**LGU 1:BARANGAY TANOD PATROL MANAGEMENT SYSTEM: (PATROL SCHEDULING AND ASSIGNMENT, PATROL ROUTE MAPPING, INCIDENT REPORTING AND RESPONSE, PERFORMANCE TRACKING, RESOURCE**

**MANAGEMENT)**

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**Abstract**

The Barangay Tanod Patrol Management System was developed to enhance the efficiency, coordination, and responsiveness of community safety efforts at the barangay level. This capstone project replaces traditional manual processes—such as logbooks and informal communication—with a digital platform that centralizes key operations including patrol scheduling and assignment, route mapping, incident reporting, response management, performance tracking, and resource allocation.

Built using MongoDB and developed in Visual Studio with web-based technologies, the system offers an intuitive interface for administrators to manage patrol schedules and monitor performance, while barangay tanods can access their assignments and submit real-time incident reports. The system also tracks essential resources like radios and first-aid kits to ensure readiness during emergencies.

The development process followed a structured approach involving stakeholder consultations, system prototyping, and multiple phases of testing. Emphasis was placed on modularity to ensure that scheduling, mapping, and reporting features work seamlessly together.

The final output is a comprehensive tool that improves accountability, accelerates response times, and supports more organized community patrolling. It also sets the foundation for future improvements such as automated alerts and analytical dashboards, highlighting the potential of technology in strengthening local governance and public safety.

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# **Chapter 1**

# **Introduction**

## **1.1 Purpose**

This document outlines the rationale and framework for the development of the Barangay Tanod Patrol Management System, a digital solution designed to modernize the operations of Barangay Tanods in the Philippines. The system aims to address inefficiencies caused by manual patrol scheduling, incident reporting, and resource management by automating core processes and enabling data-driven governance to enhance community safety and operational transparency.

## **1.2 Scope**

The scope of this capstone project is centered on the design, development, and implementation of a Barangay Tanod Patrol Management System specifically for Local Government Unit (LGU). The system aims to replace the existing manual and outdated processes currently used in managing Barangay Tanod operations with a more efficient, automated, and data-driven platform. This scope encompasses all major operational areas involved in barangay patrol management and intends to modernize and streamline these through digital tools.

The system will include the following key modules and functions:

* Patrol Scheduling and Assignment  
  The system will enable barangay officials to automatically schedule patrol shifts for Tanods based on availability, previous workloads, and current needs. The goal is to eliminate schedule overlaps, reduce idle times, and ensure that every area of the barangay receives sufficient patrol coverage. This will promote fairness in workload distribution and improve operational efficiency.
* Patrol Route Mapping  
  A dynamic route mapping tool will allow barangay leaders to define, assign, and modify optimized patrol routes. The system will analyze coverage zones and propose routes that ensure maximum visibility in high-risk or priority areas. Route adjustments can be made in real-time to respond to emergencies or changes in community needs.
* Incident Reporting and Response  
  The system will offer real-time incident reporting features through mobile devices, allowing Tanods to submit incident reports instantly. These reports will include time stamps, location data, and multimedia attachments (e.g., photos, videos), making documentation more accurate and traceable. The barangay office can immediately respond to incidents, improving response times and coordination.
* Performance Tracking  
  The system will log and analyze data on Tanod activities, including attendance, patrol completion, incident resolution times, and response quality. This enables barangay officials to monitor performance trends, enforce accountability, identify underperforming personnel, and recognize exemplary service. Over time, this supports continuous improvement and informed decision-making.
* Resource Management  
  A dedicated resource management module will track and manage patrol-related assets such as vehicles, radios, uniforms, and other equipment. The system will maintain inventory records, monitor usage, and flag shortages or maintenance needs. This reduces the risk of resource misallocation and ensures that Tanods are adequately equipped for their duties.
* User Access Control and Audit Logs  
  The system will also define role-based access controls, ensuring that only authorized users can view or modify sensitive data. Additionally, audit logs will be maintained to track system usage, fostering transparency and accountability across all users.
* Scalability and Customization  
  Although initially deployed for a single barangay (LGU 1), the system will be designed with scalability in mind. Future expansions may include integration with municipal or regional-level systems, support for multi-barangay coordination, and customization based on LGU-specific policies.

**1.3 Objectives**

* Enhance Patrol Scheduling by automating task assignments and avoiding overlaps or gaps in coverage.
* Optimize Patrol Routes to ensure maximum visibility and strategic deployment of Tanods.
* Improve Incident Reporting and Response through real-time logging and communication tools.
* Monitor Performance using measurable indicators such as patrol completion and response times.
* Streamline Resource Management for better allocation and usage of equipment and patrol vehicles.

## **1.4 Stakeholders**

* Barangay Officials and Council Members - Oversee and manage overall implementation and impact.
* Barangay Tanods - Primary users who will interact with the system for patrols and reporting.
* IT Developers and Project Team - Responsible for system design, development, and maintenance.
* Community Members - Indirect beneficiaries through improved safety and faster incident responses.
* External Researchers and Auditors - May use the system's performance data for evaluation or replication in other barangays.

# **Chapter 2**

# **IT System Overview**

## **2.1 System Description**

The Barangay Tanod Patrol Management System (BTPMS) is a comprehensive, web-based solution designed to modernize and streamline community safety operations at the barangay level. Developed using a modular architecture, the system centralizes key functionalities into five core modules: Patrol Scheduling and Assignment, Patrol Route Mapping, Incident Reporting and Response, Performance Tracking, and Resource Management.

The system is built with React.js for dynamic and responsive front-end interfaces, ensuring seamless user experiences across desktops and mobile devices. The back-end is powered by Node.js, enabling efficient server-side operations, while MongoDB serves as the flexible, NoSQL database for storing patrol logs, incident reports, and resource inventories in JSON-like documents. For styling and layout, the system utilizes Tailwind CSS, a utility-first framework that ensures consistent and customizable designs.

Key features include:

* Real-time patrol scheduling with automated conflict detection.
* Interactive route mapping for optimized patrol coverage.
* Digital incident reporting with timestamped logs and multimedia attachments.
* Performance dashboards to track tanod activities and response times.
* Resource allocation tracking for equipment like radios and first-aid kits.

The system supports role-based access control (RBAC), ensuring secure interactions for barangay officials, tanods, and residents. Designed for scalability, the BTPMS can integrate with external APIs (e.g., emergency response systems) and adapt to multi-barangay deployments in the future.

## **2.2 System Functions and Features**

**2.3 Technical Environment**

The technical environment of the Barangay Tanod Patrol Management System (LGU1) encompasses the core hardware, software, and network components that enable the system's functionality, reliability, and performance. Designed for on-premise deployment with optional cloud integration, the system ensures high availability, secure access, and scalability.

|  |  |
| --- | --- |
| **Category** | **Specifications** |
| **Hardware** |  |
| Processor (CPU) | Intel Xeon / AMD EPYC multi-core processors |
| Memory (RAM) | Minimum 8GB RAM (16GB or more recommended for optimal performance) |
| Storage | SSD with RAID 10 configuration for speed and data redundancy |
| Backup Solution | Network-Attached Storage (NAS); optional cloud backup (e.g., AWS S3, Google Cloud |
|  |  |
| **Software** |  |
| Backend Language | Node.js |
| Operating System | Windows Server or Linux (Ubuntu, CentOS) |
| Database | MongoDB |
| Platform | Web-based application with modular components |
| External Integration |  |
| Browser Support | Chrome, Firefox, Safari |
| Version Control | GitHub |
|  |  |
| **Network** |  |
| Internet Requirement | Minimum 100 Mbps high-speed internet connection |
| Network Devices | Routers, switches, firewalls |
| Connectivity Protocols | Secure access via VPN; data encryption using TLS |

## **2.4 Users and Access Levels**

## **2.5 Regulatory and Compliance Requirements**

# **Chapter 3**

# **Audit and Control Framework**

## **3.1 Audit Methodology**

### **3.1.1 Risk-Based Auditing Methodology**

### **3.1.2 Automated and Manual Audit Techniques**

### **3.1.3 Frequency of Audits**

### **3.1.4 Documentation and Reporting Procedures**

## **3.2 Control Objectives and Measures**

## **3.3 Audit Checklist and Procedures**

## **3.4 Reporting and Documentation**