Designing Data Governance With DAMA DMBOK Framework

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ABSTRACT

The vitality of data in aiding companies to fulfill their organizational objectives is paramount, as it can shape decisions across a variety of business operations. Often, corporations overlook the significance of data management, which in fact demands serious consideration. Two key issues that are frequently neglected include the hazy assignment of data responsibilities and the lack of robust data governance. The absence of transparency in data sources can interfere with data analysis or processing, while insufficient data integration and synchronization can prolong report creation time up to three days, due to the need to accumulate data from diverse sources. Furthermore, the use of Enterprise Architecture and Data Integration technologies has not reached its peak efficiency. To rectify these issues, it is recommended that PT XYZ adopts the DAMA DMBOK Framework for Data Governance. This would result in a well-organized and comprehensible data management structure. The procedure initiates with literature studies, progressing to plan data governance maturity evaluation activities, assessing data maturity levels using the DAMA DMBOK, generating recommendations, and finally planning enhancement strategies for Data Governance in the company. The anticipated outcome of this study would be the provision of Data Governance recommendations utilizing the DAMA DMBOK framework

KEYWORDS: Data Governance, DAMA DMBOK, Data Management

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1. INTRODUCTION

(ISACA, 2018) suggested that data governance can be defined as a set of activities that ensure business information and Information Technology (IT) are organized, regulated, and managed in such a way that this information can be reliable, available, accurate, useful, and in compliance with the law, regulations, and applicable internal policies. The existence of data is crucial for companies to achieve organizational goals because the information contained within it can influence decision-making in various company activities.

Organizations often do not realize that data management is an important issue that needs attention. (Zhang et al., 2022)) suggested that the concept of data governance is always challenging due to differences in perspectives. However, data governance as disciplined and legal data management can become a strategic asset for the company, involving procedures, rules, and even certain values. Among the ambiguities are the unclear identification of data responsibility and the absence of data governance, which are important issues that need attention. Non-transparent data sources can disrupt data analysis or processing, lack of data integration and synchronization, the time needed to create reports can reach three days because it requires collecting data from different sources, and the Enterprise Architecture and Data Integration technology is not yet optimal.

The author identifies one of the existing literature reviews related to data governance titled: Critical Success Factors for Data Governance: A Theory Building Approach, (Alhassan et al., 2019) describes the conceptual framework of data governance and identifies the determinants of success for data governance. Subsequently, the author finds a specific case related to data at PT XYZ, which already has Data Architecture related to business processes and company applications in the form of Enterprise Architecture.

The data architecture at PT XYZ currently only depicts a conceptual diagram in outline with non-standard entities and its physical diagram that is still managed by the responsible developer. Therefore, in this study, data management in accordance with standards and company business processes is required, one of which is by using the DAMA DMBOK framework. (Dama International, 2017)) suggested that DAMA DMBOK is a framework developed by the Data Management Association International (DAMA) to describe best practices in data management. DAMA DMBOK is an abbreviation of "Data Management Body of Knowledge" which contains a complete guide for data management. With the use of the DAMA DMBOK Framework for Data Governance, PT XYZ is expected to provide Data Governance recommendations.

2. LITERATURE REVIEW

Data governance represents a framework employed by organizations to manage data in an effective and efficient manner. The central objective of data governance is to assure that the organization's data is well-managed, easily accessible, and secure. Furthermore, data governance aims to guarantee that such data is accurate,

comprehensive, consistent, and relevant to the organization's business needs. IBM propounded that implementing high-quality data governance can aid organizations in making superior and swifter decisions, enhancing operational efficiency, and minimizing the risk of data errors.

According to The Data Management Association (DAMA) in the Data Management Body of Knowledge (DMBOK), data governance is a component of data management that provides a functional approach to building data governance within an organization. The DAMA International Framework indicates that data governance functions interact with and influence surrounding functions. In support of the data governance function framework, DAMA establishes 10 (ten) focus areas of data management as seen in Figure 1 DAMA-DMBOK Framework.
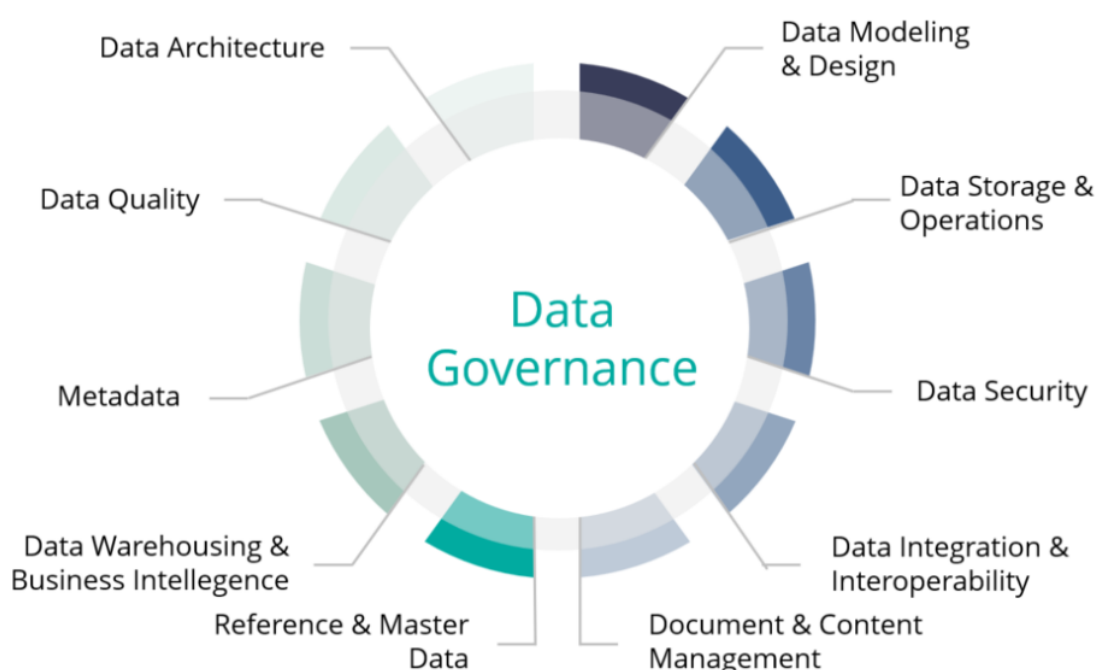

FIGURE 1. DAMA-DMBOK Framework

Several investigations related to this research topic have been conducted multiple times. These studies have been used as references by the author in conducting the research.

Data Governance and its Success Factors

In (Alhassan et al., 2019) research, the authors addressed the need to better understand the relationship between Critical Success Factors (CSF) in data governance. This single-case study employed semi-structured interviews and identified seven CSFs ranked by importance. Meanwhile, (Haug et al., 2022) explored Master Data Management (MDM) strategies to handle data quality that consumes most administrative and operational costs in many companies. This research yielded four different strategies and surprising findings about the DQ effects of centralized MDM.

(Castro et al., 2021) discussed the issue of simplifying the complexity associated with data processing, storage, and analysis techniques to manage the continuously increasing data volume. They proposed an ontology-based reasoning data governance system built on autonomous systems based on distributed components. In another study by (Alhassan et al., 2019), the authors identified the critical success factors and recommendations related to actions for an effective data governance program. The study revealed that having a 'business-based data integration strategy' is the most critical factor in data governance.

Usage and Implementation of Data Governance in Organizations

Several studies in the field of Data Governance and Information Technology focused on various aspects like industry digitalization, increasing data volume and assetization, and the role of Information and Communication Technology in business. (Zorrilla & Yebenes, 2022) developed a framework for data governance in the context of Industry 4.0 by integrating standards and frameworks such as ISO/IEC/IEEE 42010:2011, TOGAF®, RAS, Architecture Building Block (ABB), and RAI4.0. Meanwhile, (Zhang et al., 2022) explored how companies implement data governance and how it triggers strategic actions within the company. In the IoT context, (De Prieelle et al., 2022) evaluated the importance of ecosystem data governance for the adoption of data platforms in the Dutch horticulture industry.

On the other hand, some researchers focused on concepts and definitions around data and information architecture. (Boyd, 2022) discussed the understanding and definition of datasets and enriched the research data management (RDM) information science and data management framework. In the context of information architecture, (Kotusev et al., 2022) investigated the instruments used in organizations and found significant variation and inconsistency.

Big Data and Decision Making

Research in the context of management and usage of Big Data has become the main focus in various fields. On the one hand, (Shah et al., 2021) focused on the challenges of managing high volume, veracity, velocity data that comes from various sources. They identified relevant data lifecycle models and proposed DaLiF, a data lifecycle framework for data-oriented governance. On the other hand, (Nisar et al., 2020)) explored how big data provides insights on the theory of big data management in hospitals. They found that data management plays a crucial role in improving decision-making quality and the performance of the environment in public and private hospitals in China. This study showed that big data management can have a significant impact on the efficiency and effectiveness of organizations across various sectors.

Role of Data in Various Contexts

Other research in the field of data management and governance highlights various challenges associated with the utilization of data in government, commerce, and organizations. In a study by (Shepherd et al., 2019) they examined issues related to the complexity of open government data and its public benefits. With four case studies from

the UK public sector, they found various challenges such as the lack of common metadata standards, data redundancy issues, and various views on the business and public benefits of open data.

On the other hand, (Aaronson, 2019) focused on how data-based services regulate data flows in the context of trade. In his research, he argued that data has unique characteristics that make it different from trading other goods and services, and therefore requires a new approach in regulating cross-border data flows. Meanwhile, (Wibisono et al., 2022) explored how organizational units can regulate data activities to address data availability issues. They identified three patterns of action to address this problem, namely double inspection, careful control, and attentive handling. This research provides valuable insights into how organizations can better regulate data.

3. METHODS

Figure 2 depicts the flow chart of the research methodology employed. The sequence of this research stage is outlined as follows

Identification of Relevant Literature

Literature study was conducted to find out the following: 1) Description of Information Technology; 2) Information System Evaluation; 3) Utilization of Information Systems; 4) The concept of E-procurement; 5) Description of Bela Procurement; 6) Description of System Effectiveness & Efficiency; and 7) Description of ITIL.
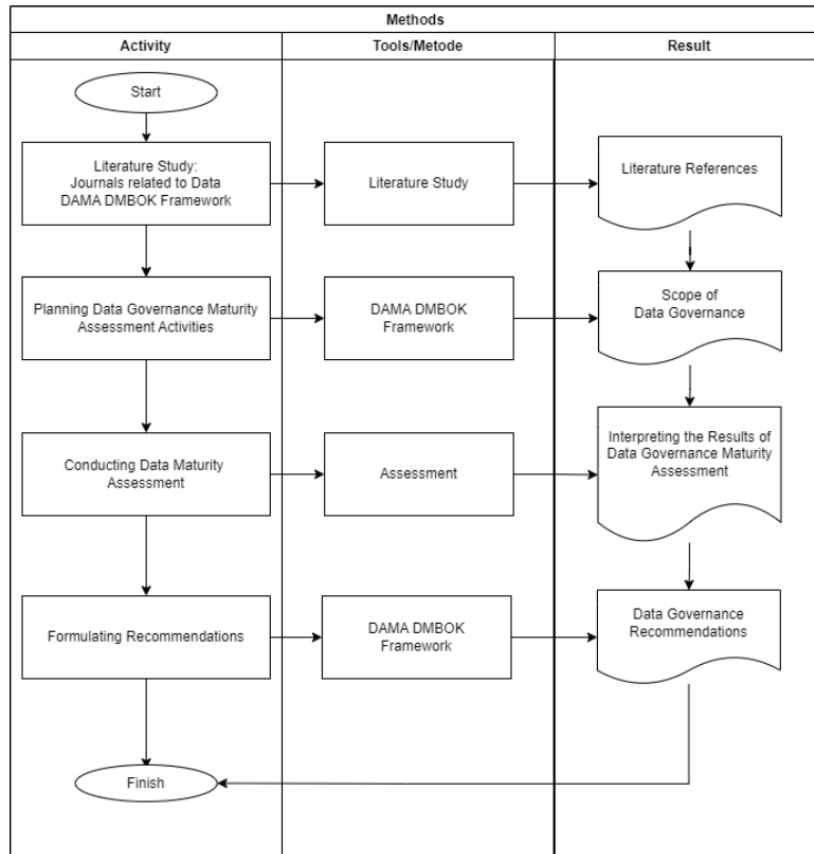

FIGURE 2. Methods

Literature Review

The objective of a literature review is to collect, analyze, and evaluate relevant information from various sources such as books, journals, articles, and reports to comprehend prior research, identify knowledge gaps, and establish a theoretical basis for the ongoing research or project. The literature review aids researchers in understanding the context, methodologies, and previous findings associated with the pre-existing research topic, and assists in identifying the most suitable methods and techniques for application in the study.

Planning Data Governance Maturity Assessment Activities

According to (Dama International, 2017) assessment planning encompasses determining the overall approach and communicating with stakeholders before and throughout the assessment to ensure their engagement. The assessment process includes the collection and evaluation of inputs, as well as the communication of results, recommendations, and action plans. The data governance maturity assessment is carried out by assessing the data management in the organization.

Conducting Data Maturity Assessment based on DAMA DMBOK

As per (Dama International, 2017) collecting appropriate inputs for the assessment based on an interaction model is critical. At the very least, the collected information will cover a formal evaluation against specific criteria. Moreover, the information could also include inputs from interviews and focus groups, systems and design documentation analysis, data investigation, emails, procedure manuals, standards, policies, file repositories, approval workflows, various work products, metadata repositories, data reference and integration architectures, templates, and forms. The next step is interpreting the assessment results.

The maturity framework to be utilized is the one provided by CMMI (Capability Maturity Model Integration). CMMI is a model established by the CMMI Institute with the aim to assist organizations in enhancing their performance and capabilities across various disciplines, including software development, service management, and data governance. This model delineates different maturity levels that reflect the organization's proficiency in managing and controlling their processes.
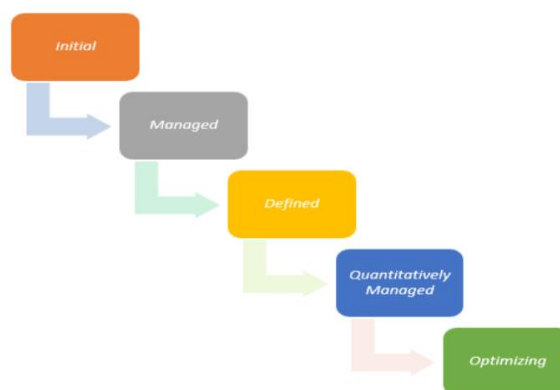
. FIGURE 3. Maturity Level in CMMI

TABLE 1. Maturity Level in CMMI

No	Level	Description
1	Initial	Processes within the organization tend to be chaotic and disorganized
2	Managed	The organization has developed basic, structured, and documented processes to manage and control key functional areas.
3	Defined	The organization has standardized processes that are well-defined and consistently implemented throughout the entity.
4	Quantitatively Managed	The organization employs quantitative metrics to systematically manage and control their processes.
5	Optimizing	The organization reaches the highest stage in process control and performance improvement.

Formulating Recommendations

As stated by (Dama International, 2017)the formulation and provision of development strategy recommendations are performed based on improvement suggestions obtained from the results.

4. RESULTS

Table 2 displays assessment results that have been mapped with CMMI maturity level, while illustration of maturity levels is shown in Table 1.

TABLE 2. Maturity Test Results

No	Focus Area of Data Management	Score
1	Data Handling Ethics	1.00
2	Data Governance	0.75
3	Data Architecture	4.00
4	Data Modeling and Design	2.33
5	Data Storage and Operations	3.00
6	Data Security	2.80
7	Data Integration and Interoperability	1.00
8	Document and Content Management	2.60
9	Reference and Master Data	2.29
10	Data Warehousing and Business Intelligence	2.40
11	Metadata Management	0.00
12	Data Quality	0.00
13	Big Data and Data Science	1.50
14	Data Management Maturity Assessment	5.00

Maturity test results show an average value of 2,05. While the average value expected by PT. XYZ is 3, so there is a gap of 0.95. The results of the gap analysis also show that only 3 (three) of the 14 (fourteen) aspects of data governance are met, namely the Data Architecture, Data Storage and Operations, and Data Management Maturity Assessment. Therefore, it is necessary to increase the level of maturity in data governance. We provide a list of recommendations for PT. XYZ to increase its maturity level in Table 3.
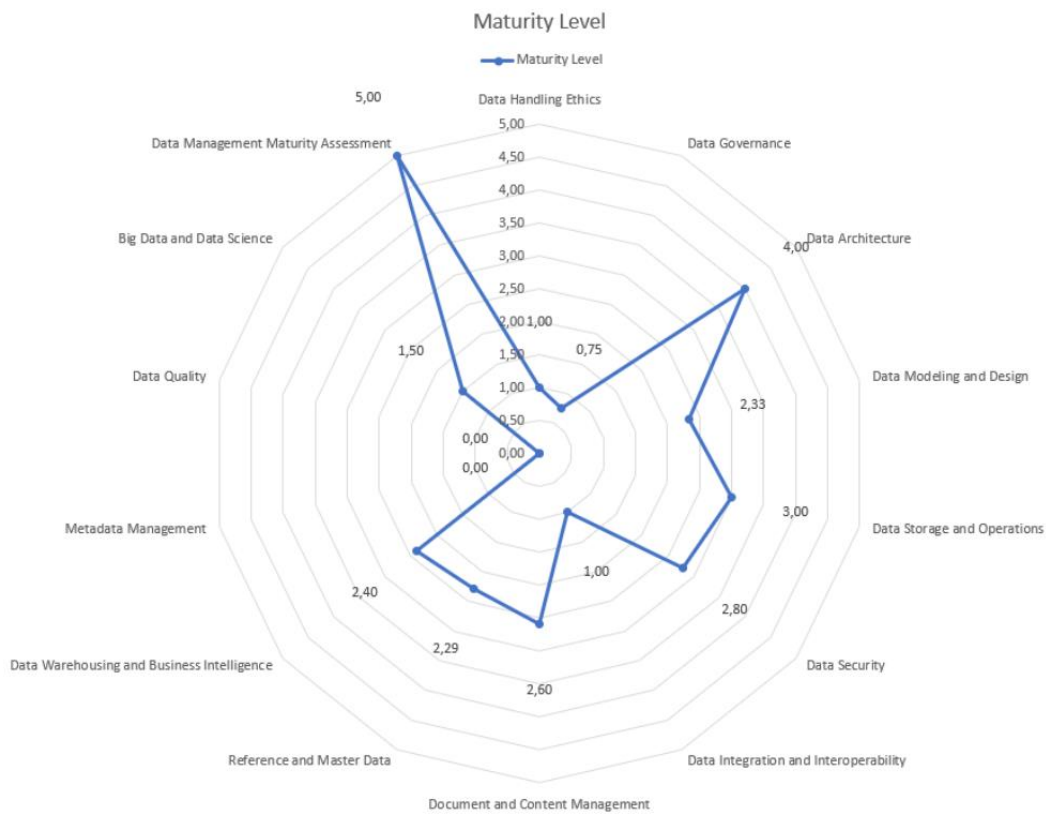
FIGURE 4. Data Maturity Assessment based on DAMA DMBOK

TABLE 3. Recommendations for increasing maturity levels

No	Focus Area of Data Management	Recommendations
1	Data Handling Ethics	Organizations should implement robust ethical guidelines that prioritize data confidentiality, integrity, availability, and respect for individual rights and cultural values.
2	Data Governance	Ensuring the integrity and trustworthiness of data necessitates a robust data governance structure. This encapsulates the definition and enforcement of policies, procedures, standards, and responsibilities to ensure effective and secure data management.
3	Data Architecture	Creating a consistent data model that reflects the structure and flow of data within the organization. This should include definitions of data entities and relationships, as well as models and workflows of related business processes.
4	Data Modeling and Design	The assurance of data quality requires data validation to ascertain its accuracy, consistency, and completeness. Implementation of specific tools and procedures for the constant monitoring and enhancement of data quality is advised.
5	Data Storage and Operations	This involves everyday processes ensuring the preservation of data accuracy, security, and accessibility. Data backup and recovery, security, and performance management are integral parts of these processes.
6	Data Security	To safeguard data from unauthorized access, alterations, or destruction, strong security policies and procedures should be established by organizations.

No	Focus Area of Data Management	Recommendations
7	Data Integration and Interoperability	Organizations should adopt standard data formats, protocols, and interfaces to ensure seamless data flow across different systems.
8	Document and Content Management	This involves the management of documents and content related to data, including the creation, editing, distribution, storage, and disposition of documents.
9	Reference and Master Data	Organizations should ensure data is stored, analyzed, and understood in a manner that facilitates the creation of business reports and analysis.
10	Data Warehousing and Business Intelligence	Establishing a data warehousing strategy that supports business intelligence, providing a unified, clean, well-structured data view that facilitates quick and accurate information retrieval is recommended.
11	Metadata Management	This aspect addresses all facets of metadata, encompassing its definition, usage, and management.
12	Data Quality	The assurance of data quality requires data validation to ascertain its accuracy, consistency, and completeness. Implementation of specific tools and procedures for the constant monitoring and enhancement of data quality is advised.
13	Big Data and Data Science	Deployment of advanced data processing techniques, predictive analytics, and real-time data processing is advised, accompanied by the formation of a skilled data science team.
14	Data Management Maturity Assessment	Regular assessments using models such as DAMA DMBOK's Data Management Maturity model are vital to identify areas of strength and areas needing improvement in data management practices.

5. CONCLUSIONS

Based on the results of the maturity level measurements in 14 area processes in DAMA DMBOK using CMMI, the average value obtained was 2,05. Meanwhile, the average value expected from PT. XYZ is 3. After the gap analysis is carried out, 11 (eleven) of the 14 (fourteen) aspects that have not reached the expected average value are found, namely:

1. Data Handling Ethics
2. Data Governance
3. Data Modelling and Design
4. Data Security
5. Data Integration and Interoperability
6. Document and Content Management
7. Reference and Master Data
8. Data Warehousing and Business Intelligence
9. Metadata Management
10. Data Quality
11. Big Data and Data Science

The identified gaps serve as a basis for initiating rectification measures aimed at attaining a level 3 maturity as detailed in Table 3. The primary hurdle for enterprises lies

in the establishment of procedures for tasks that have previously been either non-existent or conducted haphazardly at level 1.

Overall, the assessment of maturity levels based on DAMA DMBOK provides a roadmap for continuous improvement in data management, which can have substantial benefits for an organization in terms of improved decision-making, risk management, and compliance.

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