## \*\*CHAPTER THREE: METHODOLOGY\*\*

### \*\*3.1 Introduction\*\*

**This chapter outlines the methodology adopted for the development of a Web-Based Timber Trading Platform with Code-Based Authentication and an Illegal Logging Reports Dashboard. The methodology is divided into phases, including problem identification, system design, development, testing, and deployment. The approach integrates forestry-specific solutions with technical implementation using PHP and MySQL.**

### \*\*3.2 Study Area and Problem Identification\*\*

#### \*\*3.2.1 Study Area\*\*

The study focuses on the challenges faced in the timber trading industry, particularly in regions with high rates of illegal logging and unregulated timber trade. The platform is designed to address these issues by providing a centralized, transparent, and secure system for timber trading and illegal logging reporting.

#### \*\*3.2.2 Problem Identification\*\*

The following problems were identified in the forestry sector:

1. \*\*Illegal Logging\*\*: Lack of a centralized system to report and track illegal logging activities.
2. \*\*Unregulated Timber Trade\*\*: Absence of a transparent platform for buyers and sellers to trade timber legally.
3. \*\*Authentication Issues\*\*: Difficulty in verifying the legitimacy of timber traders and their products.
4. \*\*Data Management\*\*: Poor record-keeping and lack of real-time data on timber transactions and logging activities.

### \*\*3.3 System Design\*\*

#### \*\*3.3.1 Requirements Gathering\*\*

* \*\*Stakeholder Consultation\*\*: Engage forestry stakeholders, including timber traders, government agencies, and environmental organizations, to understand their needs.
* \*\*Functional Requirements\*\*:

- User registration and authentication (code-based).

- Timber trading module (buying and selling).

- Illegal logging reporting dashboard.

- Admin panel for managing users, reports, and transactions.

* \*\*Non-Functional Requirements\*\*:

- Secure and scalable platform.

- User-friendly interface.

- Real-time data updates.

#### \*\*3.3.2 System Architecture\*\*

**The system will follow a 3-tier architecture:**

1. \*\*Presentation Layer\*\*: User interface (HTML, CSS, JavaScript).
2. \*\*Application Layer\*\*: Business logic (PHP).
3. \*\*Data Layer\*\*: Database management (MySQL).

#### \*\*3.3.3 Database Design\*\*

* \*\*Entities\*\*:

- Users (traders, admins, reporters).

- Timber listings (species, quantity, price, location).

- Illegal logging reports (location, description, evidence).

- Transactions (buyer, seller, timber details).

* \*\*Relationships\*\*:

- One-to-many: User to Timber Listings.

- One-to-many: User to Illegal Logging Reports.

- Many-to-many: Transactions between buyers and sellers.

#### \*\*3.3.4 Wireframes and Prototypes\*\*

* Use tools like \*\*Figma\*\* or \*\*Adobe XD\*\* to design wireframes for:

- Homepage.

- User registration and login.

- Timber trading interface.

- Illegal logging report submission form.

- Admin dashboard.

### \*\*3.4 Development Process\*\*

#### \*\*3.4.1 Technology Stack\*\*

* \*\*Frontend\*\*: HTML, CSS, JavaScript, Bootstrap.
* \*\*Backend\*\*: PHP.
* \*\*Database\*\*: MySQL.
* \*\*Authentication\*\*: Code-based verification (OTP or unique codes).
* \*\*Hosting\*\*: Local server (XAMPP/WAMP) for testing; cloud hosting for deployment.

#### \*\*3.4.2 Code-Based Authentication\*\*

* \*\*Implementation\*\*:

- Generate unique codes for user registration and login.

- Use PHP to send codes via email or SMS.

- Store codes securely in the database with expiration timers.

* \*\*Purpose\*\*: Ensure only legitimate users can access the platform.

#### \*\*3.4.3 Timber Trading Module\*\*

* \*\*Features\*\*:

- Sellers can list timber with details (species, quantity, price, location).

- Buyers can search and filter listings.

- Secure transaction process with confirmation codes.

* \*\*Workflow\*\*:

1. Seller lists timber.

2. Buyer selects and requests purchase.

3. System generates a transaction code for confirmation.

#### \*\*3.4.4 Illegal Logging Reports Dashboard\*\*

* \*\*Features\*\*:

- Users can submit reports with location, description, and evidence (photos).

- Admin can view, verify, and take action on reports.

- Real-time updates on reported incidents.

* \*\*Workflow\*\*:

1. User submits a report.

2. Admin reviews and verifies the report.

3. Report status is updated (e.g., "Under Investigation," "Resolved").

#### \*\*3.4.5 Admin Panel\*\*

* \*\*Features\*\*:

- Manage users (approve, suspend, delete).

- Monitor timber transactions.

- Review and act on illegal logging reports.

- Generate reports and analytics.

### \*\*3.5 Testing and Validation\*\*

#### \*\*3.5.1 Testing Strategy\*\*

* \*\*Unit Testing\*\*: Test individual components (e.g., authentication, report submission).
* \*\*Integration Testing\*\*: Ensure modules work together seamlessly.
* \*\*User Acceptance Testing (UAT)\*\*: Engage stakeholders to test the platform.

#### \*\*3.5.2 Test Cases\*\*

* \*\*Authentication\*\*:

- Verify code generation and expiration.

- Test login with valid and invalid codes.

* \*\*Timber Trading\*\*:

- Test listing creation, search, and transaction processes.

* \*\*Illegal Logging Reports\*\*:

- Test report submission and admin review workflows.

#### \*\*3.5.3 Validation\*\*

* Compare platform outputs with manual calculations or expected results.
* Ensure data integrity and security.

### \*\*3.6 Deployment\*\*

#### \*\*3.6.1 Hosting\*\*

* Deploy the platform on a cloud server (e.g., AWS, Heroku) for accessibility.
* Use a domain name for easy access.

#### \*\*3.6.2 User Training\*\*

* Provide training sessions for stakeholders (traders, admins, reporters).
* Create user manuals and video tutorials.

#### \*\*3.6.3 Maintenance\*\*

* Regularly update the platform to fix bugs and add new features.
* Monitor server performance and security.

### \*\*3.7 Expected Outcomes\*\*

1. \*\*Transparent Timber Trading\*\*: A secure platform for legal timber trade.
2. \*\*Illegal Logging Reduction\*\*: Real-time reporting and tracking of illegal activities.
3. \*\*Improved Data Management\*\*: Centralized database for timber transactions and reports.
4. \*\*User Trust\*\*: Code-based authentication ensures only legitimate users access the platform.

### \*\*3.8 Ethical Considerations\*\*

* Ensure user data privacy and security.
* Avoid bias in illegal logging report verification.
* Promote sustainable forestry practices through the platform.