# Thesis Report Structure

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# Top-down Structure

1. Title Page

* *The Design and Optimization of a Scalable National Product Information Management System for the NHS*
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* 3rd May 2024.

2. Abstract

* Concise summary of the thesis objectives, methods, findings, and conclusions.

3. Table of Content

* List of chapters, sections, and subsections with corresponding page numbers.

4. List of Figures and Tables:

* List of all figures and tables used in the thesis, along with page numbers.

5. Acknowledgments:

* Gratitude towards individuals, institutions, or organizations that contributed to my research or supported during the research process.

6. Chapter 1: Introduction

### Introduction to study

* + Background of NHS procurement challenges
  + Overview of the existing product information management system across the NHS
  + Identification of gaps in efficient and scalable solutions

### Motivation for study

* + Importance of efficient procurement in healthcare
  + Explanation of how a scalable PIM can address current challenges
* Background of the research problem.
  + Overview of historical context of NHS procurement practices
  + Overview of relevant literature and research on healthcare procurement and information management
* Significance of the research.
  + Potential impact on NHS operations and patient safety & care
  + Broader implications for healthcare procurement systems globally
* Aims and Objectives of research.
  + **Aims**:
    - To design a scalable national product information management system for the NHS.
    - To optimize procurement processes and enhance resource utilization within the NHS.
    - To improve transparency, efficiency, and cost-effectiveness in healthcare supply chain management.

This thesis aims to address the challenge within the NHS procurement system by designing and optimizing a scalable national product information management system. The current lack of a centralized and efficient system leads to inefficiencies and inaccuracies in product procurement and product information management. By implementing a scalable system tailored to the NHS's needs, this research seeks to streamline procurement processes, improve data accuracy, and enhance decision-making, ultimately contributing to cost savings and better healthcare delivery.

* + **Objectives**:
    - Conduct a comprehensive needs assessment to identify key requirements and challenges within NHS procurement.
    - Design and develop a scalable product information management system tailored to the specific needs of the NHS.
    - Implement optimization strategies to streamline procurement processes and enhance system performance.
    - Evaluate the effectiveness and impact of the developed system on NHS procurement operations.

7. Chapter 2: Literature Review

* Introduction to literature review
  + Overview of importance of literature review in informing the research
  + Explanation of scope and objectives of the literature review chapter
* Review of relevant literature and existing research on the topic.
  + Healthcare Procurement Practices
  + Challenges in NHS Procurement
  + Product Information Management Systems
  + Scalability in Database Systems
  + Optimization strategies for database systems
  + Case studies and best practices
  + Summary of key findings and gaps in the literature.

8. Chapter 3: Needs Assessment/Business Rules

* Introduction to Needs Assessment
  + - Overview of purpose and scope of needs assessment
    - Explanation of importance of needs assessment for the development of the NHS national PIM system.
* Identification of Stakeholders
  + - Description of stakeholders involved in NHS procurement processes.
    - Identification of key stakeholders whose needs and requirements must be considered in the development of the PIM system.
* Stakeholder needs and requirement analysis
  + - Analysis of needs of each stakeholder group
    - Discussion of how stakeholder needs will inform the design and functionality of the system.
* Assessment of the current state or problem within the NHS procurement system.
  + - Evaluation of existing processes, technologies, and systems within NHS
    - Evaluation of the compatibility and interoperability of current systems with the proposed national PIM system
    - Identification of inefficiencies, gaps, and opportunities for improvement
* Legal and Regulatory Requirements
  + - Overview of legal and regulatory requirements relevant to PIM in healthcare
    - Analysis of compliance obligations, standards, and regulations governing data privacy, security, and interoperability.
    - Influence of legal and regulatory considerations on the design and implementation of the NHS PIM system.
* Summary of NA findings

9. Chapter 4: Design and Modelling

* Introduction to system design
  + Overview of purpose and scope of system design phase
  + Explanation of importance of a well-designed system in meeting stakeholders’ needs and requirements.
* Database Architecture
  + Description of proposed database architecture for the NHS national PIM system
  + Explanation of the database structure, including tables, fields, and relationships
  + Discussion of choice of relational Database technology and suitability for managing product information in healthcare
* Data Modelling
  + Overview of data modelling process for the PIM system
  + Entity-Relationship model
  + Identification and definition of key entities, attributes, and relationships
* Scalability
  + analysis of scalability requirements
  + discussion of scalability challenges and solutions in database design
  + description of strategies for ensuring scalability of the database architecture
* User Interface
  + overview of user interface design for the NHS national PIM system
  + description of the UI components, layout, and navigation.
  + discussion on usability principles and best practices in interface design to enhance user experience.
* Integration with GS1 certified data pools:
  + Explanation of how the PIM system will integrate with GS1 certified datapools.
  + description of data exchange protocols, standards and interfaces used for interoperability.
  + Description of the benefits of integrating GS1 standards for product identification and synchronization

One of the purposes of deploying GS1 data standards is to improve data accuracy and consistency across multiple systems. The use of GS1 standards will also act as an enabler for Automatic Identification and Data Capture (AIDC) technology, which is used to correctly identify a product at the point of use.

* Summary of System Design
  + summary of key design decisions and considerations
  + identification of design principles and strategies aimed at meeting stakeholder needs and achieving system objectives
  + transitioning to implementation phase, highlighting how the system design will guide the development of the system

10. Chapter 5: Optimization Strategies

* Introduction to Optimization Strategies
  + Overview of the importance of optimizationnin DB systems
  + Explanation of objectives of optimization strategies in the context of the PIM system
* Discussion of optimization techniques employed to enhance system performance and scalability. (query optimization, Indexing, Minimizing redundant data retrieval, etc.)
* Details of indexing, caching, partitioning, or other strategies implemented.

11. Chapter 6: Implementation

* Introduction to Implementation
  + Overview of implementation phase and significance in bringing proposed PIM system to life
  + Explanation of the objectives and scope of the implementation process
* System Development
  + Description of the development lifecycle followed for implementing the PIM system
* Database Implementation
  + steps involved in implementing database infrastructure
  + description of the process i.e. database creation, configuration, and optimization
  + Discussion of challenges encountered during implementation
* Integration with External Systems
  + Overview of the integration process for connecting PIM system with external systems and data sources
  + Description of standards and protocols used to facilitate interoperability
  + Discussion of integration requirements and considerations for data exchange with GS1 certified datapools and other external systems
* User Interface development
  + Descrption of the UI development process for the PIM system
  + Overview of the design principles, UX considerations and usability testing conducted during interface development
  + Discussion on how iterative design process informed the development of the user interface
* Testing and QA
  + explanation of the testing methodologies to validate functionality and performance of PIM system
  + description of testing phases
  + discussion of results, bug fixes, and QA measures implemented to ensure efficiency and reliability of system
* Summary of Implementation
  + key milestones and successes
  + Challenges encountered and solutions adopted during implementation.
  + recommendations for future system implementations

12. Chapter 7: Evaluation and Results

* Introduction to Evaluation
  + overview of the evaluation phase and importance in assessing the effectiveness and performance of the developed PIM system
  + Explanation of the objectives and scope of the evaluation process
* Evaluation Metrics and Criteria
  + description of metrics and criteria used to evaluate the PIM system
  + KPI and criteria for assessing system effectiveness, usability and impact
* Evaluation methodology
  + Overview of evaluation methods i.e. surveys or interviews employed to collect feedback from stakeholders
* Evaluation of System Scalability
  + analysis of the scalability of the PIM system to handle increasing volumes of data and user traffic
  + description of tests for assessing system performance
  + discussion of scalability challenges and recommendations for enhancing system scalability
* Presentation of Results
  + presentation of data collected during evaluation process
  + SWOT analysis of the PIM system
* Comparisoon with objectives and requirements
  + comparison of evaluation results with objectives and requirements defined for the PIM system
  + Assessment of the extent of the system meeting stakeholder needs, fulfill project goals and addresses identified challenges
* Summary of findings
  + Summary of key findings, insights and conclusions from evaluation phase
  + Summary of recommendations for enhancing system performance, usability and scalability

13. Chapter 8: Discussion and Conclusion

* Interpretation of the findings in relation to the research objectives.
* Discussion of implications, limitations, and future directions.
* Summary of key findings and contributions of the thesis.
* Recommendations for practice, policy, or further research.

14. References:

* List of all sources cited in the thesis (Harvard)

15. Appendices:

* Supplementary materials such as raw data, survey, or technical documentation.