

CHAPTER 3 – RESEARCH METHODS

3.1. Research Framework

This research proposes a practical framework tailored for engineering trade companies to overcome challenges related to data governance, logistics process improvement, and data visualization. The goal is to enhance operational efficiency by reducing logistics costs and improving delivery timelines. These improvements are expected to directly boost customer satisfaction by enabling the company to offer competitive pricing and faster delivery. Ultimately, the approach supports sustained profitability and strengthens customer loyalty in an increasingly competitive market.

The research methodology, illustrated in Figure 3.1:



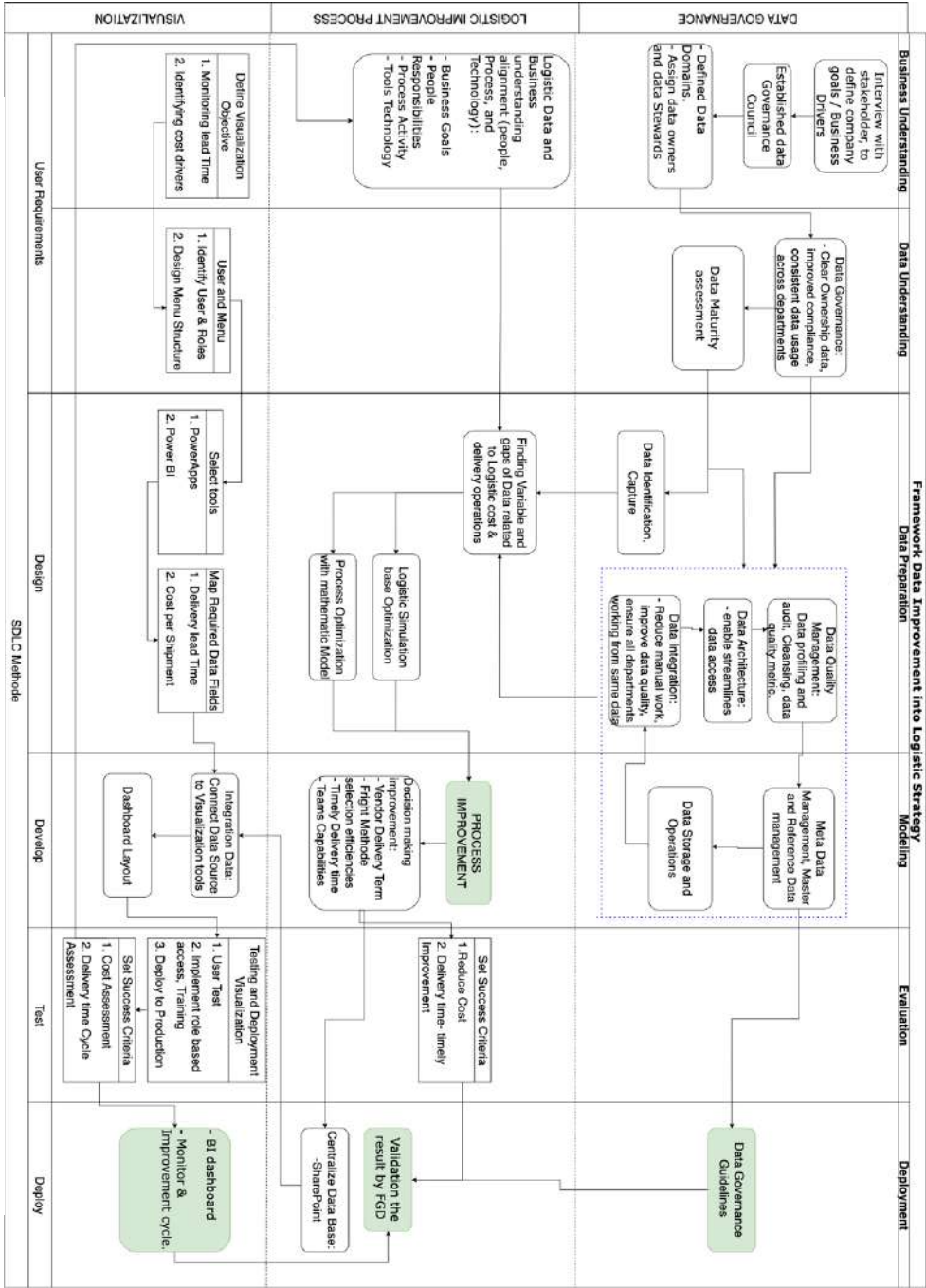


Figure 3. 1. Framework Data Improvement into Logistic Strategy

Figure 3.1, describe integrates the CRISP-DM framework with data governance by DAMA-DMBOK, logistics process optimization, and visualization tools. The framework employs a structured methodology based on three integrated pillars: Data Governance, Logistics Improvement Process, and Visualization.

The first pillar of his framework adopts an integrated framework by combining CRISP-DM (Cross-Industry Standard Process for Data Mining) as the primary analytical methodology with DAMA-DMBOK (Data Management Body of Knowledge) as the supporting data governance structure to ensure effective implementation in logistics operations. CRISP-DM provides a structured, iterative process across six phases: Business Understanding, Data Understanding, Data Preparation, Modelling, Evaluation, and Deployment, offering a robust foundation for analytics on logistic operation. However, to ensure that the data feeding each CRISP-DM phase is accurate, consistent, and fit for decision-making, DAMA-DMBOK is incorporated to address critical data management domains such as Data Governance, Data Quality, Master Data Management, and Data Integration. This integration ensures alignment between business objectives and data strategy, enhances data quality during preparation, improves model accuracy, and supports transparency in evaluation and deployment. Together, these two frameworks form a comprehensive approach that enables reliable, governed, and actionable data analysis. Positioning the organization to achieve its strategic goals of cost optimization, delivery time reduction, and quality enhancement in logistics operations.

The second pillar is the logistics improvement process focuses on aligning business understanding with data governance initiative. It begins by identifying logistics goals, key stakeholders, responsibilities, and existing tools and processes. Once this alignment is established, the next step is to identify variables and data gaps related to logistics costs and delivery time. These insights feed into simulation-based optimization and/or mathematical models. Its practicality in managing constraints across time, cost, and quality. Improvement efforts target core decision making areas such as vendor delivery terms, freight method selection, delivery timeliness, and team capabilities. These initiatives are grounded in data governance pillar, which undergoes identification,

integration, and architecture development to ensure consistency and usability. Improved data quality supports the reduction of manual work, streamlines processes, and enhances decision accuracy. Ultimately, the logistics process enhancement is not a standalone initiative but a structured, data-enabled strategy to reduce delivery time and logistics costs while maintaining product quality. After modelling, the proposed logistics improvements which is optimized delivery schedules and cost reduction strategies are validated through Focused Group Discussions (FGDs) with key stakeholders from logistics, operations, procurement, IT, finance and Managing director to assess practical feasibility, gather operational feedback, identify implementation barriers, and ensure alignment with team capabilities and real-world constraints, thereby enhancing the accuracy, acceptance, and sustainability of the outcomes.

The three pillars are the visualization, ensures that improvements in logistics are translated into actionable insights through business intelligence tools. The process begins by defining visualization objectives, primarily to monitor lead times and identify logistics cost drivers. Key users and roles are mapped, and dashboards are structured based on their operational needs. Microsoft Power BI and Power Apps are selected for their flexibility and compatibility with existing systems. Critical logistics metrics, such as delivery time and shipment costs, are mapped and integrated into the dashboard. This real-time data feed supports decision-makers with accurate, timely, and interactive insights. The dashboard layout is then designed and tested with users, ensuring ease of use and clarity. Role-based access and training are implemented before full deployment. The effectiveness of the visualization tool is evaluated using cost assessments and delivery cycle time analysis. Final deployment includes continuous monitoring and regular reporting, enabling the organization to make informed decisions, respond quickly to issues, and identify areas for further improvement. Visualization thus becomes a strategic enabler, converting raw data into intelligence that drives operational performance.

3.2. Data Governance

To ensure that logistics optimization is built upon reliable, consistent, and high-quality data, a structured data governance workflow must be established. Data governance serves as the foundation for managing data assets across the organization, enabling accurate analysis, minimizing operational risks, and supporting strategic decision-making. This sub-chapter outlines the key components and sequential steps necessary to implement an effective data governance framework tailored to the operational needs of Company XYZ.

The figure 3.2 illustrates the structure workflow adopted to govern data effectively throughout the logistic improvement process:

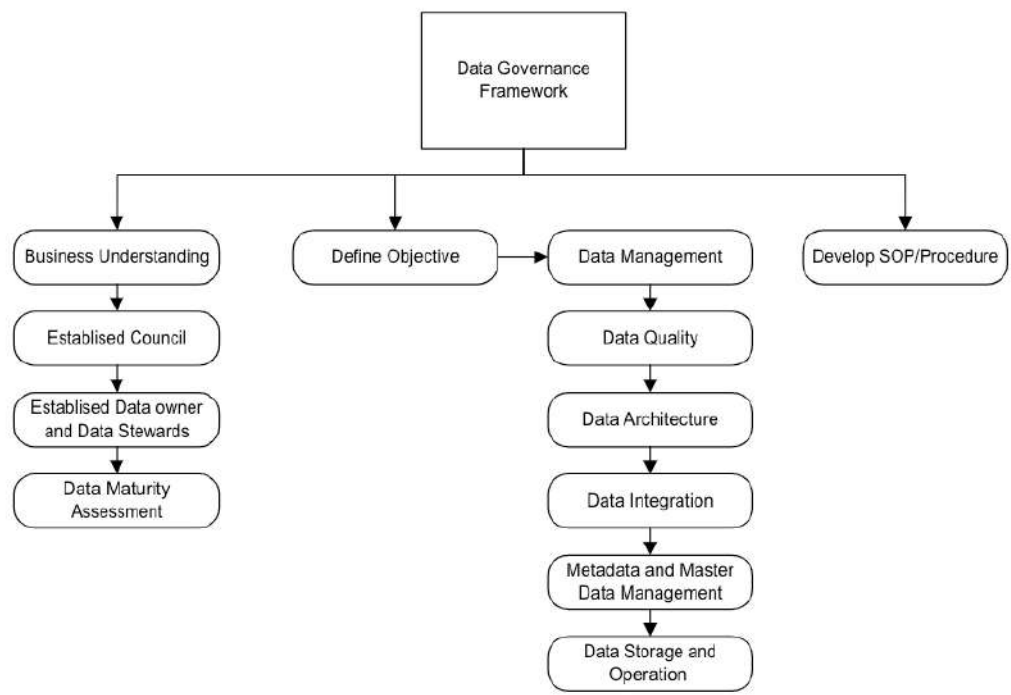


Figure 3. 2. Implanting a Data governance workflow at PT. XYZ Indonesia

The figure 3.2 illustrates a data governance workflow tailored for logistics operations at PT. XYZ Indonesia. It begins with understanding business objectives and identifying data needs, ensuring alignment with strategic goals. This is followed by assessing the

current state of data maturity to identify process gaps and quality issues. A governance structure is then established, including roles such as data owners and stewards, to enforce accountability. Subsequent steps focus on improving data quality through profiling, cleansing, and reconciliation. Once quality is ensured, data architecture and integration are designed to streamline access and ensure consistency across departments. The workflow also emphasizes the importance of master data and metadata management to standardize definitions and ensure uniform usage. Finally, governance guidelines and SOPs are developed to institutionalize best practices. This structured flow ensures that data used in analytics and decision-making is reliable, accessible, and aligned with business needs—laying the groundwork for effective logistics optimization and visualization.

3.2.1. Business Understanding

This section outlines the foundational understanding of the business context, which is essential for developing an effective data-driven logistics framework. The initial outcome of this phase is to strengthen the logistics workflow through the implementation of a data governance and organizational readiness in utilizing data as a strategic asset. Such improvements are intended to enhance data quality, which is a necessary for further analysis and system integration. The overall objective aligns with key business goals, including cost reduction, delivery time improvement, improved decision-making accuracy, and the implementation of dynamic pricing to support market competitiveness.

To develop this understanding, an analysis was conducted on the current business processes and system architecture within Company XYZ. This assessment includes mapping the end-to-end logistics process, identifying operational bottlenecks, and reviewing how data is currently collected, processed, and used.

Figure 3.3. show the existing work flow business process, including current architecture diagram.

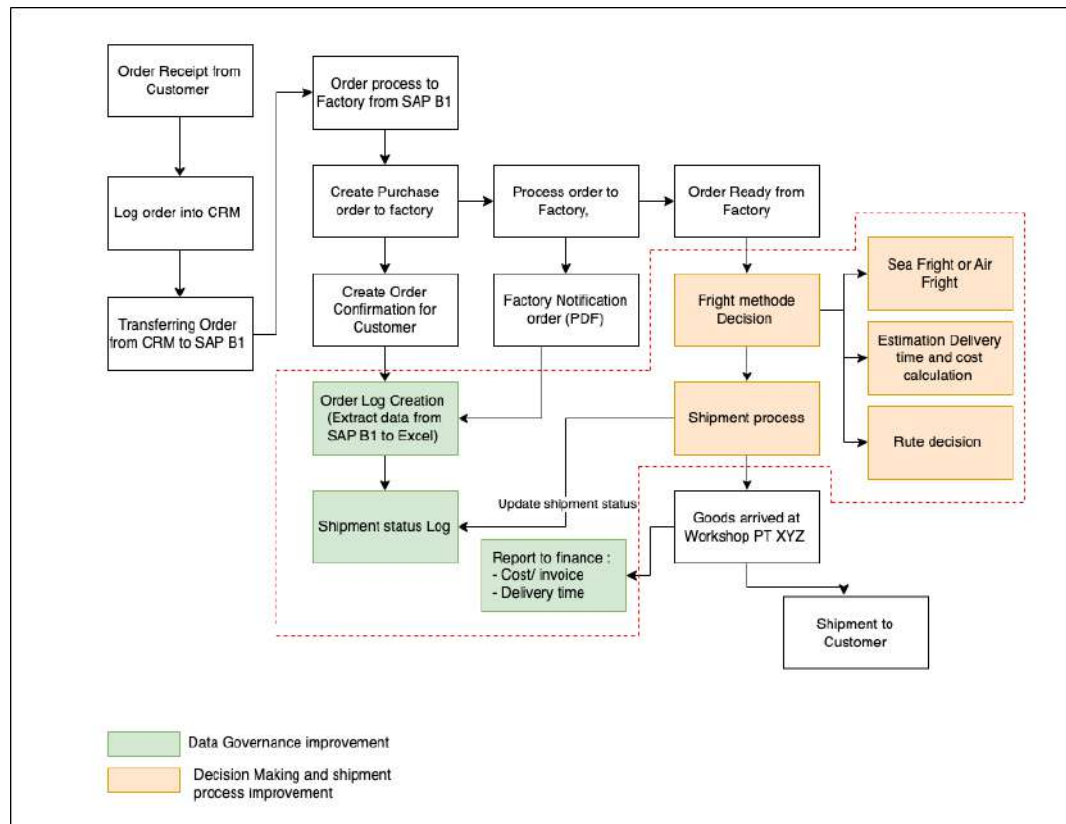


Figure 3. 3. Existing work flow of Company XYZ logistic

Figure 3.3 illustrates the existing logistics workflow. The process begins when an order is received from a customer. The order is first logged into the Customer Relationship Management (CRM) system, which is used primarily for manage customer data management related to quotation, order information, address, and sales activity such as visit, complain, and services report. After this, the order is transferred into the SAP Business One (SAP B1) system for further processing. Within SAP B1, a purchase order is issued to the factory and an order confirmation is generated for the customer. While data is available within SAP B1, system limitations require that reports be downloaded as Microsoft Excel files. These files are then shared via cloud storage to update the shipment status manually.

The decision-making process related to shipment methods, such as selecting between sea freight and air freight, is currently based on the tacit knowledge of logistics

personnel. This introduces variability in cost and delivery outcomes due to the absence of standardized data and tools support systems.

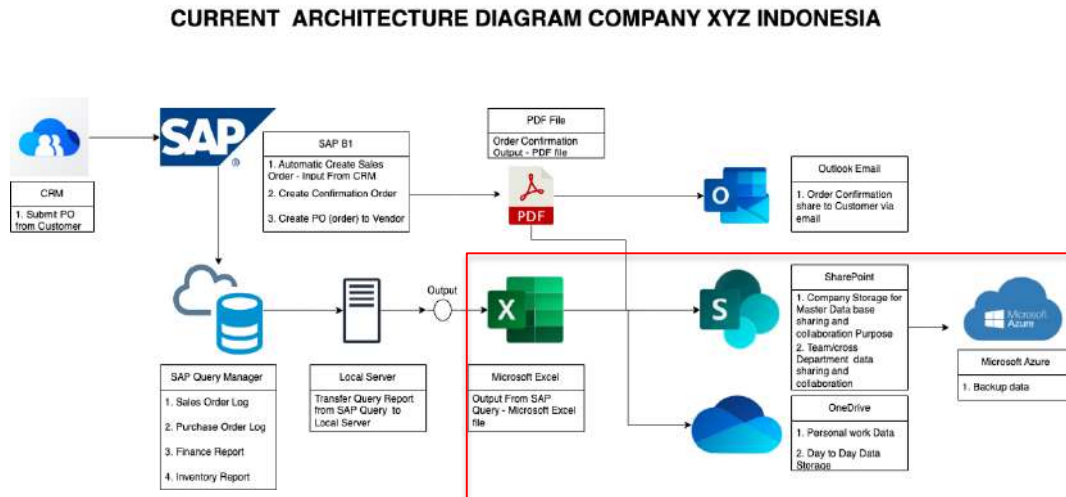


Figure 3. 4. Architecture diagram and tools used on exiting condition

The diagram figure 3.4 illustrates the current system architecture of Company XYZ Indonesia, detailing the end-to-end workflow from customer order submission to data storage and reporting. The process begins with the account owner/sales submitting a Purchase Order (PO) from customer via the CRM system, which is automatically forwarded to SAP B1. SAP B1 then creates a sales order, generates an order confirmation, and issues a purchase order to the vendor. The order confirmation is output as a PDF file, which is shared with the customer via Outlook email and also retained internally. Meanwhile, SAP B1 connects to SAP Query Manager to generate various reports such as sales logs, purchase logs, finance, and inventory data. These reports are transferred to a local server, exported as Excel files. The Excel outputs are uploaded to SharePoint for team and department-wide collaboration or to OneDrive for personal and daily operational use. Lastly, all SharePoint data is backed up timely to Microsoft Azure to ensure data security and continuity. This integrated setup supports efficient order processing, structured reporting, collaborative data access, and reliable backup.

The red box in the current architecture diagram of Company XYZ Indonesia highlights a critical gap aligned with Research Question 1 of this thesis, which concerns the

absence of proper data governance in the reporting and data-sharing processes. Although the existing setup allows for basic data distribution through SharePoint, and OneDrive, these tools function primarily as storage and file-sharing platforms rather than governed data environments. The outputs from SAP queries such as sales logs, finance reports, and inventory data are exported as a Microsoft Excel files and interpreted by individual users without standardized structures, validation rules, or audit trails. This results in high dependency on human interpretation, increasing the risk of inconsistency, error, and inefficiency in reporting. Furthermore, the absence of a governed data model means that there is no clear ownership, stewardship, or version control over the data, making it difficult to ensure data quality, traceability, and alignment across departments.

To address the critical gaps identified in the current system. Particularly the lack of data governance, manual data interpretation, and the absence of analytics capabilities. It is essential to establish a structured data governance framework tailored to logistics data. The following subchapters (3.2.2 to 3.2.7) will describe the foundational components required to build this framework, beginning with the establishment of a formal data governance structure and an evaluation of the current data maturity level. Subsequent sections will cover core domains from DAMA-DMBOX: data quality, data architecture and integration, reference and master data management, and data storage and operations. These components collectively support the creation of reliable, standardized, and accessible data that can be used to drive consistent reporting and monitoring of logistic indicators across departments.

In support this transformation, Subchapter 3.4 – Visualization Strategy focuses on the development of a Business Intelligence (BI) dashboard that answers Research Question 3 and supports real-time monitoring of logistics performance which specifically delivery lead time and logistics costs. Additionally, it presents the Proposed Architecture Diagram, which illustrates how the governed data flows from source systems into the visualization layer. To ensure clarity and sustainability, this section also applies the Software Development Life Cycle (SDLC) and includes supporting models such as the Use Case Diagram and Activity Diagram to capture user interaction

and system flow. While visualization is developed through the logistics improvement track, it fully depends on the data governance foundation to ensure that insights are reliable, actionable, and aligned with operational goals.

3.2.2. Establish a Governance Structure

A robust governance structure ensures the integrity, accountability, and proper management of data throughout the organization. Company XYZ established a Data Governance Council to lead the definition and enforcement of procedures. This council is cross-functional, consisting of members from logistics, IT, finance, and operations to ensure diverse representation. The council plays a central role in defining roles and responsibilities for data ownership and stewardship, ensuring that each data asset has a clear custodian.

By adopting a RACI matrix (Responsible, Accountable, Consulted, Informed), Company XYZ maps out who is responsible for specific aspects of data management. This formal structure encourages interdepartmental coordination and ensures data is handled consistently across business units. Additionally, establishing this governance structure fosters a culture that treats data as a valuable business asset.

Data governance is essential for establishing responsibilities, and procedures that ensure data accurate, consistent, and used properly. The absence of standardized data governance at company XYZ has contributed to a lack of ownership and accountability over critical data assets. As a response, it is necessary to form a cross functional data governance committee. This committee responsible for setting data standards, defining roles such as data stewards and data owners, and ensuring compliance with established guidelines across all business unit.

Table 3. 1. Project Committee and Role Allocation (RACI)

Role/Function	R	A	C	I	Why They are Involve
Logistic Manager	V		V	V	Oversees logistic operation. Provided cost/insights and owns process improvement.
Data Analyst/ BI Team	V		V	V	Analyzed historical and real time data to identify trends and support decision making
IT/System Integration Lead	V		V	V	Ensures platform integration, data flow, and system compatibility
Operation Director		V	V	V	Ultimately accountable for operation efficiency and delivery performance
Finance Team			V	V	Provide cost data, support cost analysis, and ensure cost visibility
Sales/ Sales Customer Service			V	V	Give feedback from customers on delivery performance and service expectations
Procurement			V	V	Help evaluate vendor performance and cost implication in the supply chain.
Executive/ Managing Director		V		V	Provides strategic direction, and organizational alignment.

The RACI matrix on table 3.1 is details the roles and responsibilities of key stakeholders involved in the project. The classification includes Responsible (R), Accountable (A),

Consulted (C), and Informed (I), ensuring role clarity and effective coordination throughout the implementation process.

Data stewards in logistic context at PT. XYZ Indonesia, roles for data owner and data steward can be mapped as per Table 3.2:

Table 3. 2. Data Owner and Data Steward Map

Role	Description
Data Owner	A senior leader responsible for the Quality, usage, and lifecycle of logistic-related data. Owns the decision rights for data definition, procedure, and access
Data steward	The operational technical staff who responsible for day-to-day data quality consistency, and compliance with governance standards. Implements rules set by the data owner.

Table 3.2. is mentioning the mapping for data owner and data steward at PT. XYZ Indonesia. This table explains the distinction between two important roles in data management. A Data Owner is typically a senior manager who has the authority and accountability for ensuring that specific data is accurate, secure, and aligned with business objectives. They define policies and make high-level decisions about data use. On the other hand, a Data Steward is a more operational role responsible for maintaining the quality of the data daily, ensuring it follows the standards and policies set by the Data Owner. Understanding the role of Data Owner and Data Steward on table 3.2 help organization to map the right person in charge for this role.

Actionable work: Established the governance committee/council with representative from logistics, finance, IT, and operation. Define responsibility of the council.

Expected result: Clear ownership of data, improve accountability, and consistent data usage across departments.

3.2.3. Data Maturity Assessment

The data understanding phase focuses on assessing the availability, quality, and structure of existing data at Company XYZ, while aligning this evaluation with the overarching data management framework selected for this study. In this case, the DAMA Data Management Body of Knowledge (DMBOK) is applied to address the lack of standardized data management practices identified during the initial assessment. The purpose of this section is to present the findings, link them to relevant DMBOK components, and propose a high-level data architecture that supports improved decision making in logistic operation.

Assessing the maturity of data management practices provides a baseline from which improvements can be planned and measured. Company XYZ uses a maturity model based on DAMA-DMBOK principles to evaluate various dimensions, including data quality, accessibility, integration, usage, and guidelines enforcement.

Workshops, interviews, and documentation reviews are conducted across departments to assess existing capabilities and gaps. The findings help prioritize focus areas for improvement, such as inconsistencies in data handling or lack of data quality controls. This assessment not only highlights technical challenges but also sheds light on organizational behaviors that impact data governance.

To assess the data maturity of Company XYZ using the DAMA-DMBOK framework, here are the guidelines of maturity assessment. This process helps organization on how well the organization manages data across key areas. As per previous discussion on framework Chapter 3.1, the key focus areas for PT. XYZ Indonesia are: Data governance, Data Quality, Data architecture, Data Integration, Reference and Master Data Management, and Data Storage and Operations.

The assessment scale followed the DAMA-DMBOK assessment scale as mentioned on figure 2.7. Data Maturity Level Dama-DMBOK by Henderson et al., 2017

Table 3. 3. Maturity Assessment Template

No	Knowledge Area	People (1-5)	Process (1-5)	Technology (1-5)	Culture and Strategy	Average Score	Maturity Level	Comment/Evidence
1	Data Governance							
2	Data quality							
3	Data Integration							
4	Reference and Master Data							
5	Data architecture							
6	Data Storage							

Table 3.3 presents the maturity assessment framework implemented at PT. XYZ Indonesia. This assessment follows the DAMA-DMBOK model and evaluates five key areas: People, Process, Technology, Culture, and Strategy. Each component is assessed based on its current capabilities and alignment with data governance principles. This structured approach ensures a comprehensive view of the organization's data management maturity.

The maturity assessment results are used to benchmark current performance and set strategic goals for progressing toward higher maturity levels. This ensures that future improvements are aligned with the company's readiness and resources.

Company XYZ has provided a primary dataset spanning a twelve- year period, with data drawn for multiple internal systems, including a CRM platform, SAP Business One (SAP B1), and Microsoft excel spreadsheets.

Table 3. 4. Data availability provide by Company XYZ,

Department	Type of Data	Description	Sources
Sales	Sales transaction from Business year of 2012	Data on each sale (Job Number) including customer name, customer classification, product description, part number product, type of product, quantity, price, date of purchase, date of delivery,	CRM System, SAP B1
Logistic Operations	Cost and delivery time logs, quotation from vendor.	Data logistic (cost, delivery time, transit time, Tax, Order Logs, Delivery logs	Microsoft Excel data base.
Finance	Customer Demographics, Cost of goods, Logistic cost, penalty.		Informant about customer location, Cost of Goods CRM System, SAP B1

Table 3.4. outlines the specific data available at Company XYZ by department to support the analysis and ensure transparency in the types of data utilized in this study. Including of each data type and its corresponding sources. This table demonstrates the variety and richness of the existing datasets, which serve as the foundation for development of a robust data management architecture

Action: Assess existing data processes and quality using a maturity model adapted from DAMA-DMBOK

Expected Outcome: Identification gaps in governance, standardization, and usage.

3.2.4. Data Quality Management

Ensuring high-quality data is a foundational element of effective data governance, particularly in logistics operations where accuracy, timeliness, and consistency of information directly influence operational efficiency and strategic decision-making. Within Company XYZ Indonesia, the growing reliance on data for cost optimization and delivery performance monitoring demands a formalized approach to data quality management that aligns with the DAMA-DMBOK framework. This includes managing data quality as a continuous lifecycle process—from requirement definition and profiling to monitoring, remediation, and governance integration.

The initiative begins by defining data quality requirements specific to logistics processes. These include shipment tracking, vendor invoicing, warehouse inventory records, and order processing data. Each of these datasets must meet specific thresholds in terms of accuracy, completeness, consistency, uniqueness, and timeliness. For example, delivery records must accurately reflect actual arrival times, invoices must be complete and properly matched to deliveries, and product codes must be consistent across SAP systems and Excel-based tracking files.

Once requirements are clearly defined, data profiling is conducted to assess the current state of key data assets. Using automated profiling tools integrated with platforms such as Power BI and SQL-based queries, the company identifies frequent issues such as missing values, inconsistent formatting, duplicated shipment entries, and outdated information. These insights form the basis for targeted cleansing activities. Data cleansing is not only a one-time correction effort but an ongoing process embedded into ETL (Extract, Transform, Load) pipelines. Standardization rules are applied, for example, to unify naming conventions for cities, ensure invoice formats are consistent, and eliminate redundancies in shipment logs.

Monitoring alone is insufficient without a systematic issue management process. Identified data quality problems are logged, categorized, and analyzed to uncover root causes, whether they stem from manual entry errors, gaps in system integration, or unclear business processes. For example, mismatched delivery statuses between SAP B1 and Excel trackers may highlight a need for tighter integration or clearer user instructions. Each issue is assigned an owner, typically a data steward who is responsible for its resolution, documentation, and prevention of recurrence.

More importantly, data quality is not treated as an isolated function but is deeply embedded in the broader data governance structure. Governance policies define clear accountability for data quality outcomes, assign data ownership, and mandate adherence to standardized validation procedures. The Data Governance Council regularly reviews quality metrics, audits the effectiveness of implemented controls, and updates guidelines in response to operational changes. This integrated model ensures that data quality is maintained across the entire lifecycle—from data capture and entry to analysis and archival.

Table 3. 5. Activity Table – Data Quality implementation for Logistic Data Governance

Aspect	Description
Defined Requirements	- Delivery status must reflect real shipment status - All key fields must be populated - Naming and formats must be standardized
Data Profiling Activities	- Identify missing values, duplicates, and anomalies - Scan data from SAP B1 and Excel trackers - Generate profiling
Cleansing Techniques	- Standardize fields (e.g., date, location, product code) - De-duplicate entries (e.g., duplicate shipments)
Monitoring Tools	- PowerApps - Quality alerts for below-threshold indicators (accuracy, completeness, etc.)

Aspect	Description
Issue Management	- Log and categorize data issues - Perform root cause analysis (manual error, integration failure) - Assign remediation owner (steward)
Audit Mechanism	- Periodic sampling of records - Manual review across systems - Reporting of audit findings to governance council
Data Stewards	- Assigned per domain (e.g., delivery, vendor, invoice) - Responsible for remediation, documentation, and communication
Governance Integration	- Data quality policy included in governance manual - Quality reviews included in council meetings - KPIs integrated with department dashboards
Tools Used	Power BI, PowerApps, SharePoint (for issue tracking), Manual audit templates
Culture and Training	Awareness campaigns and data responsibility training for logistics staff and entry-level users
Expected Outcomes	- Reliable datasets for analysis and dashboards - Improved operational performance - Greater trust in reporting and insights

Table 3.5. The table outlines the structured approach taken by Company XYZ Indonesia to manage data quality within its logistics operations, covering requirements definition, profiling, cleansing, monitoring, stewardship, and integration with data governance to ensure reliable, actionable, and trusted data for cost and delivery optimization.

3.2.5. Data Architecture

In the context of Company XYZ Indonesia's logistics operations, data architecture and integration play a critical role in ensuring that logistics data can be consistently

collected, transformed, stored, and utilized across systems. A fragmented data landscape, comprising ERP software (SAP Business One), Excel trackers, and SharePoint documentation has historically hindered data consistency, accuracy, and visibility. As such, the implementation of a well-defined data architecture is vital for unifying data sources, improving operational transparency, and enabling effective analytics.

According to the DAMA-DMBOK framework, the Data Architecture and Integration domain focuses on defining the structure and flow of data across an enterprise. This includes how data is captured, transformed, transferred, and presented for use. At Company XYZ, the logistics data architecture is purposefully designed to reduce silos, enhance interoperability between platforms, and ensure that data used for analysis and reporting is both reliable and timely.

The architecture is composed of three main layers. The first is the Source Systems Layer, where data is originally generated. This includes SAP Business One, which provides core logistics data such as orders, delivery status, and invoices. Additional operational information is captured in Excel-based shipment trackers and warehouse sheets, while some delivery confirmation data is entered manually by staff through forms.

The second layer is the Integration and Transformation Layer, which ensures that data from diverse sources can be cleansed, aligned, and merged into a consistent structure. In this layer, Extract-Transform-Load (ETL) processes are implemented. Data from SAP and Excel is standardized by applying business rules. For example, converting date formats, aligning product and vendor codes, and removing duplicates. Where direct system integration is not possible, structured templates are used for manual uploads, with validation rules in place to prevent common errors.

The final layer is the Storage and Access Layer, where cleansed data is stored in a centralized repository. SharePoint is used for structured storage of files and master data lists, while analytical datasets are maintained in PowerBI and PowerApps for

visualization. Master data guideline is included in this layer to ensure each dataset is documented with field definitions, update frequencies, and ownership.

To achieve system-wide integration, a semi-automated approach is implemented. This involves regular data extraction from SAP B1 and Excel trackers, transformation routines to clean and format the data, and scheduled data loads into Power BI and PowerApps dashboards. Data refreshes are performed daily or weekly depending on the reporting requirement. Where automation is not feasible, manual uploads are conducted based on standard templates, with data stewards responsible for reviewing and validating the input.

A well-governed data integration process also requires defined roles. At Company XYZ, data architects are responsible for designing and maintaining the overall data architecture, while integration analysts handle ETL development, mapping logic, and connector configuration. Data stewards are tasked with ensuring that the integrated data remains clean, complete, and consistent across systems. Oversight is provided by the Data Governance Council, which reviews architectural changes and ensures integration policies align with business requirements.

Governance integration is further reinforced by maintaining transparency in data flow. Each system, dataset, and integration process are documented, and data lineage is captured to trace how raw data moves from source systems to final reporting outputs.

Ultimately, the implementation of an integrated data architecture enables Company XYZ to overcome the inefficiencies caused by disconnected systems and fragmented data processes. With reliable integration, logistics teams gain timely access to consistent data, allowing them to monitor delivery performance, manage vendor reliability, and analyze logistics costs more effectively. This architecture not only supports current reporting needs but also provides a scalable foundation to incorporate future systems or data sources, ensuring long-term sustainability in the company's data-driven transformation.

Table 3. 6. Logistic Data Architecture activity

Aspect	Description
Integration Methods	- Manual uploads using structured templates with validation rules
Transformation Techniques	- Field standardization (Job number, product codes, dates) - Duplicate removal and format unification - Mapping logic between SAP and Excel structures
Storage Layer	- SharePoint for structured files, master data and datasets for analytics - Metadata maintained for each dataset
Access & Refresh Strategy	- Daily or weekly data refresh schedules - Power BI/Apps dashboards for operational visibility
Roles & Responsibilities	- Data Architect: Designs and maintains architecture - Integration Analyst: Handles mapping, ETL - Data Steward: Validates and governs
Governance Alignment	- Integration policies reviewed by Data Governance Council - Data lineage and flow documented - Change control procedures applied
Tools Used	Power BI, PowerApps, Power Automate, SharePoint, Excel
Expected Outcomes	- Improved data visibility and consistency - Reduced manual reconciliation - Scalable foundation for future system integration

Table 3.6 provides an overview of the data integration architecture, covering the full process from manual data uploads using structured templates to transformation techniques like standardization and mapping between Excel and SAP. Data is stored in SharePoint with metadata tracking, and refreshed regularly for access via Power BI and PowerApps. Roles such as Data Architect, Integration Analyst, and Data Steward are

defined to manage the flow. Governance is enforced through council-reviewed policies and change control. This setup improves data consistency, reduces manual work, and supports scalable integration for future needs.

3.2.6. Reference & Master Data

Effective logistics operations depend heavily on accurate and consistent reference and master data. Inaccuracies or inconsistencies in this foundational data can lead to delivery errors, duplicate records, miscommunication with vendors, and cost misallocations. At Company XYZ Indonesia, the focus on reducing logistics costs and improving delivery times requires a robust approach to managing reference and master data, ensuring that all core entities such as customers, products, vendors, warehouses, and delivery locations are clearly defined, governed, and maintained.

According to DAMA-DMBOK, master data refers to the non-transactional data that describes the key business entities around which business is conducted. Reference data, on the other hand, consists of static or slowly changing data used to categorize or classify other data. In the logistics domain, master data includes items such as product ID, Job number, vendor profiles, customer records, and transport carriers. Reference data includes delivery status codes, incoterms, warehouse location codes, and transport modes.

At Company XYZ, challenges in master and reference data management have historically included the existence of duplicate vendor entries, inconsistent naming conventions, outdated address information, and mismatched codes between SAP Business One and Excel tracking sheets. These issues contribute to delays in shipment processing, inaccurate reporting, and difficulty in coordinating between departments. To overcome these challenges, a centralized and governed master data management (MDM) initiative has been launched as a core pillar of the company's data governance strategy.

The first step in the MDM process is the identification of critical master and reference data entities used in logistics workflows. These include domain Material, Business

Partner Customer list and vendor lists. Once identified, each entity is subject to standardization. For example, all vendor names are formatted according to a unified naming convention, while product SKUs are synchronized between SAP and warehouse tracking spreadsheets.

To ensure consistency, validation rules are applied at the point of data entry. Dropdown menus and controlled vocabularies are introduced in Excel templates and SharePoint lists to prevent free-text errors. Duplicate detection logic is applied before new master data records are created, and periodic cleansing routines are scheduled to merge, archive, or delete redundant entries.

Data stewards are assigned responsibility for maintaining specific domains of master data. For example, a logistics data steward manages delivery location codes and warehouse references, while a procurement steward oversees vendor data. Each steward is required to periodically review their data domain, address data quality issues, and document changes.

The management of master and reference data is not conducted in isolation but is closely integrated with the overall data governance framework. Policies on master data creation, modification, approval, and retirement are documented and monitored by the Data Governance Council. A change request mechanism is established to handle updates in master data structure, including field additions or modifications.

By strengthening the management of reference and master data, Company XYZ Indonesia ensures that all logistics operations from order fulfilment to invoice matching are supported by a single source of truth. This reduces redundancy, improves data-driven decision-making, enhances cross-functional coordination, and enables scalable analytics. Most importantly, it supports the company's long-term objectives of logistics cost reduction and delivery performance improvement through greater data integrity.

3.2.7. Data Storage and Operation

Data storage and operations are foundational components within the DAMA-DMBOK framework, ensuring that data is not only stored securely and efficiently, but also made available for operational use in a consistent and controlled manner. In Company XYZ, existing storage practices are fragmented, relying on separate local servers, spreadsheets, cloud drives, and system-bound data within SAP B1 and CRM. This disconnected environment introduces risks related to data loss, duplication, and access inconsistency.

To establish a reliable and scalable data environment, this research incorporates the development of a centralized data storage strategy. The focus is on ensuring high availability, controlled access, proper backup and recovery procedures, and alignment with business continuity goals. The centralized repository integrates structured datasets from SAP B1, transactional logs from the CRM, and external files used by the logistics and finance teams. SharePoint and cloud-based databases (e.g., Microsoft Dataverse or Azure SQL) are utilized to ensure integration with Power BI and Power Apps for real-time access and visualization.

Key operational elements such as data lifecycle management, access control, and monitoring of data flows are embedded into the solution to maintain data consistency, security, and performance. Access control policies are defined based on user roles, ensuring that sensitive financial or operational data is only available to authorized personnel. Furthermore, storage operations include automated backup schedules, versioning protocols, and logging mechanisms to support data traceability and compliance requirements.

Activities:

- Design a unified data storage architecture that consolidates data from SAP B1, CRM, and Excel files into a central repository.
- Implement backup routines, version control, and access control mechanisms.

- Establish operational protocols for data refresh, archival, and recovery.

Expected Results:

- A secure, scalable, and centralized data environment with minimized redundancy.
- Improved data accessibility for analytics, reporting, and dashboard integration.
- Increased data reliability through proper storage governance and operational controls.

3.2.8. Indicator of Data Governance

To evaluate the effectiveness of data governance in logistics operations, a set of indicators was developed by adapting the DAMA-DMBOK framework. These indicators cover three dimensions: data quality, operational governance practices, and business outcomes. Table 3.7 presents the indicators, their definitions, calculation formulas, and their alignment with DAMA-DMBOK domains as well as the research objectives and hypotheses of this study.

Table 3. 7. Data Governance Indicators for Logistic Data

Indicator	Definition	Formula Measurement	/ DAMA-DMBOK Domain
Data Accuracy	Correctness of logistics records (dates, vendors).	$(\text{Correct} \div \text{Total Records}) \times 100\%$	Data Quality Management
Data Completeness	Filling of all required logistics data fields.	$(\text{Complete} \div \text{Total Records}) \times 100\%$	Data Quality Management
Data Consistency	Alignment across SAP B1, Excel, BI dashboards.	$(\text{Consistent} \div \text{Total Records}) \times 100\%$	Data Quality Management

Indicator	Definition	Formula Measurement	/ DAMA-DMBOK Domain
Data Timeliness	Speed of data availability in dashboards.	Avg. lag (hrs/days)	Data Quality / Data Architecture
Data Uniqueness	Reduction of duplicate IDs/codes.	$(\text{Unique} \div \text{Total Records}) \times 100\%$	Data Quality Management
Ownership Coverage	Data elements with assigned Owners/Stewards.	$(\text{Assigned} \div \text{Total Elements}) \times 100\%$	Data Governance / Stewardship
RACI Implementation	Roles/responsibilities mapped.	% of roles mapped	Data Governance / Stewardship
Cost Reduction	Savings from governed-data-driven optimization.	$(\text{Baseline} - \text{Actual}) \div \text{Baseline} \times 100\%$	Governance (Value Realization)
Delivery Accuracy	Improvement in on-time delivery.	$(\text{On-Time} \div \text{Total Deliveries}) \times 100\%$	Data Quality / Governance (Business Alignment)
Decision Speed	Time to generate simulations/reports.	Avg. minutes/hours per report	Data Architecture / Business Intelligence
Visibility Improvement	Share of processes monitored in dashboards.	$(\text{Covered} \div \text{Total Processes}) \times 100\%$	Data Architecture / BI / Data Governance

Table 3.7 shows the indicators applied to evaluate the effectiveness of data governance in logistics operations. These indicators cover data quality, operational governance, and business outcomes, each mapped to the relevant DAMA-DMBOK domain. Data accuracy, completeness, consistency, timeliness, and uniqueness ensure that logistics records are reliable, complete, aligned across systems, updated in near real time, and free from duplication. Ownership coverage, policy compliance, RACI implementation, and lifecycle compliance reflect the extent to which governance roles, rules, and retention practices are established and enforced. Meanwhile, business outcome indicators—cost reduction, delivery accuracy, decision speed, and visibility improvement—demonstrate the tangible benefits of governed data, such as financial savings, improved delivery performance, faster reporting, and enhanced transparency through BI dashboards. Together, these indicators provide a comprehensive framework for assessing how data governance contributes to logistics performance improvement.

3.3. Logistic Improvement Process

As per discussed on the chapter 3.1. This pillar is focuses on optimizing logistic performance through process enhancement, simulation-base modelling and strategic simulation base modelling, and strategic decision supported by data insights from explanation on sub-chapter 3.2.

The organization has established a structured data governance framework based on the DAMA-DMBOK methodology, serving as a critical foundation for ensuring data consistency, ownership, integration, and accessibility across its logistics operations. This framework is not merely a goal but a prerequisite for enabling high-value initiatives. Once data governance is firmly in place, the organization is well-positioned to progress to the next strategic phase: Logistic Improvement Process by optimizing the trade-offs between delivery time, logistics costs, and product quality. These three elements represent an ongoing balancing act in industrial and trade engineering contexts, and their effective management is essential to maintaining customer satisfaction, operational efficiency, and long-term competitiveness.

3.3.1. Business and Process Understanding

The success of logistics optimization depends on a clear understanding of the existing business environment. This subchapter details the mapping of logistics processes, from customer order entry to delivery fulfilment.

Bottlenecks, delays, and manual interventions are identified, particularly those resulting from the lack of integration between CRM and SAP B1. The analysis also uncovers reliance on tacit knowledge by logistics personnel, which introduces variability and limits scalability. By capturing both structured and unstructured processes, a complete picture of operational dynamics is established.

This foundational understanding enables targeted interventions that are both practical and aligned with business objectives such as faster delivery, reduced costs, and improved service quality.

Action: Conduct interviews and mapping to define business goals, responsibilities, tools, and existing logistics workflows.

Expected Outcome: Alignment between business objectives and logistics operations.

3.3.2. Gap Analysis and Variable identification

Building on the previous analysis, this phase focuses on identifying performance gaps and defining the variables that influence logistics outcomes. These include internal factors such as warehouse efficiency and team responsiveness, as well as external factors like vendor reliability and freight mode selection.

Qualitative insights from team interviews help validate the data and add context to inefficiencies. These findings serve as input for simulation and optimization models in the next phase.

The outcome of this analysis is a prioritized list of variables with high impact potential. Understanding this driver is critical for developing effective and actionable logistics strategies.

With data governance established in Pillar 1, PT. XYZ Indonesia successfully achieved cleaner, more integrated logistics data across departments. This enabled structured analysis and the identification of several key variables that contributed to logistics performance variability, particularly in cost control and delivery accuracy.

Core findings emerged from the business and data understanding phase:

- **Lead Time Gaps:** Delivery progress data was not consistently captured in SAP B1 or Excel logs, resulting in misaligned interpretations across departments. The absence of vendor on-time delivery tracking also made it difficult to provide customers with accurate delivery updates.
- **Cost Inconsistencies:** Logistics costs were only partially recorded in SAP B1 due to limited column availability. This prevented the company from capturing detailed cost components, leading to discrepancies between vendor invoices and finance reports.

By understanding the root variables and aligning business expectations, the team was able to prepare data for modelling and optimization.

The core of this pillar involved using governed data to run simulation models aimed at improving two critical KPIs: logistics cost and delivery time performance.

To address the issue of lead time gaps, a structured approach was implemented within the logistics operations. As illustrated in Figure 3.5, the proposed data capture structure is designed to enhance the visibility and traceability of delivery timelines. This framework outlines the critical data points that must be systematically recorded throughout the shipment process. By integrating this structure, the company aims to improve real-time monitoring, ensure consistency across departments, and ultimately

provide more accurate and reliable delivery information to internal stakeholders and customers.

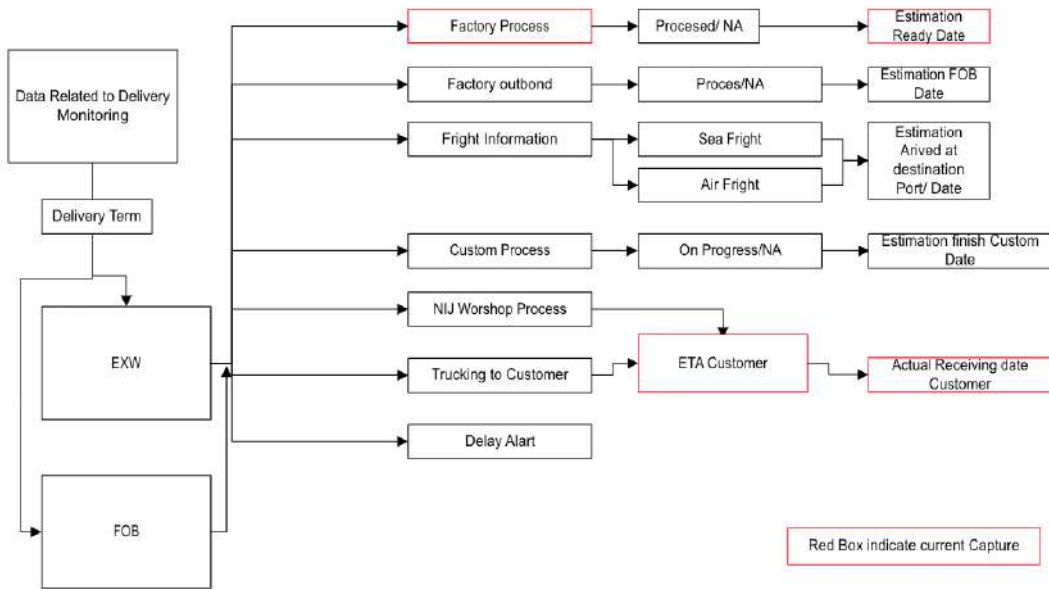


Figure 3. 5. Proposed Structure for Capturing Delivery Monitoring Data

Figure 3.5 illustrates the proposed data structure implemented to enhance delivery monitoring visibility at PT. XYZ Indonesia. The framework categorizes delivery terms into EXW (Ex-Works) and FOB (Free on Board), each with distinct process flows and data points that must be captured. For EXW shipments, key stages such as factory process, outbound readiness, freight arrangement, customs clearance, NIJ workshop activities, and final trucking to the customer are monitored through specific data entries. These include estimated readiness dates, processing statuses, estimated FOB and customs clearance dates, and customer ETA (Estimate Time of Arrival). The red box indicates the current conditions where the system captures delivery-related data, specifically at the stages of factory processing, estimated ready date, estimated time of arrival (ETA) at the customer, and the actual receiving date at the customer site.

For FOB shipments, tracking begins from the freight stage either by sea or air followed by customs and the final delivery phase. The structure also includes a delay alert node to flag any disruptions in the delivery timeline. This systematic approach enables

departments to consistently record, monitor, and communicate logistics progress, ensuring accurate information is available for decision-making and customer updates.

For Cost inconsistency, the data structure in Figure 3.6 follows this format:

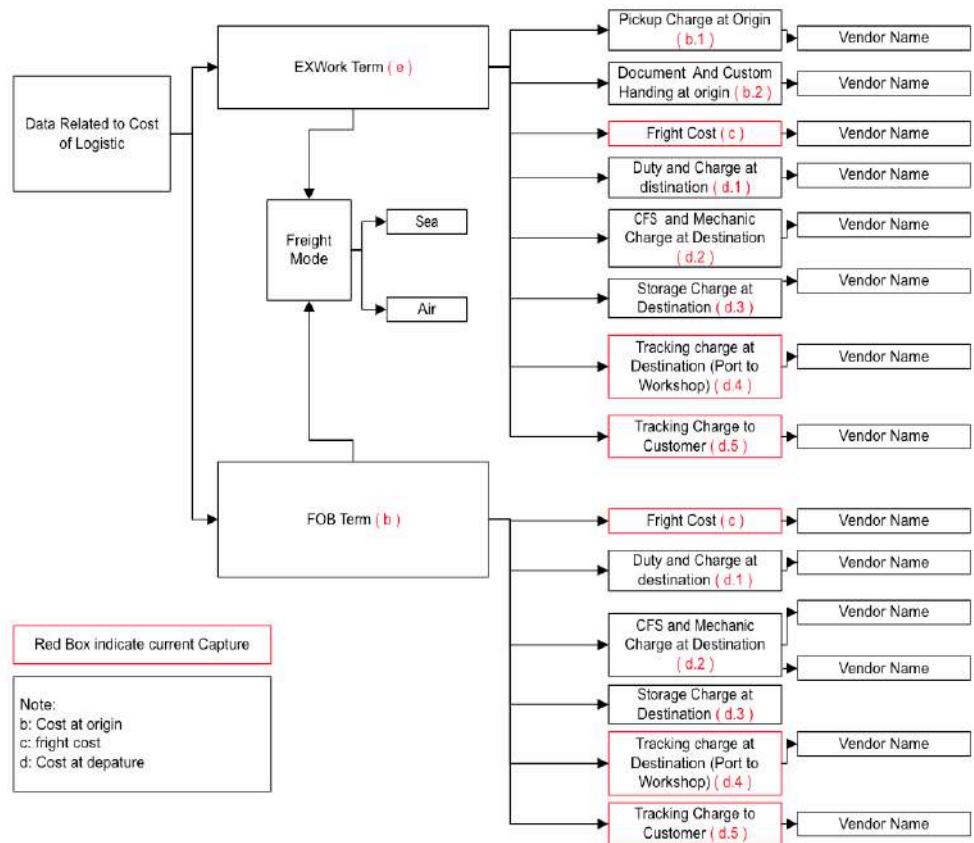


Figure 3. 6. Proposed Structure for Capturing Cost of Logistic PT. XYZ Indonesia

Figure 3.6 presents the proposed data structure for capturing logistics cost details based on delivery terms (EXW and FOB) and freight modes (Sea or Air). The structure identifies specific cost components associated with each delivery arrangement and assigns vendor responsibility for each cost item. The red stars indicate the current conditions where the system captures logistics cost-related data, specifically at the stages of tracking charges from port to workshop and tracking charges to the customer, under both EXW and FOB delivery incoterms.

For EXW terms, the logistics costs start from the pickup charge at origin, followed by documentation and customs handling, freight charges, duty and clearance fees, CFS and mechanic charges, storage at destination, and two levels of trucking charges—from port to workshop and from workshop to customer.

Similarly, under the FOB terms, the model starts from freight cost and follows a nearly parallel structure with cost components tracked from destination port to final delivery. Each cost element is linked to the relevant vendor's name, ensuring clear accountability and enabling detailed cost monitoring and validation.

This structured approach allows for granular tracking of all cost elements in the logistics process, which is critical for identifying cost inconsistencies and improving overall transparency in financial reporting for logistics operations.

3.3.3. Simulation-Based Optimization

Simulation models are employed to evaluate various improvement scenarios before implementation. Using historical and real-time data, Company XYZ tests the impact of different freight options, vendor terms, and resource allocations on logistics performance.

To effectively evaluate logistics performance and identify potential improvements, simulation-based optimization was employed. This technique allows for virtual modelling of real-world logistics scenarios using clean and governed data derived from previous governance processes (as discussed in Pillar 1). The objective is to assess the impact of different logistics strategies on operational efficiency, delivery performance, and cost outcomes under varying constraints and operational parameters.

Key parameters compared in the simulation include:

Table 3. 8. Key Parameter compared in Term of Delivery

Parameter	Ex-Work (EXW)	Free on Board (FOB)
Responsibility Start Point	Buyer (from factory gate)	Seller (until port loading)
Lead Time Visibility	High (from origin to end-point)	Moderate (limited to post-port)
Cost Control	More granular (via own vendors)	Less transparent (lump sum)
Risk Allocation	Buyer bears more risk	Shared risk (up to FOB port)
Flexibility in Optimization	Higher (buyer controls logistics)	Lower (bound to supplier flow)

Table 3.8. Simulation outcomes suggested that Ex-Work terms, while transferring more risk to the buyer, enabled greater flexibility in selecting efficient routes, carriers, and cost structures, particularly beneficial for high-value, time-sensitive products. By controlling the end-to-end process, Company XYZ could implement governed cost tracking and real-time delivery monitoring, supporting faster response to delays or deviations.

Activities Performed

- Modelling end-to-end logistics flows under both Incoterms with the govern data vs current logistic flow
- Stakeholder validation through FGD with logistics, finance, and procurement teams.

Expected Results

- Identification of the most cost-effective and reliable shipping term.

- Evidence-based recommendation for Incoterm policy revision in Company XYZ's logistics strategy.

Using historical data from integrated sources (SAP B1, Excel logs, SharePoint reports), simulations were conducted to assess various logistics scenarios. These included:

- Term of Delivery from Vendor to selecting the possibility reducing cost on origin handling cost
- Freight method alternatives (Sea or Air) to evaluate cost/time trade-offs.
- Internal team allocations based on capacity and historical responsiveness.

The simulation approach helped predict outcomes under various configurations, allowing management to test options virtually before deploying them in real operations.

Action: Identify inefficiencies in delivery time, cost variability, and manual decision-making.

Expected Outcome: Clear targets for optimization.

3.3.4. Decision Support Integration

The next step involves embedding simulation results into daily decision-making processes. Decision support systems are developed using tools like Power BI and Power Apps to ensure accessibility and real-time responsiveness (subchapter 3.4).

These systems present key insights, alerts, and recommendations through interactive dashboards. Operational staff can input real-time data, run scenario comparisons, and receive optimized suggestions for tasks such delay, potential delay, and on time delivery for delivery monitoring. While for cost monitoring, the system suggests potential lost and potential saving.

Standard operating procedures (SOPs) are updated to include the use of these systems, ensuring consistency across the organization. Decision support integration bridges the

gap between data analysis and operational execution, creating a feedback loop for continuous improvement.

Action: Use output from models to improve:

- Incoterm selection
- Freight mode optimization
- Internal team capability planning

Expected Outcome: Measurable reduction in logistics costs and improvement in delivery service levels.

3.3.5. Process Improvement Evaluation and Validation

The proposed logistics process improvements in this study originate from findings under Pillar 1: Data Governance, where gaps such as low data management and visibility as per mention on (Sub-subchapter 3.3.2. at Figure 3.5 and Figure 3.6), fragmented system integration (Sub-subchapter 3.3.2 and 3.3.4), and unclear data ownership were identified (Sub-subchapter 3.3.2). These issues hindered accurate cost tracking and delivery time monitoring.

The goal of this evaluation is to verify whether the proposed improvements result in:

- Reduced logistics costs, and
- Improved delivery time

The evaluation compares two scenarios:

- The existing logistics process, and
- Comparing to the improved process model.

By running simulation scenarios on real logistic operation, the company can measure the impact of the changes quantitatively before implementation. This evidence-based

evaluation helps ensure that the improvements are not only theoretically sound but practically beneficial.

Table 3. 9. Evaluation of Process Improvement

Evaluation Aspect Performed By		Success Criteria	Success Indicators
Delivery Time Performance	Logistics Teams	% of delivery on time	Maintain >90% on-time delivery (delay rate <10%)
Logistics Cost Efficiency	Finance Analyst	% Cost per delivery /order	4 % reduction in logistics cost

Table 3.9. show success indicator evaluation simulation compares the existing logistics process with the proposed improvement model, both applied to the same set of real scenario logistics case on PT. XYZ Indonesia. This comparison provides evidence on whether the proposed changes deliver operational benefits in actual conditions

To validate the proposed changes, Company XYZ conducts Focus Group Discussions (FGDs) with Subject Matter Experts (SMEs) from all relevant functions. These FGDs serve as a collaborative forum to review proposed changes and gather diverse insights that shape final decision-making.

The Managing Director (MD) actively contributes as an SME, offering more than a decade of experience in logistics strategy and operations. This ensures high-level alignment and continuity across departments.

Table 3. 10. Focus Group Discussion FGD requirement and evaluated condition

FGD Participant	Required Expertise	Validation Focus	Condition to Be Evaluated
Managing Director (MD)	10+ years in logistics and strategic planning	Strategic alignment	Do the changes match company goals and

FGD Participant	Required Expertise	Validation Focus	Condition to Be Evaluated
			support long-term strategy?
Logistics Manager	10+ years in logistics operations	Process performance	Do the changes reduce delivery time and costs in a real and measurable way?
Logistics Team (Order Processing & Warehouse)	5+ years in inventory and delivery coordination	Practical implementation	Can these changes be done easily with the current team and tools?
Finance Manager	10+ years in finance and budgeting	Cost efficiency	Can the savings shown in simulation be seen in real financial reports?
Order Processing Lead	10+ years in procurement and coordination	Supplier adaptability	Can suppliers follow new delivery schedules and shipping terms?
Sales Manager / Sales Engineer	10+ years in sales and customer support	Customer experience	Will these improvements help reduce delays and complaints from customers?
BI Developer / System Architect	Power BI, automation, data modelling	Dashboard and data accuracy	Can the dashboard show real-time and correct cost and delivery information?

Table 3.10 outlines the roles, expertise, and validation focus of FGD participants, demonstrating how each stakeholder contributes to assessing the feasibility, strategic alignment, and expected impact of the proposed logistics process improvements.

Stakeholders evaluate proposed scenarios based on practicality, resource requirements, and alignment with strategic objectives. The feedback is documented and used to refine

the improvement plan. This inclusive validation process fosters ownership and reduces resistance to change.

By incorporating stakeholder insights into the final design, the company ensures that process improvements are not only effective but also sustainable and widely supported.

Action: Conduct FGD (Focus Group Discussion) with SME's cross-functional teams.

Expected Outcome: Model validation and feedback-driven refinement.

3.4. Visualization Strategy

Effective visualization bridges data insights with stakeholder action. This pillar ensures that decision-makers are equipped with real-time dashboards and reporting mechanism.

3.4.1. Defining Visualization Objective

Visualization translates complex data into meaningful insights. The primary goals of visualization in this research are to monitor logistics KPIs such as cost per order and on-time delivery (OTD) rates.

These KPIs are selected in alignment with business objectives, focusing on operational efficiency and cost control. The dashboard provides stakeholders with real-time access to governed logistics data, enabling timely actions based on actual performance rather than assumptions.

By defining clear objectives, the dashboard development process remains focused, ensuring that the final outputs are not overloaded with irrelevant information.

Focus Areas:

- Monitoring Lead Time/delivery time
- Identifying Cost Drivers

Delivery time monitoring has been implemented through the dashboard using PowerApps. Meanwhile, cost drivers are not the primary focus within the current project timeline, as cost optimization efforts have already been addressed in Subchapter 3.3 and their outcomes presented in Subchapter 4.3. The development of a dedicated cost drivers dashboard is planned to continue as part of a future strategic initiative.

3.4.2. User and Role Mapping

Different roles require access to different levels of information. Each role is assigned specific dashboard views with appropriate filters and access controls. This enhances usability, protects sensitive data, and ensures that each user receives the most relevant information for their tasks.

Role mapping also supports adoption by making the tools intuitive and aligned with user needs, increasing the likelihood of daily usage.

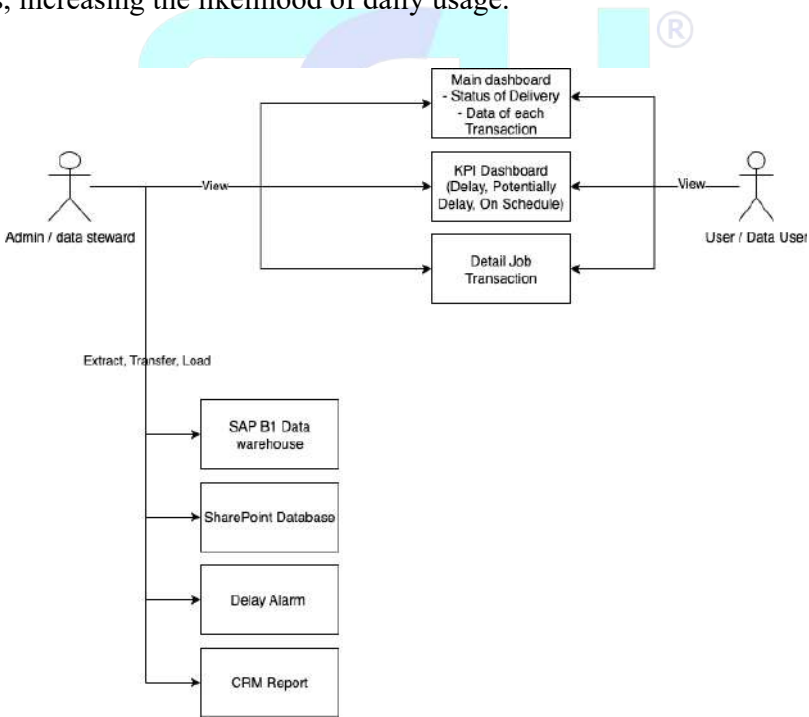


Figure 3. 7. Use Case Diagram

Figure 3.7 illustrates a Use Case Diagram for delivery monitoring dashboard ecosystem. It defines the roles of two main actors: Admin/Data Steward and User/Data

User, and their interactions with key system functionalities. Both user roles are granted view access to three main use cases: the Main Dashboard, which presents the overall delivery status and transaction-level data; the KPI Dashboard, which monitors key delivery metrics such as delays, potential delays, and on-schedule transactions; and the Detail Job Transaction, which provides deeper insights into each transaction for investigation and follow-up.

At the system backend, data is collected and processed through an ETL (Extract, Transfer, Load) mechanism from various sources including the SAP B1 Data Warehouse, SharePoint Database, Delay Alarm System, and CRM Report, ensuring a consolidated and up-to-date data flow into the dashboard environment. The Admin/Data Steward oversees data governance, ensures ETL integrity, and manages dashboard configurations. The detail activity diagram mention on Figure 3.8.

This role-based approach guarantees that each stakeholder views only the information relevant to their responsibilities while maintaining secure and controlled access throughout the system.

3.4.3. Tools and Integration

The visualization system is built using Microsoft PowerApps due to its seamless integration with the Microsoft 365 ecosystem, and its compatibility with key enterprise systems such as SAP B1 and CRM. This platform enables rapid development through low-code functionality while offering robust data interactivity and visualization capabilities. Activity diagram figure 3.8 illustrate end-to-end flow:

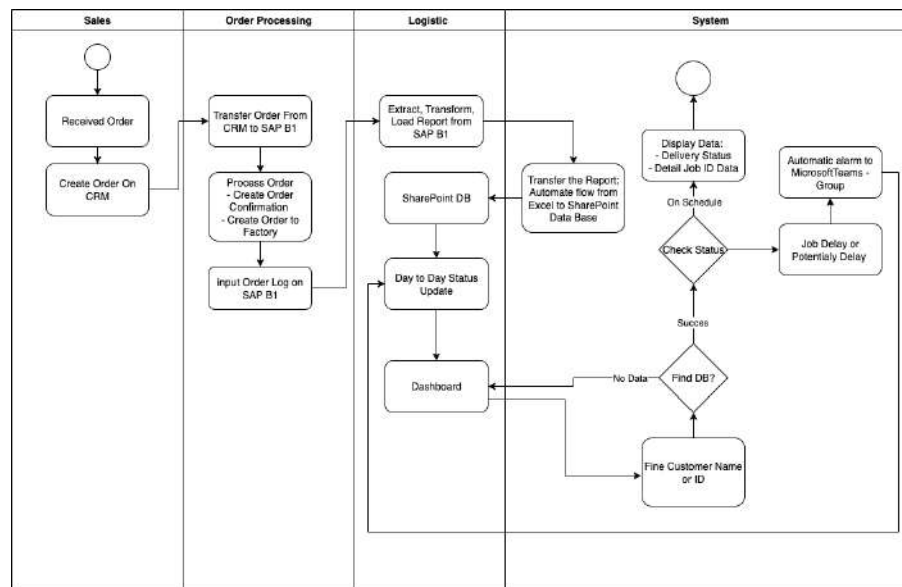


Figure 3. 8. Activity Diagram of the End-to-End Process

Figure 3.8. present an activity diagram that illustrate the end-to-end workflow of the order processing and delivery monitoring system. The process begins in the Sales division where an order is received and entered the CRM. This order is then transferred to SAP B1 by the Order Processing team, who proceed to generate an order confirmation and forward the order to the factory. Subsequently, the order log is recorded in SAP B1.

From there, the logistics team performs an extract, transform, and load (ETL) process to retrieve relevant reports from SAP B1 and store them in the SharePoint database. These reports are updated daily to reflect the latest delivery status, which is visualized in the dashboard. Concurrently, the system automates the report transfer from Excel to the SharePoint database.

PowerApps is used to create the interactive delivery monitoring dashboard. It enables users across departments as mention at figure 3.7, to securely access role-specific views, monitor delivery status in real time. Specific user also able to receive automated alerts for potential or confirmed delays via Microsoft Teams. Users can also drill down into transaction-level detail, annotate observations, and take prompt action directly from the application interface.

This ecosystem ensures that data from sales orders, factory processing, and logistics updates is transformed into actionable insights, closing the loop between monitoring, decision-making, and execution. The tools facilitate both strategic oversight and operational responsiveness.

- Tools: Power Apps, SharePoint, Power Automate
- Action: Automate integration of order and delivery data from SAP B1 and CRM to SharePoint, enabling interactive visual monitoring via Power Apps.
- Expected Outcome: Real-time dashboards for delivery status monitoring, including delay alerts and detailed transaction visibility, supporting timely action across business units.

3.4.4. Dashboard and Deployment

Dashboards are designed based on usability principles, ensuring that they are easy to navigate, visually consistent, and responsive across devices. Layouts are structured to highlight key indicators, provide drill-down options, and allow quick comparisons.

The design phase involves initial wireframing, interactive user feedback sessions, and iterative refinement to ensure alignment with user expectations and operational requirements. Before going live, dashboards are first deployed in a sandbox environment, a controlled, isolated workspace that mimics the production system. This environment is essential for testing and validation, allowing users and developers to simulate real-world conditions without impacting actual business operations or live data.

In the sandbox environment, various elements are verified:

- Data refresh and accuracy
- Role-based access controls and data security
- Alert functionality (delay alarms sent via Microsoft Teams)

- System integration with SAP B1, CRM, and SharePoint
- Usability and user interface responsiveness

This testing phase ensures the system functions as expected, minimizes the risk of disruptions, and gives users early exposure to new features in a safe setting.

Training sessions are conducted to familiarize users with functionalities and encourage adoption. Ongoing support is provided to troubleshoot issues and gather enhancement suggestions.

Action: Design menu structure, layout templates, and deploy visualization layers.

Testing: Perform user tests, role-based access verification, and production deployment.

Expected Outcome: User-centric, intuitive visualizations for operational and strategic decisions.

3.4.5. Success Criteria and Monitoring

Evaluation Tools: FGD feedback.

The objective of the FGD is to validate the logistics performance dashboard developed for monitoring delivery lead time at Company XYZ Indonesia. This FGD aims to ensure the dashboard aligns with user needs, supports real-time decision-making, and effectively presents governed logistics data in a visual format.

Table 3. 11. FGD Participant and Condition to Evaluated

FGD Participant	Required Expertise	Validation Focus	Condition to Be Evaluated
Managing Director (MD)	Strategic decision-making	Executive insight	Can the dashboard help make better strategic decisions?

FGD Participant	Required Expertise	Validation Focus	Condition to Be Evaluated
Logistics Manager	Daily logistics operations	Operational performance	Is the dashboard useful for tracking delivery speed and problems?
Sales Manager / Analyst	Sales and customer feedback	Customer delivery performance	Can the dashboard show if customers receive shipments on time?
BI Developer / System Architect	Power BI and technical implementation	Data accuracy and dashboard performance	Does the dashboard show real-time and correct data without errors or delay?
Data Steward / Governance Rep	Master data and governance rules	Data quality and compliance	Is the dashboard using clean and approved data from trusted sources?

The table 3.11 outlines the key participants for the Focus Group Discussion (FGD), their required areas of expertise, and the specific validation focus they bring to the dashboard evaluation. The Managing Director evaluates whether the dashboard supports strategic decision-making. The Logistics Manager assesses its usefulness in tracking delivery speed and operational issues. The Sales Manager or Analyst focuses on customer delivery performance, verifying if the dashboard can indicate on-time shipments. The Finance Manager examines whether logistics costs and potential savings are clearly visible. The BI Developer or System Architect ensures the dashboard displays real-time and accurate data without errors. Lastly, the Data Steward or Governance Representative evaluates whether the dashboard uses clean, approved, and compliant data from trusted sources.

3.5. Validation - FGD Question

This subchapter presents the design and planning of the Focus Group Discussion (FGD) used as a qualitative validation method to assess the outcomes of this study across the three core pillars: Data Governance, Logistics Process Optimization, and Visualization.

The FGD serves as a critical evaluation approach to gather structured feedback from selected stakeholders who are directly involved in data management, operational execution, and strategic decision-making processes within the organization.

Aligned with the research questions and objectives, the FGD is not limited to validating the functionality of the dashboard alone. Instead, it is designed to provide insights into how the implementation of data governance practices, process optimization models, and business intelligence tools have collectively contributed to measurable improvements in logistics performance, particularly in terms of cost reduction and delivery lead time.

The participants were carefully chosen to represent key organizational roles as mention on table 3.9 and table 3.10, both strategic and operational, to ensure a holistic evaluation across various functional domains. Their inputs reflect practical experiences, data usage behavior, decision-support relevance, and system compliance.

The following table summarizes the roles of each FGD participant, their areas of expertise, the validation focus they bring, and the specific condition they were asked to evaluate during the session.

Table 3. 12. Session Structure with Question Flow

Session	Questions Covered	Session Objectives
Session 1: Data Governance	Q1, Q2, Q3, Q4, Q5	Validate DAMA-DMBOK implementation effectiveness (Pilar 1)
Session 2: Process Optimization	Q6, Q7, Q8, Q9, Q10	Confirm CRISP-DM and simulation results (Pilar 2)
Session 3: Dashboard Effectiveness	Q11, Q12, Q13, Q14, Q15	Visualization /Assess Power Platform business value (Pilar 3)

Table 3.12 presents the structure of the Focus Group Discussion (FGD), showing how each session is aligned with specific research questions and objectives. Session 1 focuses on validating the effectiveness of the DAMA-DMBOK framework under Pillar 1 (Data Governance). Session 2 addresses questions related to CRISP-DM and simulation-based process improvements under Pillar 2 (Process Optimization). Session 3 evaluates the dashboard's business value and usability, particularly through the Power Platform, aligned with Pillar 3 (Visualization).

To ensure the FGD discussions remain focused and aligned with each participant's area of expertise, specific question sets were tailored to each role involved in the evaluation process. The following table 3.13 details the distribution of primary and secondary questions, along with the specific focus area for each participant.

Table 3. 13. Participant-Specific Question Focus

Participant Role	Primary Questions	Secondary Questions	Specific Probe Focus
Managing Director	Q1, Q5, Q6, Q11	Q3, Q14	Strategic alignment and long-term sustainability
Logistics Manager	Q6, Q7, Q8, Q11	Q2, Q4, Q13	Operational performance and daily workflow changes
Finance Manager	Q6, Q9, Q12	Q3, Q5	Cost validation and financial impact verification
Sales Manager	Q7, Q11, Q14	Q13, Q15	Customer impact and service improvement
Order Processing Lead	Q8, Q10, Q13	Q2, Q4	Supplier coordination and process efficiency

Participant Role	Primary Questions	Secondary Questions	Specific Probe Focus
BI Developer/System Architect	Q4, Q12, Q13, Q15	Q3, Q11	Technical implementation and system performance
Data Steward	Q2, Q3, Q4, Q12	Q5, Q15	Data quality compliance and governance adherence

Table 3.13 highlights the targeted approach used during the FGD by assigning role-relevant questions and discussion probes. By aligning questions with each participant's responsibilities—ranging from strategic planning to operational execution and technical implementation—the discussion was able to gather meaningful insights that support validation across all three research pillars.

To ensure each research question is properly addressed during the Focus Group Discussion, the questions have been structured to align with their corresponding research objectives, chapter references, framework components, and expected response types. The table 3.14 summarizes how each question supports the research validation process across all pillars.

Table 3. 14 Core FGD by Research Question

Q#	Research Question Focus	Chapter Reference	Framework Component	Expected Response Type
Q1	RQ1: Data Governance	Chapter 3.2.2 + Data Governance Table 3.1	Structure	Stories of improved problem resolution
Q2	RQ1: Data Governance	Chapter 3.2.2 + Data Stewardship Table 3.2	Roles	Examples of role effectiveness

Q#	Research Question Focus	Chapter Reference	Framework Component	Expected Response Type
Q3	RQ1: Data Governance	Chapter 3.2.4 + Data Quality Table 3.5	Management	Specific quality improvement examples
Q4	RQ1: Data Governance	Chapter 3.2.5 + Data Table 3.6	Architecture	Integration success/challenge stories
Q5	RQ1: Data Governance	Chapter 3.2.3 + Governance Table 3.3	Sustainability	Sustainability assessment and reasoning
Q6	RQ2: Cost & Timeline	Chapter 3.3.2 + Figure 3.6 + Table 3.8	Cost Optimization	Concrete cost reduction examples
Q7	RQ2: Cost & Timeline	Chapter 3.3.2 + Figure 3.5 + Table 3.8	Delivery Performance	Delivery improvement stories
Q8	RQ2: Cost & Timeline	Chapter 3.3.4	Decision Support Integration	Decision speed comparison examples
Q9	RQ2: Cost & Timeline	Chapter 3.3.3 + Table 3.7	Simulation- Based Optimization	Cost forecasting accuracy examples
Q10	RQ2: Cost & Timeline	Chapter 3.3.5 + Table 3.9	Supplier Integration	Vendor relationship change stories

Q#	Research Question Focus	Chapter Reference	Framework Component	Expected Response Type
Q11	RQ3: Dashboard	Chapter 3.4.2 + Table 3.10	User Experience Design	Workflow improvement examples
Q12	RQ3: Dashboard	Chapter 3.4.3	Data Integration & Accuracy	Data trustworthiness examples
Q13	RQ3: Dashboard	Chapter 3.4.2 + 3.4.4	User Adoption & Usage	Usage pattern descriptions
Q14	RQ3: Dashboard	Chapter 3.4.1	Decision Support Value	Specific decision improvement examples
Q15	RQ3: Dashboard	Chapter 3.4.3	Process Automation	Alert effectiveness examples

Table 3.14 serves as a roadmap for linking each FGD question to the core elements of the thesis framework. It clarifies the focus of each question, the theoretical basis or chapter reference supporting it, and the type of qualitative response anticipated. This structure ensures that the FGD effectively validates the research findings from data governance, process optimization, and dashboard visualization perspectives.

To objectively interpret the outcomes of the Focus Group Discussion, predefined success criteria were established for each group of research questions. The following table 3.15 outlines the success thresholds and measurement methods used to evaluate whether the responses indicate effective implementation of the proposed framework.

Table 3. 15: Success Criteria by Question

Question	Success Threshold	Measurement Method
Q1-Q5 (RQ1)	4 out of 5 questions show positive impact	Qualitative assessment + supporting data
Q6-Q10 (RQ2)	4 out of 5 questions show measurable improvement	Financial data + stakeholder stories
Q11-Q15 (RQ3)	4 out of 5 questions show business value	Usage data + user feedback
Overall Framework	12 out of 15 questions show success	Combined assessment across all RQs

Table 3.15 defines the evaluation benchmarks for determining the effectiveness of each research pillar. For each research question group (RQ1–RQ3), success is achieved if at least four out of five questions demonstrate positive impact, measurable improvement, or business value—supported by qualitative insights, quantitative data, or user feedback. The framework is considered successful overall if 12 out of 15 questions meet these defined thresholds.

In conclusion, the structured Focus Group Discussion (FGD) approach outlined in this chapter is designed to validate the research framework across its three key pillars: data governance, process optimization, and visualization. By organizing the sessions based on thematic focus, assigning role-specific questions, mapping them to corresponding research questions and chapter references, and establishing clear success criteria, this methodology ensures a targeted and meaningful evaluation process. Each participant contributes from their area of expertise, providing both strategic and operational insights that enrich the overall assessment. The outcomes gathered through this FGD process will be analyzed and presented in Chapter 4, serving as a critical basis for

evaluating the practical effectiveness and relevance of the proposed framework in real-world business contexts.

