM in San Jose, Occidental Mindoro in terms of education and information, manpower, equipment and facilities, and institutional coordination.

#### *1) Education and Information*

Education and information dissemination are crucial in preventing a natural phenomenon to keep a disaster from happening or even lower the impact. Clearly, it remains as a major hurdle (mean=2.67, SD=0.690) in DRRM in the municipality. Limitations to the technological and internet infrastructure are some of the reasons why raising awareness in DRRM remains as a challenge (Reyes, 2019), which is why the council should find more effective ways to disseminate information and educate the populaces.

Additionally, notifications through personal devices in times of emergency is not easily accessible to stakeholders which got the highest rating (mean=2.77) which means that even though the residents own a technological device, some do not have an access to notifications or alerts and/or these are not readily available. This is because as communication technology advances, public expectations for immediate, authoritative, and real-time hazard information are rapidly increasing (Dallo & Marti, 2021). Which is why the LGU must meet the needs of the people in using modern solutions to cope up with the modern era thus increasing the effectivity of the DRRM programs.

Moreover, lack of training for local officials regarding emergency response, lack of information dissemination campaigns, lack of information on emergency action plan, lack of real-time updates during response and lack of coordination among concerned agencies were noted to be the challenges in the part of information dissemination.

Lastly, insufficient dissemination of educational materials and resources that will help the community in disaster preparedness rendered the lowest mean (2.58). This means that the council provides IEC materials to the communities but lacks information dissemination campaigns that will educate the communities properly thus IEC campaigns are recommended to be performed on a regular basis. IEC materials effectively increase public awareness and education, with clear, relevant, and visually appealing content prompting responsible actions (de la Cruz, 2023). The IEC materials should be easy to understand and visually appealing to attract the public and be educated in DRRM for it to be deemed effective which may be the case in San Jose since there are IEC materials being distributed to the communities since it still remains as a challenge in the implementation

Manpower acts as the backbone of effective disaster risk-reduction and mitigation strategies because it provides the trained personnel and organized teams that will plan and coordinate responses and recovery from tragedies. Their functions-from early warning to rescue and rehabilitation-have critical contributions in risk reduction, saving lives, and

Table 10
Extent of challenges in the implementation of disaster risk reduction and management in terms of equipment and facilities in the municipality of San Jose, Occidental Mindoro

| **Equipment and Facilities** | | | |
|---|---|---|---|
| Insufficient rescue equipment for disaster response. | 2.62 | 0.793 | High |
| Insufficient number of rescue vehicles. | 2.57 | 0.791 | High |
| There is poor communication during disaster response that makes rescue operations and updating difficult. | 2.64 | 0.806 | High |
| The local government is not adapting advanced technology and software applications for disaster preparation. | 2.69 | 0.860 | High |
| There are no available and/or ready to use evacuation center/s. | 2.53 | 0.818 | High |
| Inadequate stockpiling of essential supplies, such as food, water, and medical resources, for emergency response. | 2.60 | 0.828 | High |
| Insufficient maintenance and repair of existing disaster response equipment and facilities, leading to decreased operational effectiveness. | 2.58 | 0.831 | High |
| Limited access to reliable communication networks and infrastructure during disaster situations, hindering effective coordination among response teams. | 2.60 | 0.820 | High |
| **Overall Weighted Mean** | **2.61** | **0.716** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

Table 11
Extent of challenges in the implementation of disaster risk reduction and management in terms of institutional coordination in the municipality of San Jose, Occidental Mindoro

| **Institutional Coordination** | | | |
|---|---|---|---|
| The other concerned offices are also occupied by their own functions that make it difficult for them to do DRRM functions. | 2.62 | 0.751 | High |
| Several volunteers are spotted during response and relief efforts as well as after emergencies and disasters. | 3.04 | 0.749 | High |
| The concerned offices do not respond quickly to communication letters. | 2.62 | 0.817 | High |
| There is no Incident Command System (ICS) for DRRM. | 2.42 | 0.846 | High |
| Each involved agency is not informed of their duties and responsibilities in DRRM and/or the mandates are not clear. | 2.50 | 0.778 | High |
| Limited inter-agency collaboration and cooperation in planning and implementing joint disaster response strategies. | 2.54 | 0.818 | High |
| Lack of clear protocols and guidelines for inter-agency coordination during disaster events. | 2.53 | 0.826 | High |
| Insufficient sharing and dissemination of critical information and data among relevant government agencies and stakeholders. | 2.48 | 0.872 | High |
| **Overall Weighted Mean** | **2.59** | **0.655** | **High** |
| **Grand Weighted Mean** | **2.62** | **0.638** | **High** |

*Scale: 1.00-1.49 Very Low; 1.50-2.49 Low; 2.50-3.49 High; 3.50-4.00 Very High*

ensuring the community resilience. However, this factor appears as a big challenge (mean=2.62, SD=0.701) in the implementation of DRRM in the municipality. Insufficient manpower, commitment, support, and training can hinder effective DRRM implementation (Azarmi, Pishgooie, Sharififar, Khankeh, & Ziya, 2022), thus, the council should identify issues and address these in order to cope up with the challenges in manpower.

Moreover, the stakeholders do not participate well in any DRRM related activities rendered the highest rating (mean=2.69) which shows that community participation impose the biggest factor since they are the first to respond when affected by disasters and their local knowledge, involvement, and cooperation are essential for effective planning, preparedness, and recovery. It was identified that both ecological concerns and past disaster experiences motivate the communities to take action, hence, community-driven efforts are effective in reducing disaster risks (Ramdhon & Demartoto, 2025), and this method must also be adopted by the municipality which will also empower them and later on led them to lead their communities.

Other challenges include insufficient permanent staff for DRRM services as well as inadequate support and resources for recruiting and retaining them, frequent personnel changes or detailing of personnel to other offices, the officials are not capacitated in all aspects of DRRM and limited training, and inadequate staffing levels and high turnover rate.

However, the personnel involved in DRRM are not technically knowledgeable exhibited the lowest mean (2.55). This shows that even though there is an inadequacy in human resource and trainings, the personnel execute to the best of their abilities enforcing satisfactory accomplishments in the implementation of DRRM in the municipality. Critical technical practice in DRRM must be advocated, technical interventions should evolve to address the ethical, historical, political, and structural complexities of community vulnerability emphasizing the importance of interdisciplinary collaboration and reflexivity in disaster risk management (Lallemant, et al., 2023) and technology in DRRM has become an essential requirement for informed decision making (Shaw, Izumi, & Shi, 2016). Thus, the municipality shall lean more and adopt science and technology innovation and research-based methods as well as collaborate with the academe in the assessment, data collection, analysis, planning, and the implementation of the proposed projects and activities.

Equipment and facilities are critically important in DRMM since without these, the personnel will not be capacitated in implementing DRRM activities and theses resources ensure that DRRM efforts are efficient, timely, and capable of minimizing loss and accelerating recovery. Yet, this aspect emerges to be one of the challenges (mean=2.61, SD=0.716) in the implementation DRRM in the municipality. Disaster management systems face significant challenges due to insufficient human, financial, and material resources which hampers effective disaster risk reduction and response efforts (Bang, Miles, & Gordon, 2019). Not only the availability of material resources but also its functionality and operationalization greatly affect this aspect which is why the council should have an inventory of equipment and facilities with corresponding conditions to evaluate the capacity of the LGU regarding this.

Furthermore, the local government is not adapting advanced technology and software applications for disaster preparation delivered the highest rating (mean=2.69) which reveals the need

Table 12
Relationship between the implementation and success of DRRM in San Jose, Occidental Mindoro

| Variables | Correlation Coefficient | p-value | Description |
|---|---|---|---|
| Implementation and Success | 0.632** | 0.00 | Moderate and highly significant |
| Success and Challenges | 0.163** | 0.00 | Low and highly significant |
| Implementation and Challenges | 0.150** | 0.00 | Low and highly significant |

***Correlation is significant at the 0.01 level (2 tailed)*
**Correlation is significant at the 0.05 level (2 tailed)*

for the LGU to embrace advanced technology to raise effectiveness. This include not just adopting new technology but about embracing new practices, procedures, and strategies that can improve the capacity of the local government to provide services that cater to the citizens' needs (David, et al., 2023). The need to mainstream Information and Communication Technology (ICT) is evident thus the council must take adaptation measures to uphold the objectives of DRRM and to function optimally.

Additionally, other notable challenges include insufficient rescue equipment for disaster response, poor communication during disaster response that makes rescue operations and updating difficult, no available and/or ready to use evacuation center/s, inadequate stockpiling of essential supplies, such as food, water, and medical resources, for emergency response, insufficient maintenance and repair of existing disaster response equipment and facilities, leading to decreased operational effectiveness, and limited access to reliable communication networks and infrastructure during disaster situations, hindering effective coordination among response teams.

Consequently, insufficient number of rescue vehicles manifested the lowest rating (mean=2.57) meaning that this factor is the least of the challenges in the municipality. Many local governments in the Panay Island, Philippines are only partially prepared when it comes to building competencies consisting of early warning, evacuation and relief, mobilization of DRRM structures and activation of systems and processes, search and rescue, and lifelines (Dariagan, Atando, & Asis, 2020) which are crucial in the effectivity and efficiency in disaster management. This appears to remain as a challenge since San Jose happens to experience geographical constraints such as island barangays, mountainous terrains, and isolated communities. Hence, the council should study these constraints and address the gaps.

Institutional coordination is a vital factor in DRRM as it ensures the participation various stakeholders who collectively respond to the disasters in prevention, preparation, response, and recovery. The coordination optimizes resource use, streamlines decision-making, enhances risk assessments, ensures coherent policies, empowers communities, and guarantees an organized and resilient response. Even so, this reveals that it is among the challenges in DRRM implementation (mean=2.5, SD=0.655). A notable challenge is balancing top-down and bottom-up approaches and the political will of the officials that hamper the smooth coordination among key players (Aldrich, 2019). Both approaches shall be utilized to perform effectively, but the execution must be analyzed to ensure inclusivity, address potential gaps, and adapt strategies to meet the diverse needs of all stakeholders.

Additionally, several volunteers are spotted during response and relief efforts as well as after emergencies and disasters generated the highest rating (mean=3.04) which means that the presence of volunteers which is vital during disaster response is low. At an operational level, volunteerism can become chaotic if not well managed, with volunteers and donations converging in large numbers which are influenced by the absence of legislation, and political and cultural processes (Roth & Prior, 2019). The council can establish incentives or reward system through legal policies in order to encourage more volunteers specially in times of disaster since empowered individuals are one of the best assets in the recovery phase.

Likewise, the other concerned offices are occupied by their own functions that make it difficult for them to do DRRM functions, as well as not responding quickly to communication letters, involved agencies are not informed of their duties and responsibilities in DRRM and/or the mandates are not clear, limited inter-agency collaboration and cooperation in planning and implementing joint disaster response strategies, lack of clear protocols and guidelines for inter-agency coordination during disaster events, and insufficient sharing and dissemination of critical information and data among relevant government agencies and stakeholders were among the remarkable challenges in this area.

Lastly, there is no Incident Command System (ICS) for DRRM rendered the lowest rating (mean=2.42) which means that the respondents acknowledge the presence of it and the least of the problems in institutional coordination and capacities. (Bradley-Smith, 2024) emphasizes that reforming the Incident Control System requires enhancing multi-agency coordination and integrating non-technical skills—like emotional intelligence and decision-making—recognizing that effective disaster management depends on people, relationships, and psychological support. Thus, the MDRRMC shall review the organizational structure, its effectiveness so far and study what to improve and integrate for better delivery of services among key agencies and offices.

### *D. Relationships Among Implementation, Challenges and Success*

A moderate positive relationship exists between the implementation and success of DRRM (Table 12). With the correlation coefficient of 0.632 and the p-value of 0.00, the null hypothesis of no significant correlation is rejected. There is sufficient statistical evidence to support that the extent of implementation tends to increase with the success of DRRM. Municipalities with more robust implementation strategies tend to have greater success in their disaster risk and reduction efforts. This could be due to a more comprehensive approach to disaster planning, better resource allocation, improved community engagement, and effective coordination among

relevant agencies. This relationship is not due to random chance, highlighting the importance of focused DRRM implementation for achieving success. Municipalities that invest in thorough planning, capacity building, and stakeholder collaboration are more likely to see positive outcomes in their disaster risk management.

The existence of moderate correlation of implementation and success is contrary to the findings of (Cubillas, Aviles and Cubillas, 2022) of low correlation between the two variables. This was attributed to the undertaking of other primary functions, limited time, effort, and resources of the personnel. Despite low correlation, the implementation of the programs tends to increase with the success of the programs.

Also, the correlation analysis indicates a low bur positive relationship between the success of DRRM and the challenges encountered during implementation with the correlation coefficient of 0.163 and p-value of 0.00, as a result, the null hypothesis is deemed rejected. This reveals that as success in DRRM increases, there is a modest but statistically significant increase in the challenges faced. As success in DRRM increases, challenges often grow due to the broader scope and complexity of managing larger and more diverse initiatives. This expansion produces additional stakeholders and higher expectations regarding accountability, which leads to pressure that function in favor of faster and more effective results being delivered. This could also expose systemic weaknesses in governance, resources, and infrastructure that once lay hidden; maintaining that success-from institutional fatigue, political resistance, or increased competition for resources-will prove a challenge. The inclusion and discovery of new risks and hazards in an ever-evolving DRRM context brings another layer of complexity which may become reason enough to hinder sustained progress.

This is similar to the study of (Owi, 2025) that as DRRM initiatives grow, coordinating diverse stakeholders becomes more complex, often leading to conflicting priorities, unclear responsibilities, and difficult decision-making. Municipalities that are more successful in their DRRM efforts may encounter issues such as increased demand for resources (Tompkins & Adger, 2004), complex logistics, or stakeholder coordination, but they also demonstrate the ability to manage and overcome these challenges through strong leadership and coordination. Thus, as the level of success increases, the challenges encountered also increases.

In addition, there is a low but positive relationship between the implementation of DRRM and the challenges encountered, therefore the null hypothesis is rejected. The correlation coefficient is 0.150 and p-value of 0.00, indicating that as DRRM implementation increases, the challenges faced by municipalities also tend to rise. As DRR programs are implemented, challenges multiply because deeper systemic issues in communities, institutions, and systems become more visible. Resistance from stakeholders, resource limitations, and institutional weaknesses emerge, especially when integrating DRRM into sectors like planning, education, and infrastructure. This could be attributed to poor training, limited data, and resources.

This is in line with the findings (Kanyasan, et al., 2018) and attributed that the challenges in implementation are because of unclear provisions in the national legislation, unclear mandates, poor monitoring system, insufficient human resources, and lack of public-private partnerships which are experienced as the DRR programs are implemented. With this, the implementation of the programs tends to increase with the challenges encountered.

## 5. Conclusions and Recommendations

This section summarizes the findings based on the results, presents the conclusions of the study and gives recommendations on the outcomes of this research.

### *A. Summary of Findings*

1. The extent of implementation of municipal disaster risk reduction and management resulted high. All the parameters including disaster preparation, disaster prevention and mitigation, disaster response, disaster rehabilitation and recovery, positively resulted in a high level of extent of implementation.
2. The extent of success of municipal disaster risk reduction and management resulted high. All the parameters including reduction in disaster impact, community awareness and participation, and resilience and quick recovery, positively resulted with high level of success.
3. The extent of challenges in implementing municipal disaster risk and reduction management resulted in a high level of challenges across all four areas, such as education and information, manpower, equipment and facilities, and institutional coordination.
4. The correlation analysis reveals a strong positive relationship between the implementation and success of DRRM.
5. The results indicate a positive relationship between the success of DRRM and the challenges encountered during implementation.
6. The result reveals a positive relationship between the implementation of DRRM and the challenges encountered.

### *B. Conclusions*

1. The extent of implementation of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of Disaster Prevention and Mitigation, Disaster Preparedness, Disaster Response, and Disaster Rehabilitation and Recovery rendered high which means that the municipality is capacitated in all thematic pillars of DRRM particularly in the prevention part that shows the readiness and proactiveness of the council.
2. The extent of success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of Reduction in Disaster Impact, Community Awareness and Participation, and Resilience and Quick Recovery resulted high which

shows that the municipality is on the verge of being resilient and the communities are empowered.

3. The extent of challenges encountered in the implementation of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro in terms of Education and Information, Manpower, Equipment and Facilities, and Institutional Coordination is high which signify that there are still a lot of challenges to address specially in the awareness campaigns to increase the level of education and participation of the stakeholders in all ages.
4. There is a strong positive significant relationship between implementation and success of Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro which reveals that as the implementation increases, success also increases, thus, the community gradually becomes a safe and resilient to natural hazards.
5. There is a low positive significant relationship between the success and challenges encountered by Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro which means that as the success increases, challenges also tend to increase but not significantly. This could be due to the strong leadership and technical capabilities of the key personnel who addresses the challenges immediately as they emerge.
6. There is a low positive significant relationship between implementation and challenges encountered by Municipal Disaster Risk Reduction and Management in San Jose, Occidental Mindoro which manifests that as implementation increases, challenges also increases but not significantly. This could be due to increase in initiatives and complexities of DRR but the council is attentive in addressing these challenges promptly to ensure effectivity and efficiency of programs and activities.

### *C. Recommendations*

Based on the findings and conclusions, the following recommendations are proposed for San Jose, Occidental Mindoro's disaster risk reduction and management (DRRM):

1. Annual updating of maps shall be done to inform the stakeholders of the current hazard situation in their community and the barangay officials who are not permanent and shifts periodically.
2. Improvement of early warning systems, information materials, and education campaign - which encompasses all ages and demographic groups - can increase the participation and enthusiasm of the community.
3. Psychological therapy and addressing mental health issues post disaster should be tackled by the council through creating a special task force composed of skilled professionals related thereto.
4. Vast quantity of relief goods and emergency kits must be procured and fair distribution must be executed to avoid conflict.
5. Post-recovery livelihood projects should be expanded and diversified to align with the skills, capabilities, and interests of the affected population, ensuring their sustainability and long-term impact.
6. Local knowledge must be actively solicited to engage both proactive and less-involved individuals, ensuring inclusive participation in recovery, planning, and development efforts.
7. Improved and stricter land use planning must be implemented to mitigate natural hazards and reduce risk and vulnerability.
8. The LGU must address the needs of the population by adopting modern solutions such as mobile-based disaster alerts and digital platforms for data banking that align with the demands of the contemporary era and ensure effectiveness.
9. The municipality shall increasingly embrace and adopt innovations in science and technology such as GIS mapping and satellite imaging, utilizing research-based methods and collaborate with academic institutions in the tackling DRRM.
10. The availability of material resources, along with their functionality and operational capacity, must be assessed to gauge the capacity of the LGU in this regard.
11. To address geographical constraints, helipads and airlift capabilities in island barangays or isolated communities must be established while rescue vehicles that can navigate difficult terrains should be employed.
12. In legislation and policy review, the integration of a reward system for public-private partnership, volunteers, and staff should be prioritized to encourage retention and ensure the continuous delivery of services and effective policy dissemination.

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