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Implementing Data Governance to Enhance Data Management at Higher Institution: UiTM Data Governance Framework

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ABSTRACT

Data management has become a critical focus in higher education institutions due to the increasing reliance on digital technologies for both academic and administrative functions. The concept of data governance plays a pivotal role in managing the complexities of data within these institutions. This paper explores the implementation of data governance frameworks in higher education institutions, specifically UiTM, using the DAMA DMBOK framework as the methodology. The paper provides insights into UiTM's experience in implementing data governance to increase accountability and improve data quality across different departments within the university. The findings highlight how UiTM's data governance framework has been instrumental in addressing data challenges, ensuring accountability, and enhancing data quality at an institutional level." Data management has become a critical focus in higher education institutions due to the increasing reliance on digital technologies for both academic and administrative functions. The concept of data governance plays a pivotal role in managing the complexities of data within these institutions. This paper explores the implementation of data governance frameworks in higher education institutions which is UiTM. The paper provides insight on data governance based on UiTM experience in implementing data governance to increase accountability and improve data quality across different departments within universities.

INTRODUCTION

Data, in academic terms, refers to digitally stored observations or information that serve as inputs for research or decision-making processes. It can exist in numerous formats, including text, images, audio,

numbers, and video, and is typically gathered from various sources like sensors, social media, transactions, or surveys. This broad definition emphasizes data's role in analysis and knowledge generation in fields such as science, business analytics, and decision support systems. Kahn, B., et al. (2024), Gualandi, B., Pareschi, L., & Peroni, S. (2023), Avanço, G., et al. (2021) and Walters, W. H. (2020). Data is typically classified into two categories:

1. Structured: Structured data is organized in a specific format, such as tables, and can be easily processed and analyzed by computers. Examples of structured data include sales data, customer records, and financial statements.

2. Unstructured: On the other hand, unstructured data refers to information that does not have a predefined structure. Examples of unstructured data include social media posts, images, videos, and audio recordings. De Haan et al (2024), Yin, Z., & Xu, Y. (2020) and Kumar, A., & Rani, R. (2020).

Data can be used for various purposes such as decision making, trend analysis, forecasting, and more. However, the value of data lies in the insights that can be derived from it. To extract these insights, data needs to be processed and analyzed using various tools and techniques. This is where data management comes in, which refers to the processes, policies, and technologies used to manage data throughout its lifecycle.

Data management refers to the comprehensive process of handling data throughout its lifecycle, encompassing its creation, storage, retrieval, and eventual deletion. This process ensures that data remains available, accurate, and usable for daily operations. In contrast, data governance provides a broader framework that includes the policies, processes, and standards for managing data as an asset. It establishes guidelines on who can access the data, how it should be handled, and the rules necessary to maintain its integrity, security, and quality. (Chen and Zhang (2021). Higgins et al. (2022) provide insights into the systematic management of data, reinforcing the need for structured approaches to ensure data integrity and compliance. Furthermore, Trubetskaya et al. (2024) discuss the significance of lifecycle management in optimizing data flow and ensuring that data is effectively utilized within an organization.

To put it simply, while data management is concerned with the practical aspects of handling data, data governance ensures that there are formal rules and oversight in place for how the data is managed and used. Data governance provides the structure within which data management operates.

The growing reliance on data in higher education institutions has underscored the importance of effective data governance frameworks to ensure data quality, integrity, and accountability. However, despite its significance, there is a lack of detailed understanding regarding the practical implementation of such frameworks in academic settings. Existing studies have primarily focused on theoretical models or specific aspects of data management, leaving a critical gap in research about how higher education institutions develop and operationalize comprehensive data governance strategies (Cheong et al., 2024; Solomon et al., 2024).

To address this gap, this paper investigates the implementation of data governance frameworks in higher education, with a focus on UiTM. Using the DAMA DMBOK framework as a foundation, this study examines UiTM's approach to enhancing accountability, improving data quality, and aligning data governance practices with organizational objectives. By providing insights into UiTM's experience, this research aims to contribute to the broader understanding of effective data governance implementation in the context of higher education.

To provide a comprehensive understanding of the topic, this paper is structured as follows: it begins with a review of the relevant literature on data management and governance, establishing the theoretical framework for this study. The research methodology, including the use of the DAMA DMBOK framework, is outlined next. Subsequently, the findings are presented, detailing UiTM's implementation of data governance. Finally, the paper concludes with implications, recommendations for practice, and suggestions for future research.

LITERATURE REVIEW

The rapid increase in data generation within higher education institutions has created a pressing need for effective data governance frameworks to manage, secure, and utilize this data efficiently. Data governance encompasses the establishment of policies, procedures, and standards that ensure data accuracy, consistency, and accessibility, thereby enhancing overall data management within these institutions (Mhlongo et al., 2023).

Higher education institutions such as UiTM encounter distinct challenges in data governance as they manage vast amounts of data from diverse stakeholders, including students, faculty, administration, and research entities (Komljenovic et al., 2024). Implementing robust data governance frameworks is essential for navigating these complexities, ensuring data quality, and maintaining compliance with regulations such as the Akta Universiti Teknologi MARA 1976 (Akta 173), Akta Rahsia Rasmi 1972, Akta Perlindungan Data Peribadi 2010, Akta Keterangan 1950, Akta Hak Cipta 1987, Dasar Pengurusan Maklumat Rasmi Universiti 2024, Dasar ICT UiTM, and Dasar Keselamatan ICT UiTM.

Successful data governance frameworks in higher education necessitate the establishment of a centralized data governance committee, clearly defined data stewardship roles, and the integration of technology to automate data management tasks (Zhou, Q., Yi, K., & Chen, X., 2023). Additionally, institutions must develop comprehensive data policies that outline data ownership, access, and usage rights to ensure effective management and security of their data assets (Mhlongo, S., et al., 2023).There are multiple data governance models available, such as DGI, IBM, and PwC, all of which adhere to the same fundamental principles (Hagerty, 2023; Alhassan et al., 2024). Each model includes specific controls that organizations must implement and human roles that must be filled to ensure the effective operation of data governance. However, UiTM has chosen the DAMA Data Management Body of Knowledge (DMBOK) framework as its guiding model. The DMBOK framework is widely recognized in the field of data management, providing a comprehensive set of principles, best practices, and guidelines for managing data effectively while ensuring its quality, availability, and security. To meet the demands of today's digital era, UiTM must enhance its data governance model by allocating appropriate data ownership, defining the types of data collected and stored, assigning exemplary stewardship roles, and implementing an effective data governance program for next-generation platforms.

The DAMA DMBOK framework consists of ten knowledge areas, which are as follows:

1. Data Governance: Establishing and implementing policies, processes, and controls for managing data assets and ensuring their alignment with organizational goals.
2. Data Architecture and Modelling: Designing and defining the structure, integration, and storage of data assets to support business requirements.
3. Data Storage and Operations: Managing the physical storage, retrieval, and optimization of data assets, including database management systems and data warehouses.
4. Data Integration and Interoperability: Enabling seamless data integration and exchange between systems, applications, and data sources.
5. Data Security and Privacy: Ensuring the confidentiality, integrity, and availability of data assets, as well as compliance with relevant data protection regulations.

6. Data Quality Management: Establishing processes and controls to ensure the accuracy, completeness, consistency, and reliability of data.
7. Reference and Master Data Management: Managing reference data and master data to ensure consistency, integrity, and usability across systems and processes.
8. Data Warehousing and Business Intelligence: Designing, developing, and maintaining data warehouses and business intelligence systems for effective reporting, analysis, and decision-making.
9. Metadata Management: Managing metadata, which provides context and information about data assets, including their definitions, relationships, and usage.
10. Data and Information Management: Implementing strategies and practices for data lifecycle management, data stewardship, and data-related projects and initiatives. (Rethwisch,2017)

METHODOLOGY

UiTM has chosen the DAMA Data Management Body of Knowledge (DMBOK) framework as its guiding model as shown in Figure 1. The DAMA DMBOK framework was selected for its comprehensive approach to data management, covering all critical areas such as data governance, integration, and quality, making it well-suited for complex environments like universities (Dama International, 2017).

Figure 1: DAMA-DMBOK2 Framework

Recognized as an industry standard, it ensures alignment with best practices and is flexible enough to be tailored to UiTM's specific needs (Haug et al., 2022). The framework emphasizes governance, which is central to the study's objectives of improving accountability and data quality (Ismail et al., 2024). Based on the DDMA DMBOK2 framework, UiTM divided the framework into three (3) as in table 1:

Table 1: Three categories of DAMA DMBOK2 as adopted by UiTM

No	Framework	Goals & Principles
1	**PEOPLE:** i. University Transformation Office ii. University Digital Office iii. Data Steward	● **University Transformation Office**: Lead and manage the initiative ● **Digital Office**: Support the initiative related with ICT ● **Data Steward**: Function as both a *data coordinator*, who tracks the movement of data inside an organization, and a *data corrector*, who understands and enforces internal rules on how data can be used.
2	**TECHNOLOGY** i. University Transformation Office ii. University Digital Office	● **Deliverables:** o Data Storage and Retrieval Systems. o Data Integration and Cleansing Tools. o Data Security and Privacy Measures o Data Governance and Compliance Tools. o Data Analytics and Business Intelligence Platforms. o Data Visualization and Reporting Tools. o Data Migration and Integration Solutions. o Data Backup and Disaster Recovery Systems. o Data Archiving and Retention Solutions ● **Toolset:** o Data Hub o Data Warehouse o Data Visualization (Power Bi) o Data Classification System
3	**PROCESS**	● **Practices & Techniques**: All activities & all parties involved ● **Activities**: All activities

Its proven success across various sectors demonstrates its versatility, while its structured lifecycle management integrates governance practices throughout the data's lifecycle (Aaronson, 2019). Additionally, DAMA DMBOK provides clear guidance for implementation and maturity assessment, helping UiTM align data governance with organizational goals and improve its practices over time (Dama International, 2017).

IMPLEMENTING DATA GOVERNANCE AT UITM

UiTM data governance is established in line with the development plan of the 12th Malaysia Plan presented by the Prime Minister in the House of Representatives on September 27, 2021, aimed at enhancing the digitization of public services, and is detailed through the Strategic Digitalization Plan for the Public Sector (PSPSA) 2021-2025. The Malaysia government aims for end-to-end online services to increase to 80 percent by 2025. This digitization initiative has indirectly prompted the government to formulate a national data governance policy in efforts to promote data sharing between the public and private sectors.

The establishment of university data governance directly supports the Strategic Core: Value-Oriented Performance in UiTM's Strategic Plan 2025 through Strategic Theme Eight (8): Smart Campus, with the implementation of a Smart Centralized Data Hub to ensure UiTM's goals toward becoming a Globally Renowned University (GRU) are achieved. The authority for the establishment of university data governance is based on UiTM's Strategic Plan, where the University Transformation Office and University Digital Office are tasked with enhancing consistency in institutional data usage, transparency regarding data sources and definitions, establishing decision-making rights, and accountability concerning data quality, reporting, access, storage, and data security.

University data governance is established with an emphasis on the following six (6) key matters:

1. Assisting the Vice-Chancellor and university management in making decisions and planning related to the administration and management of the University.
2. Strengthening the roles and responsibilities of data owners and relevant parties in managing university data.
3. Managing data and information as important assets of the university.
4. Enhancing the quality of university data through enforcement.
5. Disseminating information to stakeholders; and
6. Rating the University at the national and international levels.

University Data Governance focuses on the management aspects of the data and information life cycle, involving the processes, policies, roles, standards, and metrics necessary to protect data assets to ensure reliable, complete, and secure corporate and strategic data. Data utilized by the university and stakeholders must be managed efficiently and effectively, focusing on data management, business process management, risk management, and change management in data handling. Additionally, issues of data security and confidentiality must align with the laws and principles of university data governance.

Data, as an asset of UiTM, must be managed optimally throughout the data life cycle via effective Data Governance, particularly concerning data quality management to ensure it is complete, accurate, and trustworthy. The need to enhance the quality level of university data should be continuous, in line with the Public Sector Data Sharing Policy, which emphasizes the importance of data sharing across agencies toward digital transformation. Poor quality data can adversely affect UiTM’s reputation when the data provided to ministries and government agencies does not meet stakeholder expectations.

The establishment of University Data Governance clarifies the relationship between the operational workgroups and the university's top management, forming the foundation for robust data management. The role and involvement of top management in governance and data management become more apparent with the presence of a more transparent University Data Governance. The connection that exists at the strategic, executive, and operational levels ensures that data quality management is conducted in a more organized, efficient, and effective manner. The cultivation of data quality management will be more planned and managed, thereby involving the entire university community.

Robust and effective data governance clarifies critical aspects such as ownership, data sources, integrity, uniformity, reliability, security, and confidentiality. By implementing structured data management practices, universities can enhance operational efficiency, add value, and empower departments within the university ecosystem to make informed decisions. This approach also ensures compliance with legal requirements and relevant regulations while aligning with the university's strategic planning (Chukwurah et al., 2024).

To achieve these objectives, institutions must establish clear data governance frameworks that define roles and responsibilities, implement comprehensive data policies, and leverage technology for efficient data management. Such frameworks not only facilitate better decision-making but also promote accountability and transparency across all levels of the organization (Hagerty, 2023).

UiTM illustrates the benefits of implementing a data governance framework. By adopting a centralized data management system and establishing clear data ownership policies, UiTM was able to improve data quality, reduce data redundancy, and streamline reporting processes.

Data governance is essential as it adds meaning to the university, particularly in enhancing trust and understanding of institutional data through robust oversight and glossary, thereby accelerating digital transformation across services. University Data Governance essentially encompasses:

1. The formulation of policies, guidelines, and regulations related to the life cycle of university data management.
2. Procedures for implementing applicable regulations.
3. Decision making procedures involving the management and use of the university's official data/information; and
4. The identification of appropriate levels of accountability and responsibility at the strategic, executive, or operational levels.

A well-planned University Data Governance program requires direct attention from the Vice-Chancellor, with a governance structure involving the university's top management team. This program involves the following teams and individuals as follows:

1. Data Owner/Data Steward: The data owner is responsible for defining the data requirements and ensuring that the data is accurate and relevant. They are also responsible for defining the access permissions for the data and ensuring compliance with data protection regulations. UiTM has identified NINE (9) data owners as in Figure 2.

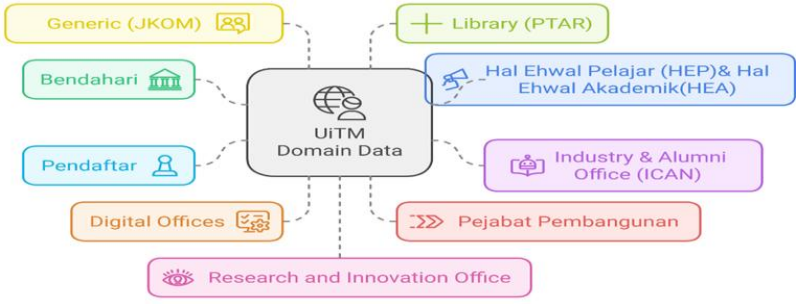

Figure 2: UiTM's Data Owners

2. Data Custodian: The data custodian is responsible for the physical and technical security of the data. They ensure that the data is stored securely, and that access is restricted to authorized individuals. Data Custodian in UiTM is the University Transformation Office.

Figure 3: UiTM Data Custodian

3. Data Governance Committee: The data governance committee is responsible for overseeing the overall data governance strategy. This includes defining policies and procedures, reviewing data quality and compliance, and making recommendations for improving data management processes. UiTM also classifies its data into eight domains, each with its own data owners. To manage these domains, UiTM has eight data domain work groups (Kumpulan Kerja Domain Data or KKDU) led by the University Data Committee (Jawatankuasa Data University or JKDU), which is spearheaded by the Assistant Vice-Chancellor (Strategy) as UiTM's Chief Data Officer. Each of them have their own TOR (Term of Reference) where JKDU (University Data Committee) are responsible to setting the strategy for data governance, drafting management policies for approval, approving best practices, providing data status reports, ensuring program oversight, addressing unresolved issues, facilitating communication, promoting the importance of governance programs, informing stakeholders, and fostering a data centered culture at the university. KKDU (Data Domain Working Group) are responsible to recommending standards, identifying strategic data, implementing governance programs, ensuring data security, assessing risks, proposing improvements, and enforcing decisions for the management of general and generic data domains at the domain data level. University Data Governance involves committees and working groups at the strategic, executive, and operational levels. The University Data Committee (JKDU) is the main pillar in the implementation of university data governance, consisting of a chairperson and representatives from senior officials of the established responsibility centers, tasked with planning, formulating policies, monitoring, and coordinating programs related to university data management. This committee is supported by eight (8) working groups, each comprising a chairperson and representatives from each domain of the university's official data. The structure of University Data Governance is as follows:

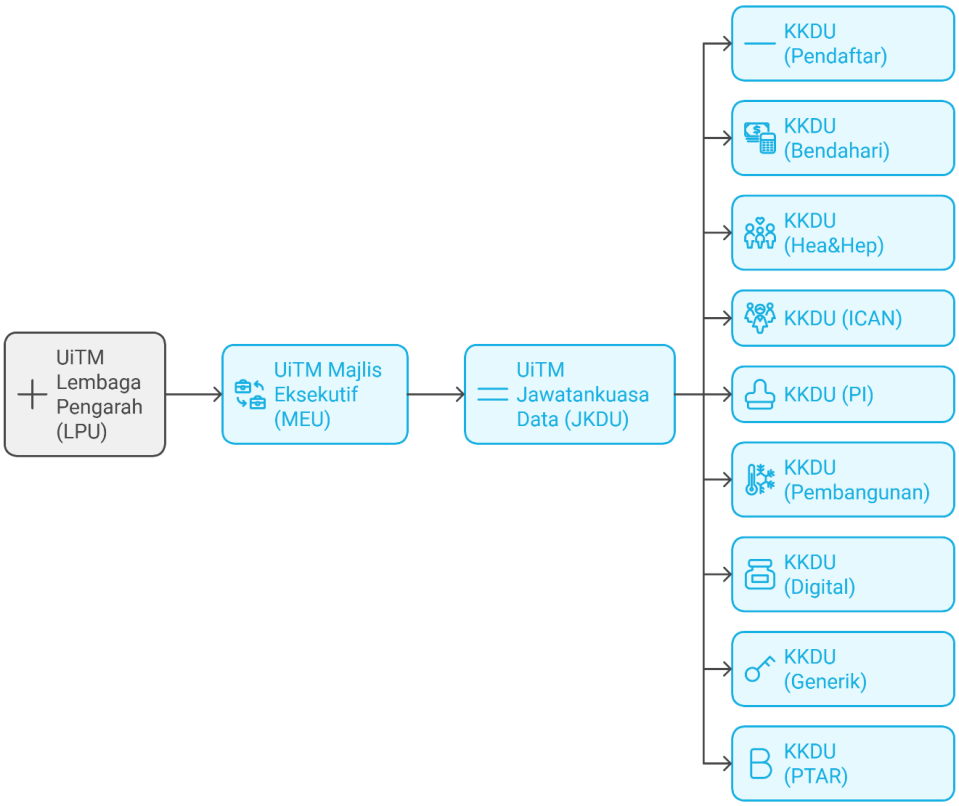

Figure 4: UiTM's university data governance

while KKDU(University Domain Data working groups) are as follow:

1. Working Group for General and Generic Data Domain under UiTM Communication Department.
2. Working Group for Human Resource Data Domain under Registrar's Office.
3. Working Group for University Financial Data Domain under Treasurer's Offices.
4. Working Group for Development, Facilities, and Domain under Infrastructure
5. Working Group for Digital Office. Domain under Digital
6. Working Group for Academic and Student Affairs Data Domain under Academic Affairs (HEA) and Student Affairs (HEP).
7. Working Group for Research and Innovation Data Domain under Research & Innovation Office. (PI, UiTM)
8. Working Group for Industrial, Community, and Alumni Network Data Domain under Industrial, Community, and Alumni Network Office (ICAN UiTM)
9. Working group for Knowledge Management Data Domain under Library (PTAR UiTM)

The council, committees, and formed task forces play a role in ensuring that the decision-making process is conducted through proper governance procedures. Meetings are held transparently and clearly, with members declaring any interests, and discussions and decision-making processes are based on the established terms of reference.

4. IT Team: The IT team is responsible for managing the technical aspects of data governance, such as implementing data security measures, managing data storage, and maintaining data integrity. It's under University Digital Office.
5. Business Users: Business users are responsible for using data in a way that supports the overall goals of the organization. This includes ensuring that data is used ethically and in compliance with regulations, as well as making sure that data is used effectively to inform business decisions.

Effective data governance necessitates collaboration and communication among various roles and responsibilities within an organization. By clearly defining and assigning these roles, organizations can ensure that data is managed effectively, securely, and in compliance with regulations (Bouchez et al., 2023). This collaborative approach fosters accountability and enhances the overall effectiveness of data governance initiatives. Data governance is essential because it adds meaning to the UiTM, particularly in enhancing trust and understanding of institutional data through robust oversight and a comprehensive glossary, thereby accelerating digital transformation across services. UiTM Data Governance fundamentally encompasses:

1. The formulation of policies, guidelines, and regulations related to the data management lifecycle at the university.
2. Procedures for implementing the applicable regulations.
3. Decision-making procedures involving the management and use of official university data/information; and
4. Identification of appropriate levels of accountability and responsibility, whether at the strategic, executive, or operational levels.

A well-planned University Data Governance program requires direct attention from the Vice-Chancellor, along with a governance structure that involves the university's top management group.

Today, globalization poses a major challenge for UiTM, where various borderless globalization trends have impacted the national education landscape, particularly in higher education, which is also affected by new norms, economic changes, and the political, social, and cultural climate of society. The university's competitiveness is assessed based on its ability to attract new student enrolments, industry recognition, and its global ranking compared to other higher education institutions, both public and private, especially in the Asian region. This challenge is further emphasized by annual ranking reports such as QS Ranking, THE, UIGreen Metrics, SETARA, MyRA, and other accreditations.

The agenda to strengthen data management in universities is crucial for higher education institutions (HEIs), the Ministry of Higher Education (KPT), and the nation in ensuring that every plan and decision made by university management aligns with the university's objectives. Efforts to enhance access to quality data are collective actions that must be taken by all levels, whether strategic, executive, or operational. To ensure comprehensive and thorough access and data collection at the university, UiTM will develop a policy to establish governance and regulatory control over university data management through this UiTM Data Governance framework.

The need for data applications exists not only internally to measure departmental performance indicators but also in response to requests from ministry agencies and stakeholders to support the development of the higher education data warehouse (MyMoheS) and the implementation of data sharing across agencies, which still has a moderate impact on the effectiveness of government service delivery. This requires empowering promotional programs, publicity, and change management to create awareness of the importance of data management and sharing in the country's economic development

CONCLUSION

In conclusion, data governance is essential for enhancing data management in higher education institutions. Implementing an effective data governance framework helps institutions improve data quality, ensure compliance with regulations, and make more informed decisions. However, challenges such as legacy systems, data silos, and stakeholder buy in must be addressed for these frameworks to succeed.

A consistent, repetitive, and sustainable approach through the establishment of data governance and the implementation of related programs is essential to protect the security and integrity of data as an asset of the University. The need for formal data governance policies and structures enables data governance programs to be implemented and operate more effectively throughout the university system. Through this University Data Governance, data from each department at UiTM will be integrated through uniform and sustainable governance via a unified platform, ensuring reliable, accurate data that can be accessed anytime and anywhere. This will facilitate the university's ability to obtain accurate information related to students, staff, finances, research, commercialization, and other information within the university in a timely manner.

University Data Governance must be implemented according to good governance procedures to ensure that the decision-making processes at all levels are transparent, efficient, accountable, and ethical. Good Data Governance also ensures that the university utilizes data resources and workforce optimally, delivering effective, dynamic, fast, and accurate services, which in turn enhances customer and stakeholder satisfaction.

The study has certain limitations that should be acknowledged. Firstly, it focuses exclusively on UiTM, making the findings context-specific and potentially less applicable to other institutions with different structures or challenges. Secondly, while the DAMA DMBOK framework provides comprehensive guidance, it may not address certain institution-specific nuances. Lastly, the study is limited on implementing the framework and does not account for future developments or evolving challenges.

For future research, comparative studies across multiple institutions could identify common challenges and best practices in implementing data governance. Investigating the integration of the DAMA DMBOK framework with others, such as COBIT or ISO 27001, might uncover synergies for addressing unique challenges. Longitudinal studies tracking the long-term impact of data governance frameworks would offer insights into their sustainability. Furthermore, exploring the role of emerging technologies, such as artificial intelligence, in enhancing data governance and developing metrics to measure the framework's effectiveness could significantly contribute to the field.

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REFERENCES

Alhassan, I., et al. “A Study on the Design of Big Data Governance Framework in Higher Education and Its Application in Student Management.” ResearchGate. Available at: ResearchGate

Avanço, G., et al. “A Literature Review on the Definition of Data in the SSH: Every Informational Data Is Technically Data.” Open Research Europe, 2021. https://doi.org/10.12688/openreseurope.13918

Bouchez, C., et al. “Redefining Data Governance: Insights from the French University System.” HAL. Available at: HAL

Chen, Y., and Zhang, Y. "Data Management Practices in Research: A Review of Current Trends and Future Directions." Journal of Academic Librarianship, vol. 47, no. 6, 2021, Article 102407. https://doi.org/10.1016/j.acalib.2021.102407

Chukwurah, I., Ige, A., Adebayo, O., and Eyieyien, P. "Frameworks for Effective Data Governance: Best Practices." Cultural Computer Science & IT Research Journal, vol. 5, no. 7, 2024, pp. 1666-1679. https://doi.org/10.1007/s43093-024-00300-0

Della Chiesa, B., and Mazzocchi, C. "Rethinking Data Management Planning: Introducing Research Output Lifecycle Management." CODATA Data Science Journal, 2023. https://doi.org/10.5334/dsj-2024-034

De Haan, E., Padigar, M., El Kihal, S., Kübler, R., and Wieringa, J. E. "Unstructured Data Research in Business: Toward a Structured Approach." Journal of Business Research, vol. 177, 2024, Article 114655. https://doi.org/10.1016/j.jbusres.2024.114655

Gualandi, B., Pareschi, L., and Peroni, S. "What Do We Mean by 'Data'? A Proposed Classification of Data Types in the Arts and Humanities." Journal of Documentation, vol. 79, no. 7, 2023, pp. 51-71. https://doi.org/10.1108/JD-07-2022-0146

Hagerty, M. "Data Governance in Higher Ed: Where to Start & How to Maintain It." EdTech Magazine, 2023. Available at: EdTech Magazine

Kahn, B., et al. "Frameworks, Dimensions, Definitions of Aspects, and Assessment Methods for Data Quality." JMIR Medical Informatics, vol. 12, no. 1, 2024, e51560. https://doi.org/10.2196/51560

Kanza, S., and Knight, A. "Research Data Management: A Strategic Approach to Managing Research Data Throughout Its Lifecycle." International Journal of Information Management, vol. 54, 2020, Article 102155. https://doi.org/10.1016/j.ijinfomgt.2020.102155

Kumar, A., and Rani, R. "An Unstructured to Structured Data Conversion Using Machine Learning Algorithm in Internet of Things (IoT)." , 2020. https://doi.org/10.2139/ssrn.3563389

Liu, Weijia, et al. "How Data Security Could Be Achieved in the Process of Cloud Data Governance?" , pp. 114-120, 2023. https://doi.org/10 .2991 /978 -94 -6463 -056 -5 _16

Mhlongo , S ., et al ."Balancing Privacy , Security , and Transparency in Data Management : Ethical Considerations for Data Governance ." International Journal of Educational Research , vol .20 , no .8 ,2023 , pp .133 -139 . Available at : [IJERD](http://www.IJERD.com/paper/vol20-issue8/2008133139.pdf)

Rethwisch , David G.. DAMA-DMBOK : Data Management Body of Knowledge. Second Edition ,2017

16. Solomon , A ., Simpa , O ., Adenekan , A ., & Obasi , I .."Data Governance and Quality Management — Innovation and Challenges in the Digital Era." Journal of Business Research , vol .150 ,2024 , pp .1 -12 ; https://doi.org/10 .1016 /j.jbusres .2024 .02 .012

Trubetskaya , A ., McDermott , O ., Durand , P ., & Powell , D.J .."Improving Value Chain Data Lifecycle Management Utilizing Design for Lean Six Sigma Methods." The TQM Journal , vol .36 , no .9 ,2024 , pp .136 -154 . https://doi.org/10 .1108 /TQM -01 -2024 -0020

Walters , W.H .."Data Journals : Incentivizing Data Access and Documentation within the Scholarly Communication System." Insights : The UKSG Journal , vol .33 , no .1 ,2020 , pp .18 -20 . https://doi.org/10 .1629 /uksg .510

Yin , Z ., & Xu , Y .."Combining Structured and Unstructured Data for Predictive Modeling in Healthcare." *Journal of Biomedical Infomatics* , vol .107 ,2020 , Article 103446 . https://doi.org /10 .1016 /j.jbi .2020 .103446