

## CHAPTER 3 – RESEARCH METHODS

Our study requires material and equipment selection. This involves using Ethereum blockchain network, smart contract development environments, and cloud storage systems. This comprehensive method uses quantitative and qualitative methods. Our qualitative legal evaluations of PDP Law privacy rules complement our quantitative measurements of transaction processing speeds and data throughput. The last phase comprises thorough evaluation and validation to ensure the solution's efficacy, compliance with PDP Law, scalability, and usefulness in real-world agricultural data circumstances.

### 3.1 Materials and Equipment

In conducting research on blockchain-based solutions, it is essential to focus on specific technologies and platforms. HARA owns the HARA Ledger, which is a private blockchain network that runs a permissioned blockchain network on the Ethereum Virtual Machine (EVM). This network allows for the implementation of smart contracts as effective solutions. HARA possesses a dataset covering personal and land information of farmers engaged in paddy, corn, tobacco, and palm oil planting, which requires evaluation in Indonesia's newly data protection legislation, *Undang-Undang Republik Indonesia Nomor 27 Tahun 2022 Tentang Perlindungan Data Pribadi* (Presiden Republik Indonesia, 2022). This research will specifically concentrate on the analysis conducted within the PDP LAW framework.

### 3.2 Research Methodology

To achieve the objectives of this thesis, a qualitative research methodology was adopted to explore the intersection of blockchain technology, PDP law, and HARA data acquisition product. The exploratory case study approach provides an in-depth understanding of how blockchain-based data management aligns with PDP Law and where compliance gaps exist.

To achieve the objectives of this thesis, a structured approach comprising four key steps, as illustrated in Figure 3.10 will be undertaken.

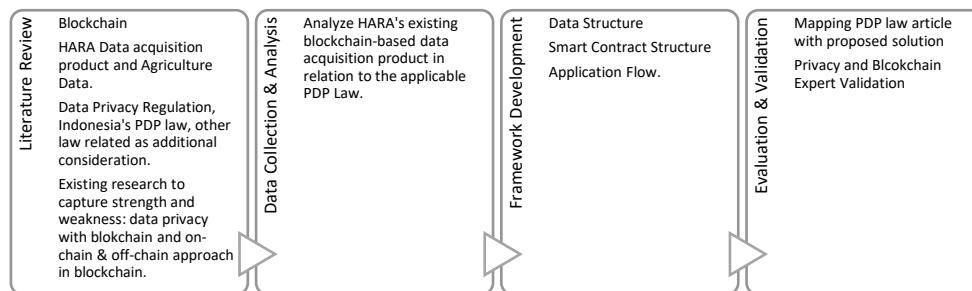


Figure 3.10. Research Flow.

### 3.2.1 Literature Review

The research begins with a comprehensive literature review covering four key areas to establish a theoretical foundation and guide the analysis and framework development:

- **Blockchain:** This section explores the fundamental principles of blockchain technology in general and specifically for Ethereum, as it relevant to HARA ecosystem. The review highlights blockchain's role in data management, emphasizing its benefits (e.g., immutability, security, and trust) and limitations (e.g., scalability, compliance challenges, and privacy concerns).
- **HARA data acquisition and agriculture data:** This part analyzes HARA's data acquisition product, detailing how the data collects, processes, and utilizes agricultural data. The review examines the role of blockchain in enhancing data integrity within the agricultural sector.
- **Data privacy regulation:** This section reviews key data protection frameworks, with a focus on Indonesia's PDP Law. It compares these regulations with international privacy standards such as GDPR to identify common principles and unique compliance requirements.
- **Existing research on data privacy with blockchain and on-chain & off-chain approaches:** This part explores previous studies that address the intersection of blockchain technology and data privacy. It evaluates various privacy-preserving techniques, such as encryption, pseudonymization, and hybrid data storage. It also

examines case studies that demonstrate best practices and innovative solutions for ensuring compliance with privacy regulations while leveraging blockchain's capabilities.

### **3.2.2 Data Collection and Analysis**

The data collection process is designed to support the literature review and address the research objectives. The study gathers both qualitative and technical data through document analysis and interviews. The document analysis focuses on reviewing existing technical documentation related to HARA's data acquisition product, including system architecture and data structure. Additionally, legal documents such as Indonesia's PDP Law, POJK regulations, and UU No. 8 Tahun 1997 are examined to ensure a comprehensive understanding of compliance requirements and regulatory constraints.

In addition to document analysis, semi-structured interviews are conducted with key stakeholders within HARA, including the data team lead, blockchain developers, and product owners. These interviews provide firsthand insights into HARA's current data management practices, particularly regarding how personal data is collected, processed, stored, and recorded in blockchain.

Following the data collection phase, a gap analysis is conducted to systematically evaluate HARA's current data management practices against the compliance requirements of the PDP Law. The gap analysis aimed to identify discrepancies between HARA's current data practices, and the regulatory standards outlined in the PDP Law. The findings from this analysis provide the foundation for developing the initial design proposed in this study.

### **3.2.3 Framework Development**

Based on the findings from the literature review, data collection, and gap analysis, a framework is developed to enhance HARA's data acquisition product while ensuring compliance with PDP Law, particularly Article 27, Article 43, and Article 44. The

framework is designed to establish mechanisms that comply with these legal provisions while maintaining the benefits of blockchain technology.

The development process includes designing the data structure, smart contract architecture, and application flow to ensure compliance with PDP Law. This involves implementing privacy-preserving techniques, data retention policies, and permanent deletion methods that address regulatory requirements while maintaining the efficiency of on-chain and off-chain data storage.

#### **3.2.4 Evaluation & Validation**

The evaluation will systematically identify the relevant PDP Law articles that impact data collection, processing, storage, and deletion, with a primary focus on Article 27, Article 43, and Article 44. The proposed data structure and management framework will be validated through in-depth discussions with industry experts in blockchain technology and data privacy, ensuring its effectiveness, feasibility, and real-world applicability. Expert feedback will be incorporated to refine and enhance the framework, ensuring full compliance with regulatory requirements while seamlessly integrating into HARA's data management ecosystem.