

UNIVERSITI TEKNOLOGI MARA

**EVALUATING RECORDS
MANAGEMENT STANDARDS FOR
BIG DATA IN MALAYSIAN
ORGANIZATIONS: A MULTIPLE
CASE STUDY**

NOR SAKILA BINTI ASNAWI

PhD

June 2026

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NOR SAKILA BINTI ASNAWI

Thesis submitted in fulfilment
of the requirements for the degree of
Doctor of Philosophy
(Information Management)

Faculty of Information Science

June 2026

CONFIRMATION BY PANEL OF EXAMINERS

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I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

The increasing volume, variety, and velocity of data generated through digital technologies have intensified the need for effective management practices that ensure data reliability, integrity, and accountability. However, most big data approaches focus on analytics and technology rather than the governance principles required to manage information as reliable evidence. This research addresses this gap by examining big data management from a records management perspective. The study aims to explore how records management standards can be applied to control and manage big data effectively and to develop a framework integrating records management principles with big data characteristics. This study also emphasizes the importance of aligning data governance practices with established standards to ensure sustainability, compliance, and long-term accessibility of digital information within organizations. A qualitative research design was employed, involving interviews with records professionals selected through purposive sampling across organizations engaged in big data environments. Data were analyzed thematically to identify the alignment between records management elements and the defining characteristics of big data. This approach enabled an in-depth understanding of current practices, challenges, and the practical applicability of records management standards in dynamic and complex data environments. The findings revealed that out of the eight elements identified from ISO 15489-1:2016, six were found relevant and effective in addressing big data challenges. These six elements, together with several emergent elements identified through practice, formed the basis of a proposed framework for managing and controlling big data within organizational contexts. The framework provides a structured approach for integrating records management principles into big data initiatives, thereby enhancing governance, accountability, and evidence-based decision-making in data-driven environments. The study contributes to both theory and practice by extending the application of records management standards into the big data domain and offering practical insights for organizations seeking to improve data governance strategies.

ACKNOWLEDGEMENT

All praise and thanks be to Allah S.W.T., the Most Gracious, the Most Merciful. With His infinite mercy, guidance, and strength, I was able to embark on and complete this long and challenging PhD journey. There were many moments when I felt lost, overwhelmed, and on the verge of giving up, but it was Allah who listened to my silent prayers, witnessed my tears, and lifted my heart when I had no strength left. Truly, without His help, I would not be standing where I am today. Alhamdulillah.

I would also like to express my sincere appreciation to my supervisor, Assoc. Prof. Dr. Irwan Kamaruddin Abd Kadir, and my co-supervisor, Assoc. Prof. Dr. Alwi Mohd Yunus, for their continuous guidance, patience, and valuable insights throughout this research. Their support and mentorship have been a critical part of this academic journey.

My heartfelt thanks go to all the informants who kindly agreed to participate in the interviews and contributed valuable input to this study. I am also truly grateful to the postgraduate (Pascasiswazah) team at the Faculty of Information Sciences for their assistance and support in navigating the administrative and academic processes.

A special thank you goes to the my Viva Voce panel for their insightful evaluation and encouraging feedback: Associate Professor Dr. Safawi Abdul Rahman (Chairman), Associate Professor Ts. Dr. Hj. Saiful Farik Mat Yatin (Internal Examiner), and Prof. Dr. Mira Kartiwi (External Examiner). Their valuable comments and professional guidance have significantly strengthened this thesis.

To my beloved husband, Muhammad Farhan Rifa'ie bin Raduan - words cannot express the depth of my gratitude. You have been my greatest supporter, motivator, and source of strength. Thank you for standing beside me through every breakdown, every sleepless night, and every tearful moment. You never gave up on me, even when I wanted to give up on myself. Your belief in me, your constant encouragement, and your endless patience gave me the courage to keep moving forward. This PhD is as much yours as it is mine.

To my beloved children, Safiyya Femida binti Muhammad Farhan Rifa'ie and Rayyan Reezqie bin Muhammad Farhan Rifa'ie - Both of you have been my constant source of inspiration and strength throughout this journey. Every sacrifice and effort invested in this work was driven by my love for you and the hope that one day you will understand the meaning behind it. Your presence in my life has given me purpose and resilience, guiding me through every challenge. This achievement is dedicated to both of you, who have been my light during times of difficulty.

To my beloved siblings and my entire family, thank you for your unwavering support, understanding, and constant encouragement throughout this journey.

Finally, this thesis is dedicated to the loving memory of my late father and mother. Your vision, prayers, and sacrifices continue to shape my path, even in your absence. This victory is for both of you. Al-Fatihah.

Alhamdulillah.

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LIST OF ABBREVIATIONS

Abbreviations

ATLAS.ti	Archive for Technology, Lifeworld and Everyday Language. Text Interpretation
BDM	Big Data Management
CCSDS	Consultative Committee for Space Data Systems
DIRKS	Designing and Implementing Recordkeeping Systems
GLC	Government Linked Company
InterPARES	The International Research on Permanent Authentic Records in Electronic Systems
ISO	International Organization for Standardization
IoT	Internet of Things
IM	Information Management
InterPARES	The International Research on Permanent Authentic Records in Electronic Systems
IVIS	Information Visualization
NGO	Non-governmental Agency
NSW	New South Wales
OAIS	Open Archival Information System
RMS	Records Management System
UiTM	Universiti Teknologi MARA

CHAPTER 1

INTRODUCTION

1.1 Background of Study

This chapter provides an overview of the study, outlining its background, problem statement, objectives, research questions, and significance. It establishes the foundation of the research and highlights its importance in addressing emerging challenges in managing information within organizations.

As a foundation for the integrity of organizational activities, records management is essential in every organization. It supports the accurate capturing of routine activities and transactions that ensure consistency, reliability, and accountability in operations. Effective records management contributes to achieving organizational goals by ensuring that records are systematically created, maintained, and disposed of. It enhances operational efficiency, supports informed decision-making, reduces risks, ensures compliance with legal requirements, and preserves valuable information for the long term. A structured records management framework safeguards sensitive data and promotes accountability through reliable recordkeeping practices (The ECM Consultant, 2023).

However, as technologies continue to advance, the emergence of big data presents significant challenges to traditional records management. Thinking Records (2013) highlighted that issues related to big data could not be overlooked, and records management needed to be strengthened to effectively manage and control this rapidly expanding information environment. In her study in Kenya, Lucy Kibe (2019) emphasized that records management is vital to control organizational affairs systematically—from record creation to their storage, use, and final disposition. Similarly, Rolf Green (2015) stressed that records management remains fundamental in addressing the complexities brought by big data.

At the heart of this research lies the philosophy of records management and an analysis of how big data can be managed effectively through these principles. Big data analytics plays a critical role in organizing and deriving meaning from large and unstructured data sources, particularly those generated from the Internet of Things. Hemlata (2016) noted that due to the vast volume of data, organizations employ various

analytical methods and tools—both professional and non-professional—to identify trends and patterns. While analytics tools are essential for interpreting data, this study focuses on assessing whether existing records management standards are adequate for governing and controlling big data. According to Rolf Green (2015), the challenges posed by big data cannot be resolved solely through technological tools; instead, the data itself must be managed systematically. In this context, this study identifies records management standards that are appropriate for managing the complexities associated with big data. Gandomi and Haider (2015) also argued that effective record maintenance and governance are critical for ensuring the accuracy, quality, and reliability of data analytics, reinforcing the view that sound records management underpins successful big data initiatives.

The motivation for examining records management within the dimensions of big data arises from prior research acknowledging that large data volumes require systematic information control. However, previous studies did not sufficiently explore the contribution of records management in addressing big data challenges. This study builds on that gap, arguing that records management principles can provide practical solutions to the problems associated with big data. This perspective aligns with Rolf Green's (2015) experience as an information management specialist, who noted that records professionals have historically played a crucial role in managing storage and information even before the rise of modern IT. This historical insight emphasizes the long-standing relevance of records management in handling large-scale data environments.

In addition, traditional records management concepts such as archival practices offer valuable guidance for managing big data. Rolf Green (2015) observed that modern technologies tend to back up and store all data indiscriminately, which contrasts with the records management philosophy that emphasizes appraisal, selection, and control. From this perspective, modern data management focuses on storage and retrieval, whereas records management emphasizes long-term preservation and value determination. The archival approach, therefore, provides a foundation for developing strategies to control and manage big data effectively. Consequently, this research incorporates multiple records management standards, including ISO 15489-1:2016(E), to evaluate their applicability and relevance in managing and controlling big data within organizational contexts.

The emergence of big data had, without a doubt, affected our lives in numerous aspects. For commensurate and systematic analysis results to be obtained, the ever-expanding volume of unstructured data on the internet posed new issues regarding storage and management. Controversial statements about records management as a control center were discussed in recent research, such as that by Nor Sakila, Irwan Kamruddin, Abdul Rahman & Alwi Yunus (2022). Their work broadened the scope by examining whether records management systems could cope with the challenges posed by big data. This article analyzed the effectiveness of current records management standards in addressing the scale and complexities of data in the modern digital age, offering insights into the evolving role of records professionals in managing big data.

ARMA International emphasized the critical role of Records and Information Management professionals in big data initiatives, highlighting their involvement in advising on data disposition policies, assessing big data technologies, and consulting on security and privacy risks (ARMA International, 2015). The International ARMA-Association recently noted that, when focusing on big data, there was a fundamental question: where did the data come from, and what was the essence of the work of records professionals who organized and controlled the 'big data.' A major concern for the seminar was the management of big data in modern corporations, which constituted a cost and risk yet also offered many benefits where data played a key role. So, Unhelkar, A. (2018) also tried to pinpoint the fact that data was, in fact, one of the most prized assets in any establishment. In his view, it was also a resource like gas or electricity where well-harnessing and appropriate management of it translated into great business benefits. Nevertheless, technological developments had reached a point where both the volume and complexity of big data had increased to a level that posed immense challenges for organizations in the area of management, security, and use of data (Unhelkar, 2018).

In order to solve these challenges, this research analyzed whether Records Management standards were applicable in the growing field of big data. More specifically, the study sought to understand the extent to which such standards could be modified in order to manage big data within an organizational setting in Malaysia. The growth of the internet in Malaysia, one of the countries with the highest penetration in Asia as highlighted in the Digital Report (2019), resulted in an increase in the volume of data created. This statistic explained the growth of volume of data generated using the internet, which, if unchecked, could cause an unchecked growth of big data.

In these socio-technical perspectives, this study delved into the various aspects associated with big data such as its implications on organizations and the management practices that were adopted. The research took up a qualitative research approach that aimed at exploring the best practices in managing big data in accordance with the Records Management standards. Addressing these challenges to the big data management practices was the objective of this investigation and thus the study sought to extend useful recommendations. This study concluded with the best framework that an organization ought to have embarked on so as to avoid wastage of resources when managing big data through the Records Management standards.

1.2 Problem Statement

In the digital era, organizations increasingly rely on big data to generate insights, support informed decision-making, and sustain competitive advantage. Big data has enhanced organizational performance through real-time analytics and evidence-based strategies (Gupta et al., 2023; Chen & Zhang, 2022). The integration of internal and external data sources has further expanded analytical capabilities across multiple sectors (Martinez & Gupta, 2023). However, the rapid expansion of big data has simultaneously intensified challenges related to data governance, security, quality, and long-term control.

Although existing research has extensively examined big data technologies and analytical methods, there remains a critical gap in understanding how records management principles and standards can be applied effectively within big data environments. Much of the literature prioritizes technological solutions, while the role of records management in ensuring authenticity, accountability, compliance, and reliable decision-making remains underexplored. This disconnect has resulted in organizations managing vast volumes of data without sufficient control mechanisms grounded in established records management frameworks.

The inadequacy of traditional records management systems becomes particularly evident when addressing the volume, velocity, and variety of big data (Joashi, 2018; Wang et al., 2023). Conventional systems often struggle to capture, classify, store, and retrieve large volumes of structured, semi-structured, and unstructured data in a timely and reliable manner (Unhelkar, 2018). As a result, organizations experience fragmented data repositories, reduced information reliability,

and limited traceability, which directly affect the quality of organizational decision-making.

The consequences of these inadequacies are not merely theoretical. Empirical evidence indicates that weak data governance and poor records control have contributed to significant compliance failures and data breaches across various industries. For example, regulatory authorities worldwide have reported substantial penalties imposed on organizations for non-compliance with data protection and records retention requirements, particularly in sectors such as finance, healthcare, and telecommunications (Demchenko et al., 2013; Somani & Deka, 2018). Industry reports have further shown that ineffective data governance practices increase the risk of data loss and security breaches, resulting in financial losses, reputational damage, and erosion of public trust (IBM Security, 2023).

These risks are amplified in digitally advanced contexts such as Malaysia, where rapid digital transformation and high internet penetration have accelerated big data adoption across public and private sectors (Digital Report, 2024). The widespread use of cloud platforms and Internet of Things (IoT) technologies has extended data creation beyond traditional organizational boundaries, increasing governance complexity and exposure to privacy and security threats (Mohammed, 2016; Garyaev, 2019). Without robust records management controls, organizations remain vulnerable to regulatory non-compliance, data misuse, and unreliable decision outcomes.

Despite these growing risks, limited empirical research has examined the applicability of ISO 15489-1:2016(E)—a widely recognized international records management standard—within big data contexts. While prior studies have discussed data governance frameworks and information management practices (Smith & Brown, 2021; Johnson & Lee, 2024), few have evaluated whether ISO 15489-1:2016(E) can effectively address the governance, accountability, and control challenges posed by big data environments. This gap highlights the need for systematic investigation into the relevance of records management standards in supporting effective and compliant big data management.

Accordingly, this study aims to assess the applicability and effectiveness of ISO 15489-1:2016(E) in addressing big data challenges within organizational settings through big data V's. By doing so, the study seeks to contribute empirical insights toward the development of best-practice records management strategies that bridge

conventional records management principles with the complex requirements of contemporary digital ecosystems.

1.3 Purpose and Objectives of Study

The purpose of this study was to develop an optimal framework suitable for managing big data through the application of records management standards. Accordingly, the main objective of the study was specified as follows:

Table 1. 1
Research Objectives

Objectives
RO 1.0:
To evaluate current records management practices used that are suitable in dealing with big data V's.
RO 2.0:
To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.
RO 3.0:
To design and validate a records management framework for managing big data by integrating suitable elements from established records management standards.

Notes: Research objective of this study

Almeida, F.L.F. (2017) highlighted several benefits that organizations could gain from leveraging big data when using proper techniques for management. One of the key advantages was cost-saving. By adopting appropriate big data management practices, businesses could store massive volumes of data at a significantly lower cost compared to traditional databases. This not only reduced operational expenses but also increased efficiency in managing large datasets. Furthermore, big data offered a competitive advantage for businesses by providing valuable insights that could help them explore new business opportunities. With the right data analysis techniques, organizations could uncover patterns, trends, and opportunities that would otherwise have been hidden, enabling them to stay ahead of competitors in the marketplace (Almeida, F.L.F., 2017).

Moreover, Manyika (2017), as cited by Almeida (2017), argued that organizations could utilize big data to explore new products and business models. By analyzing vast amounts of data, businesses could identify emerging trends, customer preferences, and untapped markets, which could inform the development of innovative products and services. This created new avenues for growth and fostered a more agile and responsive business environment.

However, to fully realize these benefits, it was crucial for organizations to first implement proper big data management strategies. Effective management ensured that data was organized, accessible, and secure, making it easier for businesses to derive actionable insights. Without robust data management practices, organizations risked making poor decisions based on incomplete, inaccurate, or inaccessible data. Therefore, the proper management of big data was foundational to capitalizing on the opportunities it presented.

In this study, records management standards were selected as a framework to evaluate their suitability in managing big data. The objective of the study was to determine whether these standards could provide a reliable and effective approach to managing the challenges associated with big data. Through this research, the study aimed to propose the best framework for organizations to manage big data efficiently, ensuring they could harness its full potential while mitigating risks. By applying records management principles, organizations could streamline their big data processes, improve decision-making, and ultimately achieve greater business success.

1.4 Research Question

Table 1. 2
Research Questions

Research Questions
RQ 1.0: What current records management practices are suitable for dealing with big data V's?
RQ 2.0: What are the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizations?
RQ 3.1 : Which elements of records management standards are suitable for developing a framework to manage big data?

Notes: Research questions for this study

1.5 Scope of Study

This study focuses on evaluating how records management standards can be applied to address challenges associated with big data within organizational environments in Malaysia. The geographical scope of the research is limited to organizations operating in Malaysia that are actively involved in generating, managing, or utilizing large volumes of digital data. These organizations were selected because they represent environments where big data practices are increasingly integrated into organizational operations.

The study concentrates on records management practices relevant to big data environments. From a technical perspective, the research focuses on how records management principles can support the management, governance, and control of data characterized by the big data V's. The study does not examine the development of big data technologies, analytical algorithms, or data processing systems. Instead, the emphasis is placed on governance and management practices related to records and information management.

The study also defines its theoretical scope through the application of established records management standards, particularly ISO 15489-1:2016(E). The research evaluates how elements of this international standard may support organizations in addressing governance, control, and accountability challenges

associated with big data environments. The study therefore focuses on the applicability of records management standards rather than broader information systems or data analytics frameworks.

Data for the study were obtained from professionals who are involved in managing records and information within organizations. These participants included Records Managers, Records Officers, Document Controllers, Information Technology Professionals, Business Managers, and Legal Professionals. Their professional roles provide practical insights into how records management practices are implemented in data-intensive environments.

The organizations included in this study were selected based on their active involvement in managing large volumes of digital data and their reliance on structured records management practices. The selection criteria focused on organizations that operate in data-intensive environments where big data characteristics are evident. These organizations were drawn from sectors where digital information management plays a critical role in organizational operations and decision-making. The selection process also considered the availability of records management professionals who possess both practical experience in records management and familiarity with big data environments. A detailed description of the organizational selection criteria and sector representation is presented in Table 3.5 (Chapter 3).

From a methodological perspective, the study adopts a qualitative multiple case study approach. This approach enables the researcher to obtain detailed insights into existing records management practices and professional experiences in managing big data. The collected data are analysed using a matrix analysis technique to evaluate how records management standards correspond with the characteristics and management requirements of big data. This analytical approach supports the identification of key elements necessary for the development of a records management framework suitable for big data environments.

By defining these boundaries, the study aims to provide a focused examination of how records management standards can contribute to managing big data challenges in organizational contexts. While the findings offer insights relevant to Malaysian organizations, they may not be directly generalizable to all industries or international contexts due to differences in regulatory environments, technological infrastructures, and organizational practices.

1.6 Research Significance and Contributions / Benefits

a) Need for Records Management in Managing Big Data

There was an escalating need for effective Records Management systems to handle the enormous volumes of Big Data being generated by organizations. As businesses increasingly relied on data to drive decision-making, improve services, and gain competitive advantages, the importance of managing this data efficiently became undeniable. Records Management was essential for maintaining order, ensuring the integrity and reliability of data, and optimizing the utility of the information contained within these vast datasets. By establishing a structured approach to data management, organizations could ensure that data remained accessible, accurate, and compliant with relevant laws and regulations, all while enabling organizations to extract actionable insights that could drive business growth.

b) Researchers' Understanding of the Need for Records Management and Roles of Records Professionals in Handling Big Data Issues

This study aimed to deepen researchers' understanding of the indispensable role that Records Management and records professionals played in addressing Big Data challenges. Records Management was no longer just about archiving documents but had evolved to encompass the systematic management of both structured and unstructured data within organizations. By elucidating the significance of these roles, the study provided researchers with a clearer understanding of how effective data governance could improve the management of Big Data. Furthermore, this research enhanced the ability of scholars and practitioners to identify and develop the most effective methods for controlling, utilizing, and securing Big Data. Ultimately, this opened new avenues for innovation, contributing to the development of advanced methodologies and solutions that addressed the unique challenges of Big Data.

c) Improvisation in Organizational and Records Professionals in Malaysia

The findings of this study were expected to stimulate significant improvements in the approach to Records Management within Malaysian organizations. By highlighting the critical importance of proper Records Management practices in dealing with Big Data, the research served as a catalyst for organizations to adopt more robust data management frameworks. These improvements not only increased operational efficiency but also enhanced data security and integrity, which were paramount in an increasingly digital world. Additionally, the study underscored the essential roles that records professionals played in managing these Big Data challenges, thereby contributing to a more structured, well-informed, and strategic approach to data governance. This empowered Malaysian organizations to optimize their data handling capabilities, fostering a more competitive and agile business environment.

d) The Expansion of Records Management Roles

This research contributed to the broader recognition and expansion of the roles associated with Records Management. By demonstrating the vital role Records Management played in managing Big Data, the study helped further establish the profession's relevance in modern organizations. The increased awareness and understanding of Records Management's applicability in various contexts—ranging from legal compliance to operational efficiency—encouraged a more widespread adoption of Records Management practices across different sectors. This helped ensure that organizations could not only comply with data protection regulations but also make the most out of their data, driving innovation and business success. The research helped position records professionals as key players in managing Big Data, expanding the scope of their influence and responsibilities.

e) Novelty of Research or Study

This research distinguished itself from existing studies by focusing specifically on the application of Records Management standards as a method for managing Big Data. While much of the existing literature on Big Data management touched upon various technological and organizational challenges, this study took a unique approach by linking Records Management standards directly to the effective handling of Big Data. The novelty of the research lay in its detailed examination of how these standards could be adapted and applied to meet the specific challenges of Big Data within the Malaysian context. By exploring how international Records Management standards could be customized to address the unique needs of Malaysian organizations, this study offered a fresh perspective on Big Data management. It sought to develop a suitable framework that organizations could follow to improve their data governance frameworks, ensuring that Big Data was managed in a way that supported long-term business success.

1.7 Limitations

Limitations referred to factors or constraints that may have affected the scope or results of a study but were beyond the researcher's control (Simon & Goes, 2013). In this study, three key limitations were identified.

i. Organization:

While Big Data was generated by individuals, groups, and organizations, this study specifically focused on organizational contexts. Only a select number of organizations were included in the research, chosen based on their data growth rates and significant contributions to the generation of Big Data. As such, the results may not have been fully representative of all organizations, particularly smaller entities or those with less pronounced data expansion. The findings primarily reflected the experiences and practices of larger organizations with substantial Big Data ecosystems.

ii. **Technology:**

Big Data encompassed a broad range of information sources, from human-generated data to data produced through technological means. However, this study focused solely on the technological aspect of Big Data, specifically examining how records professionals managed the growing volumes of data generated through internet technologies. As a result, the study did not explore other potential sources of Big Data, such as data generated through social interactions, offline activities, or human behaviour, which may have limited the comprehensiveness of the research in terms of all data sources involved in Big Data management.

iii. **Records Professionals:**

This research targeted records professionals as the primary focus group. The sampling included only those professionals who possessed substantial knowledge and expertise in both records management and Big Data. By focusing on experienced professionals, the research aimed to gather insights from individuals who were well-versed in the complexities of managing large datasets and records in the context of Big Data. However, this may have limited the diversity of perspectives, as the experiences of those with less experience or understanding of Big Data may not have been fully represented.

1.8 Definitions of Terms

In this research study, the following definitions were applied:

a) Record

Records were information created, received, and maintained that had value and could be evidence in the organization.

b) Records Management

Records management referred to the systematic and organized control of the entire lifecycle of records that ensured good business activities and transactions.

c) Standard

A standard refers to a formally established set of principles, guidelines, or requirements that define agreed-upon practices for performing specific tasks or processes. Standards are developed to ensure consistency, quality, and reliability, and they support organisations in improving performance, managing risks, and achieving sustainability.

d) Framework

A framework refers to a structured set of concepts, principles, and guidelines that provides a systematic foundation for understanding and managing complex processes or systems. It serves as an organising structure that guides the development and implementation of practices within a specific domain.

e) Big Data

Big Data referred to the large volume of data created from various sources that was generated every day and continued to increase over time based on the characteristics of the V's (Volume, Velocity, Variety, etc).

f) Big Data Analytics

Big Data Analytics involved the systematic examination of extensive datasets to discover patterns, correlations, and insights that could inform decision-making.

g) Internet of Things (IoT)

The Internet of Things (IoT) referred to the network of interconnected devices that communicated and exchanged data over the internet. This technological revolution allowed for the collection and analysis of large quantities of data from smart devices, fundamentally changing how Big Data was managed and utilized.

h) Organization

An organization was defined as a structured social unit of people who managed and organized information to fulfil a specific need or achieve particular goals

i) Records Professional

A records professional was an individual trained in the principles and practices of managing records and information. A records professional could also be any professional whose role involved managing information and could be considered a records professional or information professional, as long as they possessed good knowledge and skills in managing information within their organization.

1.9 Conceptual Overview of Research Gap

To provide a clearer overview of the research focus, the relationship between big data challenges, limitations in existing records management practices, and the identified research gap is summarized in Figure 1.1. The diagram illustrates how the rapid growth of big data has created governance and management challenges that are not fully addressed by traditional records management approaches. It also highlights the need to evaluate the applicability of established records management standards and develop a suitable framework for managing big data within organizational environment

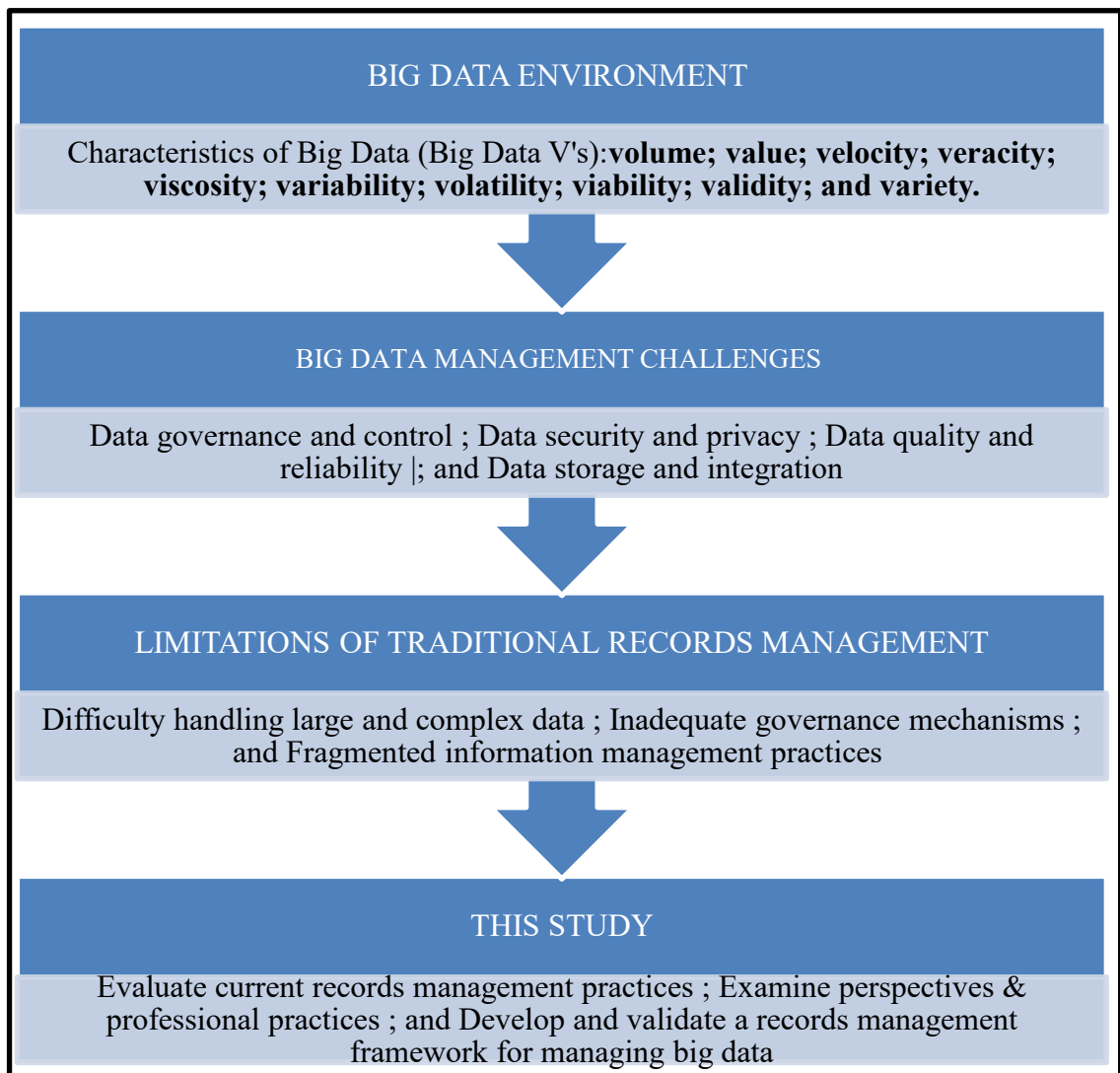


Figure 1. 1 Conceptual Overview of Research Gap

1.10 Chapter Summary

True to its word, this chapter detailed the problem statements, research objectives, and research questions of the thesis while also provided adequate definitions of key terms relevant to the topic. Particularly, the definitions and key terms allowed for a better understanding of the context and breadth of the research, and as the chapter was in itself wide-ranging, it was able to articulate the significance of the research and its implications in depth. The chapter did not gloss over the limitations of the study either, and instead served to provide a candid acknowledgment of the scope of research to be conducted.

Ultimately, the intentions of the chapter were rather clear. It wished to comprehensively explain the nature of the research being conducted while elaborating on the problems it intended to solve and its complex reasoning. Structuring the chapter while ensuring that problems, objectives, and questions were clearly defined ensured that the subsequent sections of the thesis were cohesive. The considerations taken within the chapter not only provided context to the research but also contributed to collating the existing knowledge of the area.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of Big Data Environment

Big data offers a wealth of opportunities to organizations because of the ease with which information, both external and internal, can be combined leading to predictive and statistical analyses (Martinez and Gupta, 2023). Furthermore, the proper organization and management of data allows for multifaceted decision-making and helps to improve the overall efficiency of an organization (Insights on Governance, Risk and Compliance, 2014; Gupta et al, 2023; Chen and Zhang, 2022; Wang et al, 2023 ; Smith and Brown, 2021; Johnson and Lee, 2024). Ensuring that information is well-organized and accessible facilitates proficient decision-making at organizational tier, thus helping to ascertain a competitive cross-jurisdictional position. Moreover, the contemporary context forces multiple organisations to depend on big data to achieve deep competitive insights along with fast-paced growth in the market.

However, When we talk about technology, Big data was emerging so fast today. According to Waal-Montgomery (2015) as cited by Siti Aisyah Ismail & et al. (2018), every year there is approximately 40% volume of data created and will continue to increase fifty times by the year 2020 from the current volume. Moreover, the increase of the big data era also due to the explosion from the advance of technology in today's world (Siti Aisyah Ismail & et al.. 2018).

As cited in Mahmoud Mawed., & Assem Al-Hajj. (2016), Davenport and Dyche, (2013) mentioned that Big data is referring to the large and disparate volumes of data that are dynamic and being created by people, tools, and machines. The same goes for Almeida, F.L.F., (2017) where she believes that big data is about the large amount which can affect the business where it can be structured and unstructured. This is followed by Tengku Adil, (2018) in his Ph.D. research that believes big data is about large datasets were cannot be handled by the traditional application and cannot fit into a single server. Insights on governance, risk, and compliance, (2014) also stated that big data is referring to dynamic and large volumes created from a variety of tools, machines,

and people. While, Rolf Green, (2015) added that NASA coined big data as large data sets that need to be analysed.

As explain above, Big data also divided into two types which are structured and unstructured. Mahmoud Mawed., & Assem Al-Hajj, (2016) mentioned that structured data referring to the information created in projects such as FM or building where the data is already fixed, easy to store, or analysed. While unstructured data happens during the maintenance project, for example, the is additional information added or increasing during the project such as scanned documents, captured photos, graphics, videos, and many more. This is different from Uma Mohan, (2015) that believes structured data is those data that have a relationship with each other's and stored together in tuples while unstructured is data stored separately and not in one table or tuple. Unstructured data also do not have a relationship with the data.

Unstructured data can be referring to as the Internet of Things (IoT). Palaghat Yaswanth Sai., & Pabolu Harika (2017) mentioned that IoT is a way of users connecting with each other's using devices through internet monitoring, and the data from it was produced rapidly in the large-scale development. Tulasi, (2016) also mentioned that IoT was spread across various fields such as retail management, health, and many more. Tulasi, (2016) also believes that internet application was very closely associated with human life such as emails to e-learning and many applications can be seen nowadays. Through the internet, all is not possible.

Besides, there is a study that comes out with semi-structured data. Xiaomeng Su,(n.d), mentioned that semi-structured data is between the structured and unstructured. The semi-structured is referring to data that may be incomplete and have structure at the beginning but can change unpredictable and rapidly at the end. Generally, it is not a fixed schema such as Web Logs.

2.1.1 Technological Advancements in The Big Data Environment

The rapid evolution of Big Data technologies has been driven by the need to manage and analyse ever-growing volumes of diverse data efficiently. Several key technological advancements have played a crucial role in shaping the Big Data landscape, enabling organizations to store, process, and extract meaningful insights from massive datasets. These advancements include distributed computing frameworks, NoSQL databases, real-time data processing technologies, and advancements in machine learning and artificial intelligence.

2.1.1.1 Distributed Computing Frameworks

Distributed computing frameworks have become foundational in managing Big Data due to their ability to handle large datasets across multiple nodes in a cluster. The Hadoop ecosystem, particularly the Hadoop Distributed File System (HDFS) and MapReduce programming model, is one of the most significant innovations in this area. HDFS allows for the storage of large data files by splitting them across multiple machines, ensuring data redundancy and fault tolerance. This makes it possible to store and manage petabytes of data without a single point of failure (Reddy et al., 2023).

The MapReduce model, developed by Google and later open-sourced as part of the Hadoop project, is designed to process large-scale data in parallel across a distributed network. MapReduce divides tasks into smaller sub-tasks (map phase) and then combines the results (reduce phase) to produce the final output. This parallel processing capability significantly reduces the time required to analyse large datasets, making it a cornerstone of Big Data analytics (Dean & Ghemawat, 2008).

2.1.1.2 NoSQL Databases

Traditional relational databases, while effective for structured data, struggle with the flexibility and scalability required for Big Data. NoSQL databases have emerged as a solution to these limitations by offering schema-less data models, horizontal scalability, and the ability to handle unstructured and semi-structured data. NoSQL databases can be categorized into four main types: key-value stores (e.g., Redis), document stores (e.g., MongoDB), column-family stores (e.g., Apache Cassandra), and graph databases (e.g., Neo4j). Each type is optimized for specific use cases. For example, MongoDB, a document-oriented database, is ideal for managing JSON-like documents and offers great flexibility in handling varied data structures (Chen & Li, 2024). Similarly, Cassandra is designed for high availability and can efficiently manage large amounts of data across many servers without compromising performance (Stonebraker, 2010).

2.1.1.3 Real-Time Data Processing Technologies

With the growing demand for real-time insights, especially in industries such as finance, healthcare, and e-commerce, technologies that enable real-time data processing have become essential. Apache Spark and Apache Flink are two prominent frameworks that have advanced real-time data processing.

Apache Spark, known for its in-memory processing capabilities, allows data to be stored in memory rather than on disk, drastically speeding up data processing times. Spark supports both batch and stream processing, making it versatile for various applications (Zaharia et al., 2016). Apache Flink, on the other hand, is designed specifically for stream processing and provides low-latency data processing, making it suitable for real-time analytics (Liu et al., 2024).

These technologies have enabled businesses to perform complex analytics on streaming data, such as fraud detection, personalized marketing, and real-time risk management. The ability to analyse data as it arrives allows organizations to make immediate decisions and respond to events as they happen, offering a significant competitive advantage.

2.1.1.4 Machine Learning and Artificial Intelligence

Machine learning (ML) and artificial intelligence (AI) have become integral to Big Data analytics, enabling the development of predictive models, pattern recognition, and automated decision-making systems. These technologies rely heavily on Big Data to train algorithms that can learn from and make predictions based on vast datasets.

Advancements in deep learning, a subset of machine learning, have further expanded the capabilities of Big Data analytics. Deep learning models, such as neural networks, can analyse complex patterns and relationships within data, making them powerful tools for image recognition, natural language processing, and recommendation systems (Ahmed & Qureshi, 2024). The integration of Big Data with AI and ML technologies has led to the creation of intelligent systems that can analyse data at unprecedented scales and speeds.

Frameworks like TensorFlow and PyTorch have made it easier to implement machine learning models on Big Data platforms. These frameworks are optimized for

distributed computing environments, allowing them to process large datasets efficiently and scale as data volumes grow.

2.1.1.5 Cloud Computing and Big Data

The convergence of cloud computing and Big Data has further accelerated technological advancements in this field. Cloud platforms such as Amazon Web Services (AWS), Google Cloud Platform (GCP), and Microsoft Azure offer scalable infrastructure and a range of Big Data services that allow organizations to store, process, and analyse data without the need for significant on-premises hardware investments.

Cloud-based Big Data solutions provide flexibility in scaling resources up or down based on demand, enabling businesses to manage costs effectively. Additionally, cloud platforms offer integrated analytics services, such as AWS Redshift for data warehousing, Google Big Query for large-scale data queries, and Azure HDInsight for Hadoop-based processing. These services streamline the deployment of Big Data solutions, making advanced analytics accessible to a broader range of organizations (Nguyen & Tran, 2023).

2.1.2 Impact Big Data on Various Sectors

Big Data has transformed numerous industries, driving innovation, efficiency, and decision-making across various sectors. The impact of Big Data is particularly evident in healthcare, finance, retail, and manufacturing, where it has become a key enabler of new business models and operational strategies.

2.1.2.1 Healthcare

In healthcare, Big Data analytics has revolutionized the way medical professionals approach patient care. The ability to analyse vast amounts of data from electronic health records (EHRs), medical imaging, and genomics has paved the way for personalized medicine, where treatments are tailored to individual patients based on their genetic makeup and health history (Raghupathi & Raghupathi, 2014). Predictive analytics has also improved the ability to forecast disease outbreaks and manage chronic conditions, leading to better patient outcomes and more efficient healthcare delivery (Wang, Kung, & Byrd, 2018). Additionally, Big Data supports the development of

precision medicine, enabling healthcare providers to identify the most effective treatments for specific patient subgroups (Murdoch & Detsky, 2013).

2.1.2.2 Finance

The financial sector has been a frontrunner in adopting Big Data technologies, using advanced analytics to enhance risk management, fraud detection, and algorithmic trading. Financial institutions analyse large datasets to assess credit risk, optimize investment portfolios, and detect fraudulent activities in real time (Davenport, 2014). The use of Big Data in high-frequency trading has also transformed the landscape of financial markets, allowing for the rapid execution of trades based on complex algorithms that analyse market data at lightning speed (Jain et al., 2016). Furthermore, customer analytics in banking helps institutions personalize services, improving customer satisfaction and loyalty (Chen, Chiang, & Storey, 2012).

2.1.2.3 Retail

In the retail industry, Big Data has become essential for understanding consumer behaviour and optimizing business operations. Retailers like Amazon and Walmart leverage Big Data to gain insights into customer preferences, enabling them to personalize marketing strategies and improve the overall shopping experience (Chen, Chiang, & Storey, 2012). By analysing data from online transactions, social media, and customer feedback, retailers can predict trends, optimize inventory levels, and streamline supply chains (Huang & Rust, 2018). Big Data analytics also plays a critical role in dynamic pricing strategies, allowing retailers to adjust prices in real-time based on demand fluctuations and competitor actions (Kumar et al., 2021).

2.1.2.4 Manufacturing

In manufacturing, Big Data has driven significant advancements in operational efficiency and product quality. One of the key applications is predictive maintenance, where data from sensors and IoT devices is analysed to forecast equipment failures before they occur (Lee, Kao, & Yang, 2014). This approach reduces downtime and maintenance costs by allowing manufacturers to address issues proactively rather than reactively. Big Data also enables manufacturers to optimize production processes,

improve supply chain management, and enhance product development by analyzing data from various stages of the manufacturing lifecycle (Li et al., 2017). In smart manufacturing, the integration of Big Data with artificial intelligence and machine learning is leading to more autonomous and efficient production environments (Zhong et al., 2017).

2.1.3 Challenges in the Big Data Environment

The emergence of Big Data has transformed how organizations operate, offering new avenues for innovation and decision-making. However, these opportunities come with significant challenges, particularly concerning the management, processing, and analysis of large-scale data. Below are some of the most critical challenges faced in the Big Data landscape:

2.1.3.1 Managing Data Volume

One of the most significant challenges in Big Data is the sheer volume of data generated. The explosion of data from various sources, including social media, sensors, and transaction logs, necessitates advanced storage solutions. Traditional storage systems often fall short in handling such massive datasets, leading organizations to adopt distributed storage systems like Hadoop or cloud-based storage to manage the growing data effectively (Gandomi & Haider, 2015). Efficient management of this data requires scalable infrastructure and strategies to ensure quick retrieval and processing.

2.1.3.2 Handling Data Variety

Big Data is characterized by its variety, which includes structured, semi-structured, and unstructured data. Structured data, which is highly organized and easily searchable, contrasts with unstructured data such as text, images, and videos, which lack a predefined structure (Borkar et al., 2021). The variety in data types requires specialized tools and techniques for integration and analysis, as traditional relational databases are often inadequate for handling unstructured data (Hashem et al., 2015).

2.1.3.3 Coping with Data Velocity

Data velocity refers to the speed at which data is generated, processed, and analyzed. In many cases, organizations need to process data in real-time to gain timely insights. However, managing high-velocity data streams is challenging, as it requires robust computational resources and sophisticated algorithms to handle data efficiently (Zikopoulos et al., 2012). Ensuring low latency and maintaining data consistency are critical, especially in environments where immediate decision-making is necessary (Goes, 2014).

2.1.3.4 Ensuring Data Quality and Veracity

The reliability and accuracy of data, often referred to as data veracity, are essential for producing meaningful insights. Big Data often includes noisy, incomplete, or inconsistent data, which can lead to inaccurate analysis if not properly managed (Sivarajah et al., 2017). Ensuring data quality involves rigorous cleaning and validation processes, which are particularly challenging given the scale and diversity of data in Big Data environments (Manyika et al., 2011).

2.1.3.5 Data Integration and Interoperability

Integrating data from various sources poses a significant challenge, particularly when dealing with disparate systems that may use different formats and protocols. Achieving interoperability between these systems requires standardized data formats and robust middleware solutions to facilitate seamless data exchange (Chen et al., 2014). The complexity of data integration increases when dealing with legacy systems that may not easily integrate with newer technologies (Mikalef et al., 2018).

2.1.3.6 Addressing Security and Privacy Concerns

With the vast amounts of sensitive information contained in Big Data, ensuring data security and privacy is paramount. Organizations must protect data from unauthorized access, breaches, and cyberattacks while complying with regulations like the GDPR and CCPA (Kshetri, 2014). This challenge is compounded by the need to maintain data accessibility and usability for legitimate users (Tankard, 2012).

2.1.3.7 Governance and Compliance

Effective data governance is essential for managing Big Data in alignment with regulatory requirements and organizational policies. This includes defining data ownership, implementing access controls, and establishing procedures for data retention and disposal (Yin & Kaynak, 2015). Implementing a comprehensive governance framework in a Big Data environment is challenging due to the volume, variety, and velocity of data (Davenport, 2014).

2.1.3.8 Infrastructure Costs and Scalability

As data volumes continue to grow, organizations face the challenge of scaling their infrastructure to meet increasing demands. Expanding storage capacity and computational power can be costly, particularly for smaller enterprises (Hashem et al., 2015). Cloud-based solutions offer flexibility and scalability, but managing costs while ensuring that the infrastructure can handle large-scale data processing remains an ongoing concern (Goes, 2014).

2.1.3.9 Skill Gaps and Workforce Training

The rapid advancement of Big Data technologies has led to a significant demand for skilled professionals in data science, analytics, and engineering. However, there is a shortage of talent with the necessary expertise to manage and analyze Big Data effectively (Chen et al., 2014). Organizations must invest in training and development programs to bridge the skill gap and keep their workforce updated on the latest tools and techniques (Manyika et al., 2011).

2.2 The 10v's Big Data

Generally, know that big data is about V's. Some research believes big data is related to 3 (three) V's but some mentioned it is more than it.

Here below the summary of the chronology of the big data V's based on a few research gains through literature review in this study which will explain one by one:

Table 2. 1
The 10 V's Big Data

3 Vs Big Data	4 Vs Big Data	5 Vs Big Data	10 Vs Big Data
Volume	Volume	Volume	Volume
Velocity	Velocity	Velocity	Velocity
Variety	Variety	Variety	Variety
-	Veracity	Veracity	Veracity
-	-	Value	Value
-	-	-	Viscosity
-	-	-	Variability
-	-	-	Volatility
-	-	-	Viability
-	-	-	Validity

Notes: The 10V's of big data based in chronology

Oracle, (2019) believes big data about the variety contains that is greater in increasing volume and ever-higher velocity that known as the *three (3) Vs (Volume, Velocity, Variety)*. In research conducted by Tengku Adil, 2018 he comes out with three (3) V's which are volume, velocity, and variety. Volume is referring to the volume of information that is too big; velocity related to information that continuously flowing; and variety related to formats of information that are varied and too unstructured (Tengku Adil, 2018). This is different from Insights on governance, risk and compliance, (2014) that believes big data is about the four (4) V's which are volume, velocity, variety, and veracity. Volume here is about the amount created is high and vast compared to traditional sources; velocity is about data that generated is very fast where the process will never stop even during people fall asleep; variety is about data from different sources that created from machines as well as people, and veracity is about data that comes or sourced from various and different places that need a user to analyze or test the quality of data. (Insights on governance, risk and compliance, 2014).

This is the same with some research where they add another V's or which is the **fourth** one, "**Veracity**". As cited in Mahmoud Mawed., & Assem Al-Hajj. (2016), Halevi and Moed, (2012) stated that Veracity is about the reliability of types of data which is at what level the data is reliable to use. This is supported by Lucy Kibe, (2019) that also believes, big data exist in varying forms and sizes such as images, music, video, and many more. Sreenivas R. Sukumar, (2015) also believes veracity is important in

big data where it is about any source that leads to the uncertainty or accuracy of the information and also inconsistencies such as duplication, ambiguities, missing data, and many more.

However, Almeida, F.L.F., (2017) believes, that big data consists of **five v's which are volume, velocity, variety, veracity, and value**. Volume represents the quantity of data that can be managed and stored; velocity is about the speed that needs to calculate to query the relative of data to the rate of change of the data.; the variety is about the different formats of the data; the veracity is about the trustworthiness of the data or messiness, and lastly the value is about the importance provided by entities or companies in access data.

This is different from Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018) that stated big data consists of **10 Vs** which are **volume; value; velocity; veracity; viscosity; variability; volatility; viability; validity; and variety**.

Volume here based on Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018) is a large data set that has been generated either by human interaction records, science, and education, or business records; Value referring to the data that can provide usefulness in any decision making. The value also one of the most important elements in big data where it can give a big impact on business profit; Velocity is referring to the speeds of information or data created; Veracity is related to the accuracy and quality of data that can be trusted in making a decision; Viscosity is an about data that is complex that can give impact and deal with the degree of correlation and interdependencies in big data structures. Viscosity also happens in huge data sets especially for data that comes from various sources that involving in linking, matching, and transformation activities; Variability is related to the data flowing that is not inconsistent and can be shown at times; Volatility is about the life duration of data which how long the data can be valid and stored. Volatility is also related to the volume, variety, and velocity of big data where it needs to be understood to help in developing the policies for big data and retention requirements; Viability is about data that need to be active and live forever to help in developing and producing more data when needed; Validity is referring to the correctness of the consequent analysis and producing sources of big data to use it in decision making; Variety is related to various of data either structures, unstructured or semi-structured that can be a level degree of data organizations. According to Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018), structured data has a high degree rather than unstructured data where it is easier to handle.

Based on the explanation above, we can see that current research believes big data is consists of 10V's. Each V's of big data have their challenges that need to be overcome. Through this study, Records Management Standard will be used to seeing either it is suitable or not in managing big data. A clear explanation of big data V's and how to overcomes it using the Records Management Standard will be explained in content 2.5 in this chapter.

2.3 The Increasing of Big Data in Malaysia Through IoT

The convergence of Big Data and the Internet of Things (IoT) has significantly influenced various sectors in Malaysia, driving the nation's progress toward a data-driven economy. As IoT devices proliferate, they generate vast amounts of data, necessitating advanced Big Data analytics to extract actionable insights. This review explores the increasing presence of Big Data in Malaysia through IoT, focusing on its implications, challenges, and the strategic initiatives undertaken to harness its potential.

Malaysia has experienced a substantial increase in IoT adoption, driven by government initiatives, technological advancements, and industry demand. The Malaysian government, through its National IoT Strategic Roadmap, aims to position the country as a regional IoT hub. This roadmap highlights the potential economic impact of IoT, forecasting contributions of RM9.5 billion to the gross national income by 2025 (MIMOS, 2014). The adoption of IoT across various sectors, including manufacturing, healthcare, and agriculture, has led to the generation of massive datasets, emphasizing the need for robust Big Data analytics frameworks (Ramli, 2023).

Besides, the integration of IoT and Big Data in Malaysia is transforming industries by enabling real-time data collection and analysis. IoT devices, equipped with sensors and connected via the internet, generate continuous streams of data. This data, when analyzed using Big Data techniques, provides valuable insights for optimizing operations, enhancing customer experiences, and improving decision-making processes. For instance, in the manufacturing sector, IoT-enabled machines monitor production processes, and the resulting data is analyzed to predict maintenance needs, reducing downtime and increasing efficiency (Rahim et al., 2022).

Despite the benefits, the surge in data from IoT devices presents several challenges. One significant challenge is data management, where the volume, velocity, and variety of data require sophisticated storage, processing, and analysis techniques.

Traditional data management systems are often inadequate to handle the scale and complexity of IoT-generated data. Furthermore, ensuring data security and privacy is a critical concern, as IoT devices can be vulnerable to cyberattacks, leading to potential data breaches (Wang, & Lo, 2023).

Another challenge is the integration of IoT data with existing Big Data systems. This requires not only technical expertise but also significant investments in infrastructure and human resources. The lack of standardized protocols for IoT devices adds another layer of complexity, making it difficult to achieve seamless data integration and interoperability (Tan, 2023).

Besides, the IoT is one of the elements that lead to the increasing information that finally transforms into big data. Over the world, the internet was used widely including in Malaysia. According to Digital Report (2020), we can see that Malaysian one of the highest internet users based on population. Here below figure from Digital Report (2020):

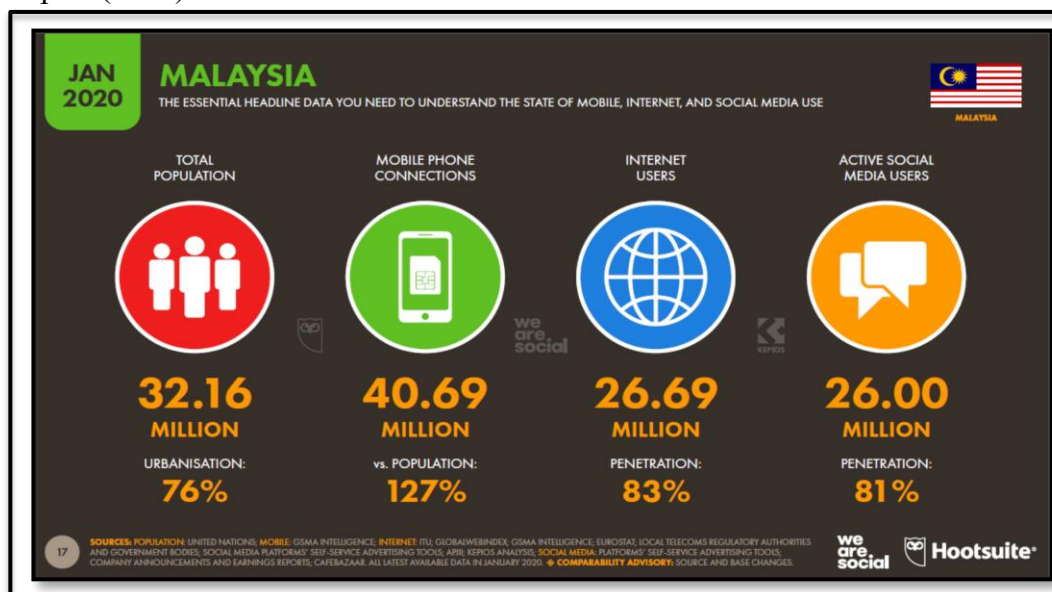


Plate 2. 1 The Total Population of Malaysian Users on Internet Usage

Based on the plate above, we can see that 32.26 million of the population, or 76% of Malaysian are internet users, have mobile phone connections, and active in media social. There are 40.69 million people or 127% compare to a current population that has a mobile phone connection for their daily life tasks and around 26.69 million persons or 83% are internet users. While 26.00 million or 83% is active in media social.

Through this statistic, we can see there is increasing digital growth happens from Digital Report, (2019) compare to the Digital Report, (2020). Below is the figure on digital growth indicators that show changes from the year 2019 to 2020.

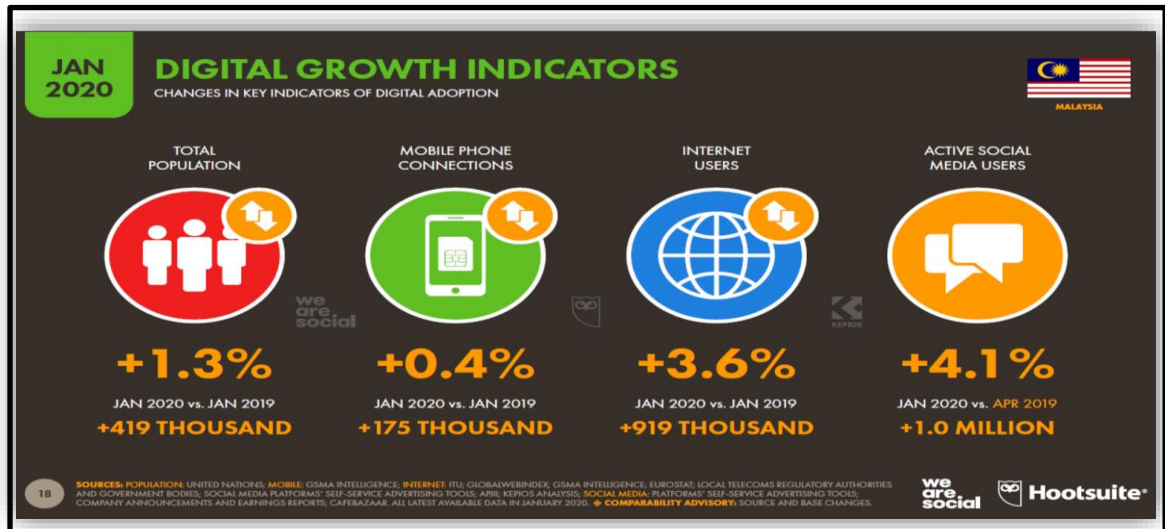


Plate 2. 2: Malaysia Digital Growth Indicators from The Year 2019 to 2020

Based on the plate above, we can see the numbers are all positive which means there is growth recorded on internet users. The population from January 2019 until January 2020 was increased by added 419 thousand users or 1.3%. This was lead to the use of internet users that increase with an added total of 919 thousand or 3.6%. This same goes for the mobile phone connections that increase up to 175 thousand or 0.4% differ from the previous year. Lastly is the total of people that is active in media social showed the highest increasing which added 1.0 million users or 4.1% in January 2020 compare with January 2019.

Based on a statistic from Digital Report (2019) and Digital Report (2020), we can conclude that Malaysia is an active country in internet usage. Moreover, Peng Hwa Ang, (2016) also supported that, Malaysia's attitude toward the internet since previous until nowadays and being the first country in South-East Asia active in public internet access. As stated by Yap, (1995) in Peng Hwa Ang, (2016) previously, since the middle of 1995 only 5,000 users in Malaysia use the internet but, different from now where the numbers keep increasing.

Today, The *Digital 2024 Malaysia* report highlights key insights into internet usage in Malaysia. With an internet penetration rate of 96.8%, the country has 32.7 million internet users, and 88.8% of the population is active on social media. The report shows significant mobile internet usage, with mobile connections reaching 143.3% of the population, indicating multiple device usage. E-commerce and digital payment systems are also seeing growth, reflecting the increasing role of technology in daily life.

2.3.1 Summary of the Digital 2024 : Malaysia Report

The Digital 2024: Malaysia report published by DataReportal provides a comprehensive overview of the current digital landscape in Malaysia. The report highlights trends in internet penetration, mobile connectivity, social media engagement, e-commerce activities, and digital payment adoption. These developments demonstrate the increasing reliance on digital technologies and the rapid expansion of data generation within the Malaysian digital environment (Kemp, 2024).

As of 2024, internet penetration in Malaysia has reached approximately 89%, reflecting continuous growth compared with previous years. This increase is largely supported by improvements in digital infrastructure, including the expansion of high-speed broadband services and the ongoing rollout of 5G networks. While urban areas generally demonstrate higher levels of connectivity, government initiatives continue to focus on reducing the digital divide between urban and rural communities (Kemp, 2024).

Mobile connectivity remains the dominant mode of internet access in Malaysia. Approximately 95% of internet users access online services through smartphones, highlighting the central role of mobile technologies in digital communication, information exchange, and online services. The expansion of mobile internet and 5G technology has further accelerated digital interaction, allowing individuals and organizations to access digital platforms more efficiently (Kemp, 2024).

Social media usage is also highly prevalent in Malaysia. Platforms such as Facebook, Instagram, TikTok, and Twitter attract significant user engagement, with Malaysian users spending an average of 3.5 hours per day on social media platforms. These platforms are widely used for communication, entertainment, and commercial activities, contributing significantly to the generation and exchange of digital information (Kemp, 2024).

The growth of e-commerce further illustrates the increasing digitalization of Malaysian society. Online retail sales reached approximately MYR 50 billion in 2024, representing a significant increase compared with previous years. The expansion of digital marketplaces, improved logistics infrastructure, and widespread adoption of digital payment systems have contributed to this growth. Platforms such as Shopee, Lazada, and Zalora dominate the Malaysian e-commerce market, while new digital businesses continue to emerge to meet evolving consumer demands (Kemp, 2024).

In addition, the adoption of digital payment systems has accelerated significantly. Approximately 70% of Malaysian internet users now use e-wallet services such as Touch 'n Go eWallet, GrabPay, and Boost for online and offline transactions. The development of financial technology (fintech) services, including blockchain-based platforms and digital lending systems, has further expanded the digital economy in Malaysia (Kemp, 2024).

Overall, these developments demonstrate that Malaysia has experienced substantial digital growth driven by increasing internet usage, mobile connectivity, and digital platform adoption. The widespread use of digital technologies generates large volumes of data across multiple platforms and services. Consequently, the expansion of digital activities contributes significantly to the growth of big data, creating new challenges related to data management, governance, security, and information control within organizational environments.

2.3.2 Main Reasons People Use Internet

The internet has become an integral component of contemporary society, supporting a wide range of activities including communication, information retrieval, entertainment, e-commerce, education, and social networking. According to the Digital Report 2024, individuals aged between 16 and 64 engage with digital platforms for multiple purposes that shape everyday digital interactions. These activities collectively contribute to the continuous generation of digital information and the increasing complexity of managing data within modern digital environments (Kemp, 2024). Evidence of these patterns is presented in Figure 2.3, which illustrates the primary motivations for internet usage among individuals in Malaysia.

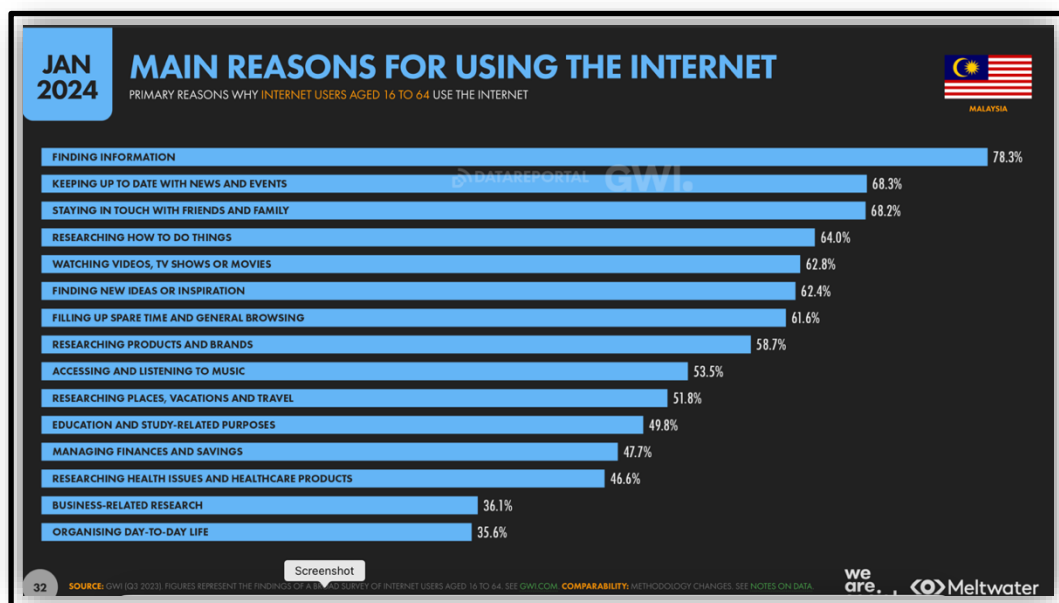


Plate 2. 3 Number of Main Reasons for Using the Internet

One of the most prominent uses of the internet is communication, which has evolved substantially with the development of digital communication technologies. Platforms such as email services, instant messaging applications, and video conferencing tools allow individuals to communicate in real time regardless of geographical location. Social networking platforms further facilitate interaction among individuals and communities by enabling users to exchange messages, share multimedia content, and collaborate in both personal and professional contexts (Wellman & Gulia, 1999; Bargh & McKenna, 2004). As a result, these communication platforms generate

extensive digital records in the form of text messages, images, videos, and other user-generated content that accumulate within digital information systems.

Another significant motivation for internet use is information retrieval and knowledge seeking. Search engines, digital libraries, and online databases provide access to vast quantities of information across multiple disciplines. The internet therefore offers diverse sources of knowledge, including academic publications, institutional repositories, online encyclopedias, and community-based knowledge platforms. Such accessibility has significantly transformed research practices, education systems, and professional knowledge development (Bawden & Robinson, 2012; Case & Given, 2016). Nevertheless, the abundance of information available online also introduces several challenges. Internet users often encounter issues such as information overload, misinformation, and difficulties in evaluating the credibility of digital sources. These challenges highlight the importance of information literacy and effective information management practices in navigating digital environments (Nicholas et al., 2011).

The internet also plays a major role in digital entertainment and media consumption. Online streaming platforms, social media services, and digital gaming platforms allow users to access and share multimedia content such as videos, music, and interactive media. The rapid expansion of digital entertainment services has significantly transformed patterns of media consumption by enabling users to access content on demand across multiple devices (Tryon, 2013; Taylor, 2018). Consequently, entertainment platforms generate substantial volumes of multimedia data across digital networks. Despite the benefits associated with accessible entertainment, several concerns have been raised regarding excessive digital consumption. Researchers have highlighted potential issues such as content overload, algorithm-driven content recommendations, and the development of digital echo chambers that may limit exposure to diverse perspectives (Pariser, 2011). In addition, prolonged engagement with online entertainment platforms has been associated with concerns related to productivity, social isolation, and mental well-being (Przybylski & Weinstein, 2017).

Another important area of internet use is electronic commerce (e-commerce). Online marketplaces allow consumers to purchase goods and services through digital platforms, thereby transforming traditional retail models and expanding global trade opportunities. E-commerce platforms rely heavily on data analytics and digital transaction records to analyze consumer behavior, manage supply chains, and enhance

customer experiences (Laudon & Traver, 2018; Turban et al., 2018). These transactions generate significant volumes of digital records, including purchase histories, payment information, and customer interaction data. Despite the advantages offered by online commerce, several operational challenges remain. Issues such as logistics management, product authenticity, and consumer trust continue to influence the sustainability of e-commerce activities. In particular, the presence of counterfeit goods and concerns over transaction security require businesses to implement transparent practices and reliable customer service mechanisms in order to maintain consumer confidence (Turban et al., 2018).

The internet has also expanded opportunities for education and knowledge development through the emergence of e-learning platforms and digital learning environments. Online learning platforms allow individuals to access educational resources, participate in training programs, and pursue lifelong learning opportunities regardless of geographical location (Means et al., 2014; Siemens, 2014). These platforms generate various forms of digital educational records, including course participation data, learning analytics, and assessment records. However, despite the benefits of flexible and accessible learning environments, several challenges remain. One of the most prominent concerns is the digital divide, where unequal access to internet connectivity and digital devices creates disparities in educational opportunities (Van Dijk, 2020). In addition, the absence of physical classroom interaction in online learning environments may lead to reduced student engagement and motivation, particularly for learners who benefit from direct interaction and hands-on learning experiences (Means et al., 2014).

Finally, the internet facilitates social interaction and online networking, enabling individuals to build relationships, participate in digital communities, and collaborate across geographical boundaries. Social networking platforms provide spaces where users can exchange ideas, share experiences, and form communities based on shared interests (Ellison et al., 2007; Hampton et al., 2011). These platforms continuously generate large volumes of user-generated content including posts, comments, images, and multimedia files. While online social networking offers opportunities for connectivity and community engagement, it also raises important privacy and ethical concerns. Social media platforms collect extensive amounts of personal data, often without users being fully aware of how such data is collected, processed, or utilized (Van Dijck, 2013). The use of personal information for targeted

advertising, political communication, and behavioral monitoring has therefore sparked ongoing debates regarding privacy protection and the ethical responsibilities of digital platform providers.

Overall, the diverse motivations for internet usage demonstrate how digital platforms have become deeply embedded within various aspects of contemporary life, including communication, commerce, education, entertainment, and social interaction. The widespread adoption of internet technologies contributes to the continuous generation of large volumes of digital information across multiple platforms. As digital interactions expand, organizations are increasingly required to manage vast quantities of data generated through these activities. This growing volume of digital information highlights the importance of effective governance and information management strategies, particularly within the context of big data environments.

2.3.3 Internet use In Malaysia Based on Digital Report (2024)

The rapid expansion of internet usage in Malaysia has played a crucial role in accelerating the generation of digital data. The Digital Report (2024) provides comprehensive statistics that illustrate the extent of internet adoption and digital engagement within the Malaysian population. These statistics demonstrate how widespread internet access, combined with increasing reliance on digital platforms, contributes significantly to the growth of large-scale data environments.

Plate 2.4 illustrates the number of people using the internet in Malaysia and the amount of time spent online each day. The report indicates that approximately 33.59 million individuals, representing 97.4 percent of the population, actively use the internet through various digital devices. On average, Malaysian users spend approximately 8 hours and 17 minutes per day online. This extensive daily engagement reflects the deep integration of digital technologies into everyday life. Furthermore, the number of internet users continues to grow annually, with an increase of 1.1 percent or approximately 357 thousand new users recorded between 2023 and 2024 (Digital Report, 2024).

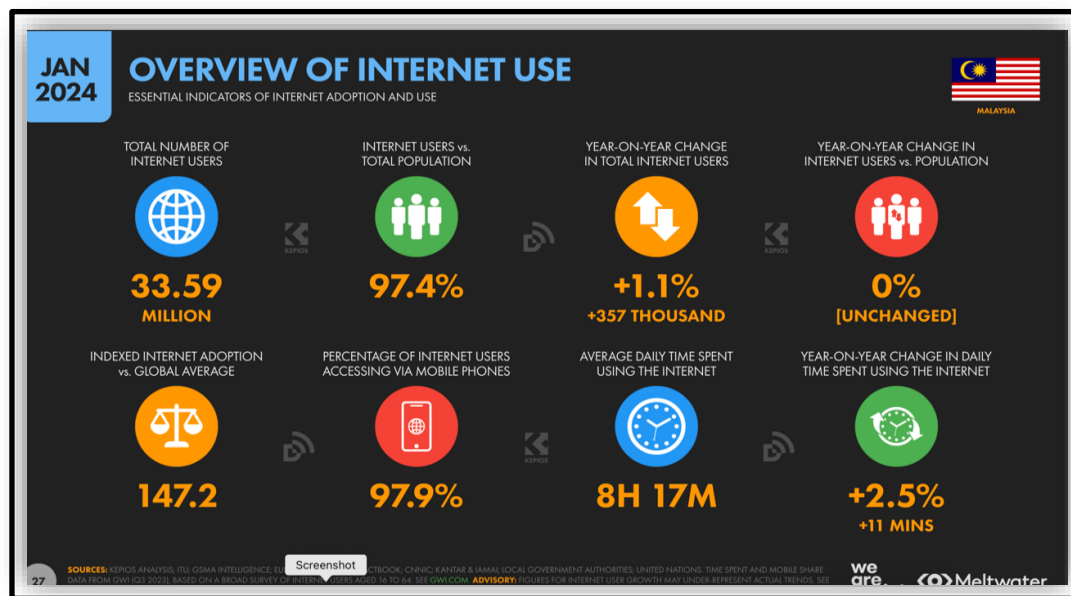


Plate 2. 4 Overview on Internet Use

Plate 2.5 further illustrates the year-on-year growth of internet users in Malaysia. Although the increase from 33.2 million users in 2023 to 33.6 million users in 2024 may appear modest, it still represents a steady expansion of digital participation across the country. The sustained growth of internet adoption indicates that digital platforms are becoming increasingly embedded in social, economic, and organizational activities. As more individuals access online services, the amount of digital information generated through online interactions also continues to expand.

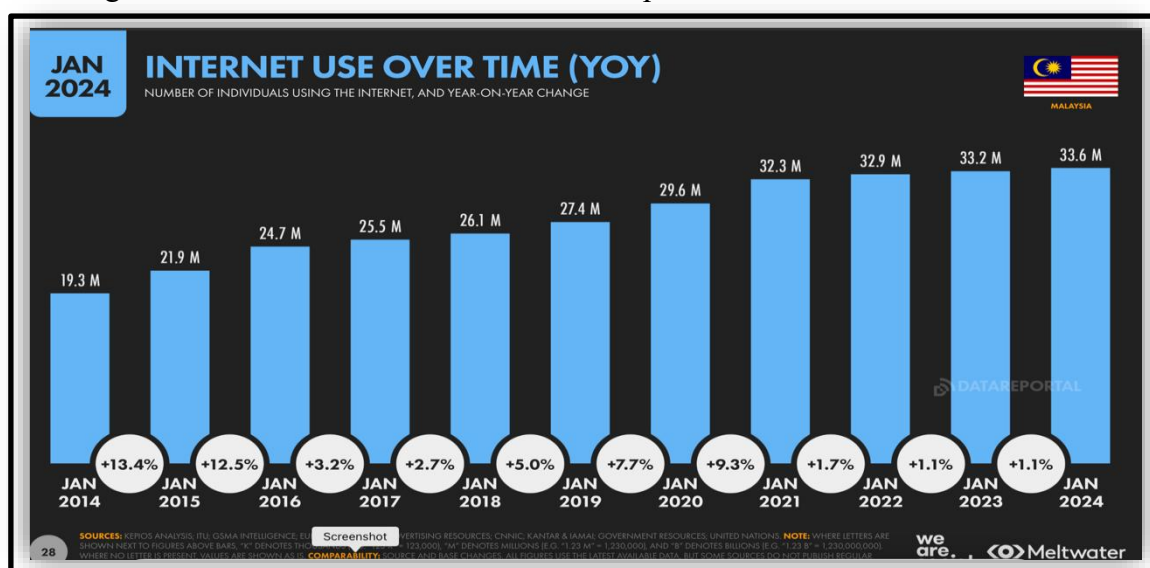


Plate 2. 5 Number of Individuals in Malaysia Using the Internet and Year-on-Year Change

In addition to the growth in internet penetration, digital activities in Malaysia are strongly driven by the widespread use of social media platforms. The Digital Report (2024) indicates that platforms such as WhatsApp, Facebook, Instagram, and TikTok are among the most widely used digital communication tools. For instance, WhatsApp records approximately 90.7 percent usage, followed by Facebook at 84.9 percent, Instagram at 77 percent, and TikTok at 68.8 percent. These platforms serve as major channels for communication, entertainment, and social interaction. As users share messages, multimedia files, and online content, vast quantities of digital records are continuously generated and stored within digital infrastructures.

The growth of internet usage is also reflected in the increasing number of visits to major websites and digital platforms. Figure 2.6 presents the most visited websites in Malaysia according to SimilarWeb data, with Google.com recording approximately 569 million monthly visits. Other frequently accessed platforms include YouTube, Facebook, Twitter, Shopee, and TikTok, which support a wide range of activities such as information search, social interaction, online shopping, and digital entertainment.

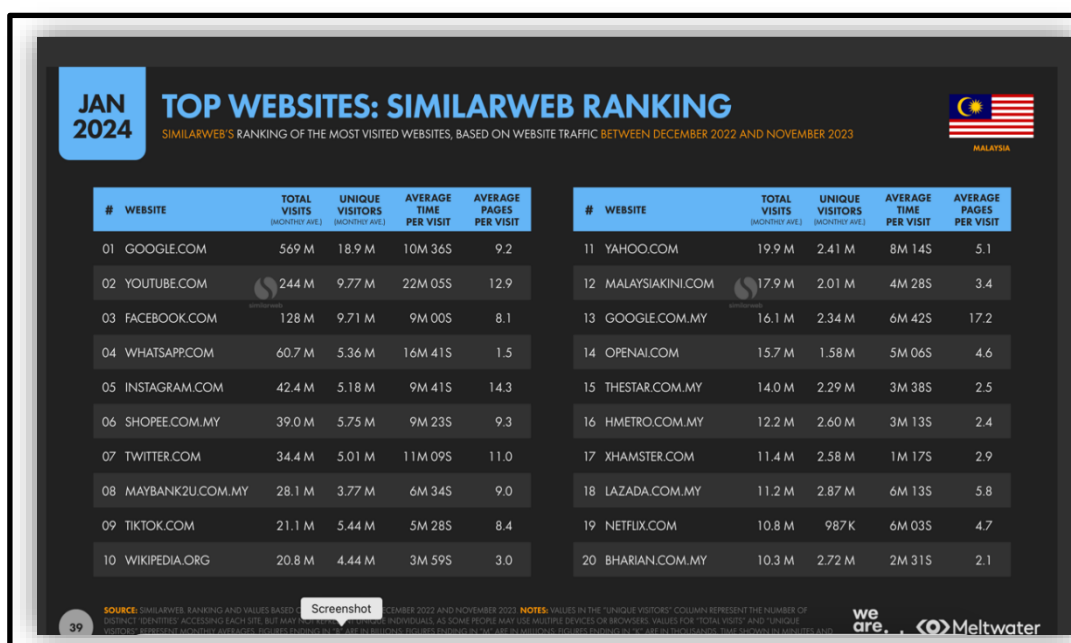


Plate 2. 6 Most-Visited Websites in Malaysia According to SimilarWeb

Similarly, Plate 2.7 shows website ranking statistics obtained from Semrush, which also identifies Google, YouTube, Facebook, and various digital commerce platforms among the most frequently visited websites in Malaysia.

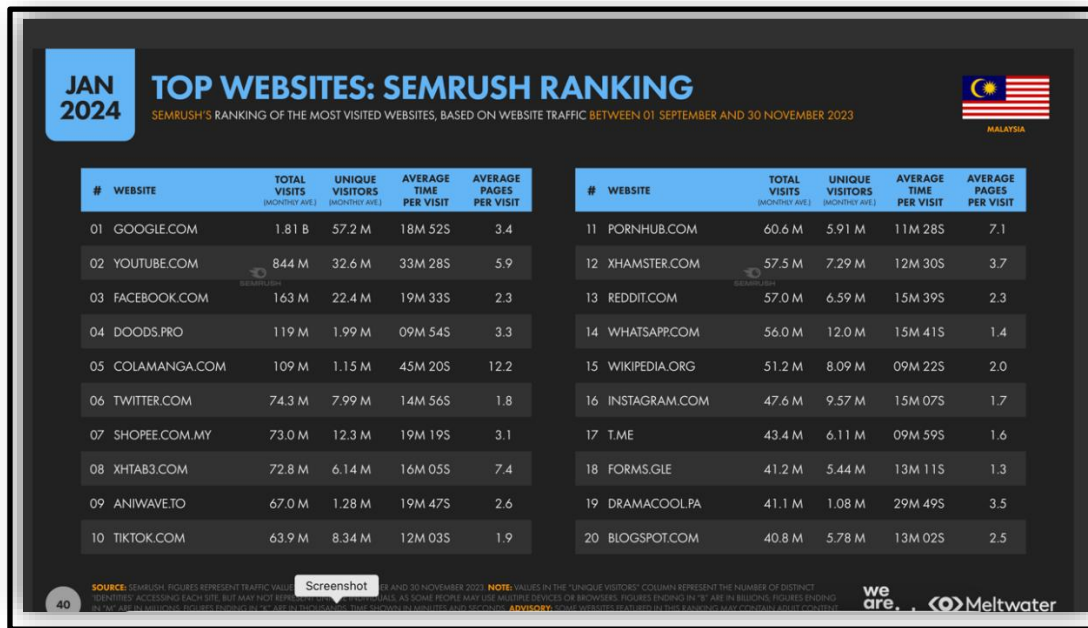


Plate 2. 7 Most-Visited Websites in Malaysia According to Semrush

These statistics demonstrate that internet users in Malaysia engage extensively with digital platforms for communication, entertainment, information retrieval, and commercial transactions. Each of these digital interactions contributes to the creation of massive volumes of digital information. For example, social media interactions generate multimedia content, e-commerce transactions produce digital payment records, and search engines record user activity data. Collectively, these digital activities contribute to the continuous expansion of large-scale datasets across multiple digital platforms.

From a broader technological perspective, the increasing reliance on internet-based services is closely associated with the development of the Internet of Things (IoT) and other interconnected digital systems. As digital devices, mobile applications, and smart technologies become more integrated into daily activities, they generate vast streams of real-time data. The increasing connectivity between users, digital platforms, and IoT-enabled systems therefore contributes significantly to the rapid growth of big data environments. Consequently, organizations are required to manage increasingly complex volumes of digital information generated through these interconnected technologies.

Overall, the statistics presented in the Digital Report (2024) highlight the extensive level of digital engagement within Malaysian society. The continuous growth of internet usage, combined with the increasing adoption of digital platforms and

connected technologies, contributes directly to the expansion of big data ecosystems. As digital interactions become more frequent and data-intensive, effective governance and information management strategies become essential to ensure that the large volumes of data generated through internet activities can be properly managed, secured, and utilized within organizational environments.

2.3.4 Issues of Increasing Big Data Through the Internet of Things (Iot)

The Internet of Things (IoT) has significantly transformed data generation processes, resulting in the rapid expansion of big data across digital environments. As interconnected devices continuously collect and transmit data, organizations are increasingly required to manage large-scale, heterogeneous datasets. While IoT enables improved operational efficiency and data-driven decision-making, it also introduces critical challenges related to data management, integration, security, and governance

2.3.4.1 Data Management and Storage Challenges

The large-scale data generated by IoT systems presents substantial challenges in terms of storage and management. The characteristics of big data—particularly volume, velocity, and variety—require organizations to adopt scalable and flexible storage infrastructures such as cloud computing and distributed systems (Xu et al., 2020; Sivarajah et al., 2020).

High data volume requires systems capable of storing continuously expanding datasets, while high-velocity data demands real-time processing capabilities. Additionally, the diversity of structured and unstructured data formats increases the complexity of data integration and management processes (Bonomi et al., 2014). Efficient data management therefore requires advanced techniques such as indexing, data partitioning, and lifecycle management to ensure both performance and cost efficiency.

Moreover, IoT environments often operate under resource constraints, particularly in edge computing contexts where processing capabilities are limited. Issues such as data redundancy, storage inefficiency, and system scalability further complicate data management, requiring organizations to adopt optimized storage strategies and data deduplication techniques (Xu et al., 2020; Zhou et al., 2020).

2.3.4.2 Data Quality and Integration Challenges

Ensuring data quality and effective integration remains a major challenge in IoT-based big data environments. IoT systems generate data from diverse sources with varying formats, standards, and reliability levels, making it difficult to achieve consistency and accuracy (Gubbi et al., 2013).

Data quality issues include inconsistency, incompleteness, redundancy, and variability in accuracy, all of which may negatively affect analytical outcomes and decision-making processes (Chen et al., 2014; Wang, 2019). In addition, integrating data from heterogeneous sources requires advanced transformation and harmonization processes to ensure interoperability across systems (Al-Fuqaha et al., 2015).

As IoT ecosystems continue to expand, scalable integration frameworks and data governance mechanisms are required to support real-time data processing and ensure the reliability of analytical outputs.

2.3.4.3 Privacy and Security Concerns

The increasing use of IoT devices raises significant privacy and security concerns due to the continuous collection of sensitive personal data. IoT systems are often vulnerable to cyber threats, including unauthorized access, data breaches, and malware attacks (Alrawais et al., 2017; Sicari et al., 2015).

Privacy concerns arise from the lack of transparency in data collection processes and limited user control over personal data. IoT systems often aggregate data to generate detailed user profiles, raising ethical concerns related to surveillance and data misuse (Zuboff, 2019).

Security challenges are further exacerbated by weak authentication mechanisms, insecure communication protocols, and insufficient device updates. Addressing these risks requires the implementation of encryption, access control mechanisms, and robust cybersecurity frameworks to ensure data protection and system integrity.

2.3.4.4 Ethical and Social Implications

The expansion of IoT-generated big data has introduced significant ethical and social challenges. The extensive collection of personal data raises concerns related to consent, surveillance, and data ownership (Floridi et al., 2018).

IoT technologies enable continuous monitoring of individuals, which may lead to privacy infringement and potential misuse of data for profiling or discriminatory practices. Furthermore, unequal access to IoT technologies may contribute to digital inequality, where certain groups benefit more than others from technological advancements (Eubanks, 2018).

To address these concerns, ethical design approaches such as privacy-by-design and transparent data governance are essential to ensure responsible use of IoT technologies.

2.3.4.5 Impact on Organizations

IoT-generated big data provides organizations with opportunities to enhance operational efficiency, improve decision-making, and develop innovative business models. Real-time data analytics enables predictive maintenance, optimized resource allocation, and improved customer insights (Brous et al., 2020).

However, organizations must also address challenges related to data governance, security, and workforce capabilities. Effective utilization of IoT data requires investment in data infrastructure, analytics capabilities, and employee upskilling.

In addition, organizations must ensure compliance with data protection regulations and establish governance frameworks to manage data responsibly and maintain user trust.

2.3.5 Conclusion of the Increasing of Big Data Through IOT

The increase in big data through the Internet of Things (IoT) presents several challenges, including data management, quality, privacy, and ethical concerns. Addressing these issues requires advancements in technology, robust security measures, and the development of ethical guidelines. Continued research and innovation are essential to mitigate the challenges and fully leverage the benefits of IoT-generated big data.

This is because, the rapid proliferation of the Internet of Things (IoT) has fundamentally altered the landscape of data generation, leading to an exponential increase in big data. This data explosion presents both opportunities and challenges for organizations and individuals alike. The benefits of IoT-generated big data are evident in its potential to drive innovation, improve operational efficiency, and enable data-driven decision-making across industries. However, these opportunities come with significant challenges, particularly related to data quality, integration, privacy, security, and ethical implications.

As IoT devices continue to become more pervasive, organizations face the complex task of managing and processing vast amounts of heterogeneous data. Ensuring data quality and integrity across different IoT systems, safeguarding sensitive information from cyber threats, and addressing privacy concerns are critical for maintaining user trust and ensuring compliance with legal and regulatory frameworks (Chen et al., 2014). Furthermore, organizations must navigate the ethical and social implications of IoT data, including issues related to surveillance, consent, and inequality (Zuboff, 2019).

Besides, the reasons Malaysians use IOT and social media are multifaceted, encompassing social connectivity, information access, entertainment, e-commerce, and self-expression. These drivers underscore the integral role of IOT in Malaysian society, shaping how individuals communicate, consume information, and interact with the digital economy. Understanding these motivations is essential for grasping the broader implications of social media in Malaysia's digital landscape.

All these statistics showed in this chapter prove that there is a huge number of users who browse the internet in their daily life that will lead to the increasing of big data. This is supported by Syed Yasmeen Shahdad, (2018), who that mentioned, the availability of the internet and network resources were lead to the advance of

technologies that resulted in the emerging of the Internet of Things (IoT) and of course big data due to the huge amount of data that produces from the internet.

This also will lead to other issues on the internet. For example, Peng Hwa Ang, (2016) in his study stated that during the conference on the internet in Kuala Lumpur, that joined by the Prime Minister of Malaysia, identify that the internet would not be a censor. In the same weeks as the conference, there are meeting in Singapore involved Information Minister said that they are on considering laws to sieve on “other nonsense and pornography” on the internet. He also added they need to observe other countries to implement the new internet.

The success of IoT implementations depends on an organization’s ability to effectively manage big data, which requires not only advanced technical capabilities but also the development of robust governance frameworks. The ethical design of IoT systems, including privacy-by-design principles, secure data management practices, and transparent data usage policies, is crucial for addressing these concerns and ensuring that IoT technologies are used responsibly and equitably (Cavoukian, 2010). Therefore, in emerging of big data through the internet, it is important to have proper management in managing big data created by technology. In this study, records management was chosen to see either records management standards can manage big data or not.

This is because, as IoT-generated big data continues to expand, effective records management practices will become increasingly important for organizations seeking to harness its full potential. A well-integrated RM strategy can address many of the challenges associated with IoT data, including storage, security, compliance, and data quality. By adapting RM principles to meet the demands of big data, organizations can optimize their data management processes and derive greater value from IoT technologies. Moreover, records management will be essential in ensuring that IoT data is used ethically and in alignment with legal and regulatory frameworks, safeguarding both organizational interests and individual rights.

The literature demonstrates that the rapid growth of big data is driven by increasing digital connectivity, widespread adoption of IoT technologies, and expanding digital platforms across multiple sectors. While these developments provide significant opportunities for data-driven decision-making, they also introduce substantial challenges related to data governance, security, and information management. Existing studies largely focus on technological solutions for managing

large-scale data environments. However, comparatively limited attention has been given to the role of records management standards in addressing governance and accountability issues within big data ecosystems. This gap suggests the need to examine how established records management frameworks, particularly ISO 15489-1:2016, can contribute to effective governance and management of big data within organizational contexts.

In the next literature, the researcher list a few records management standards that may be suitable to handle big data. Before that, it is important to understand the relationship between records management standards in managing big data.

2.4 Relationship Between Records Management with Big Data

International Standard ISO 15489:2001 defines records management as a field responsible for managing the efficiency of information. This is including the systematic control of creations along with the receipt, maintenance use, and disposition of records. The records management also about the capturing process and maintaining the evidence of information related to the transaction in the form of records and business activities. Based on this definition, we can see how valuable records management. If the organization smart in implement the records management standards any issues can be managed and control. In this paper, the researcher sees records management standards as a way that maybe can help in managing the emerging of big data.

Big data related to various of the information created has become a big phenomenon that needs to be focusing. According to Brecht., D (2014) managing data is an important thing in business today. In the big data revolution, only a few people are taking part in it. As cited by Brecht., D (2014) some organizations using a business analytics platform to analyze data. Some using software to capture, store, analyze, and manage the datasheet. However, some challenges happen maybe can be overcome through records management standards This is because good data management can lead to the success of organizations that can be the key priority. Moreover, Carol Stainbrook as cited by Brecht., (2014) also agrees on the importance of records management including in managing big data. Carol who is Executive Director at Cohasset Associates in Minneapolis stated that records management can be better awareness and analysis for companies in managing information that will allow better visibility data and to avoid problems happens.

Moreover, Unhelkar, B. (2018), believes that big data need to be controlled. This is because, the increasing of data will lead to the consistency need in ingestion, usage, and storage. According to Iron Mountain (2020), there are issues in big data that need records manager skills in managing big data. This is due to the issue where some organizations start to leave the handling of data. This happens when too much and vast information create and collected from daily customer interactions. For example, in business, there is a lot of information created every day such as amounts, global payment, transaction dates, locations, deposit patterns, and many more. Therefore, due to this issue, Iron Mountain (2020) believes that needed records management in analyzing the customer data or big data. This is supported by The JISC infoNet Service, (2007), which believes records management is needed to sustain the growth of organizations.

In recent years, scholars have increasingly emphasized the importance of integrating records management and information governance practices within big data environments. The rapid growth of digital information generated through interconnected systems, cloud computing, and Internet of Things (IoT) technologies has intensified the need for structured governance mechanisms to ensure accountability, reliability, and compliance. Contemporary studies suggest that traditional data management approaches alone are insufficient to address governance challenges associated with big data, particularly in relation to data authenticity, long-term preservation, and regulatory compliance (Franks, 2021; Smallwood, 2020). In response, researchers have proposed the integration of records management principles into broader data governance frameworks to support the effective management of digital information assets throughout their lifecycle (Lemieux, 2021; Duranti & Rogers, 2022). These developments indicate that internationally recognized standards, such as ISO 15489, may play a significant role in governing digital records within complex big data environments. However, despite this growing recognition, limited empirical research has examined how records management standards can be systematically applied to address big data challenges within organizational contexts.

This paper also believes, the relationship between records management (RM) and big data is becoming increasingly significant as organizations grapple with the challenges of managing vast and diverse datasets generated by modern technologies. Traditionally, records management focused on the systematic control of the creation, maintenance, use, and disposal of physical and digital records. However, the advent of

big data, characterized by its volume, variety, velocity, and veracity, has transformed the scope and function of records management. In this context, RM must evolve to handle the unique challenges posed by big data, ensuring that data is effectively organized, accessible, and compliant with legal and regulatory requirements.

One of the core functions of records management is the classification and organization of data. In a big data environment, this function becomes even more critical due to the sheer volume and complexity of the data involved. Big data encompasses structured, semi-structured, and unstructured data, often collected from a wide range of sources such as IoT devices, social media, and transactional systems (Smallwood, 2014). Effective RM provides a structured framework for categorizing and organizing these diverse data types, making it easier for organizations to retrieve, process, and analyze relevant data when needed.

One of the key challenges associated with big data is determining which data should be retained, archived, or discarded. The volume of data generated by big data systems often exceeds what organizations can store and process efficiently. RM practices, particularly those related to data lifecycle management, can help address this challenge by establishing clear retention and disposal policies for big data (Smallwood, 2014).

By applying records management principles, organizations can develop taxonomies and metadata schemes that categorize big data based on its purpose, origin, and retention requirements. This structured approach not only improves data accessibility but also enhances the efficiency of data analytics, as relevant data can be identified and processed more effectively (Saffady, 2020). In this way, RM plays a crucial role in managing the complexity of big data environments by imposing order and structure.

Records management emphasizes the importance of identifying the value of data over time and implementing policies for its appropriate retention or disposal. For example, not all IoT-generated data may need to be retained indefinitely—certain types of data may only be useful for short-term analysis, while others may hold long-term strategic value (Rosenbaum, 2010). By leveraging RM principles, organizations can ensure that only valuable data is retained, helping to manage storage costs and avoid unnecessary data clutter.

In addition, RM can ensure compliance with regulatory requirements related to data retention. Many industries, such as healthcare and finance, are subject to strict

regulations that mandate how long certain types of data must be stored. Records management ensures that these regulatory requirements are met by establishing retention schedules and ensuring that data is disposed of appropriately when it is no longer needed (Sweeney, 2015).

Besides, Big data presents unique governance challenges due to its decentralized nature and the diversity of data sources involved. In this context, records management provides a framework for ensuring that big data is managed in accordance with legal, regulatory, and organizational policies (Saffady, 2020). Effective RM promotes transparency and accountability in data governance, ensuring that data is collected, processed, and stored in compliance with relevant regulations, such as the General Data Protection Regulation (GDPR) in Europe or the Health Insurance Portability and Accountability Act (HIPAA) in the U.S.

Through records management, organizations can implement audit trails, data access controls, and accountability mechanisms that ensure the integrity and security of big data. For example, RM can help track who has accessed or modified data, ensuring that proper authorization procedures are followed and that any changes are documented (Smallwood, 2014). This is particularly important in industries that handle sensitive information, where data breaches or unauthorized access can result in severe legal and financial penalties.

The relationship between records management and big data is increasingly interdependent, with RM providing critical support for the organization, governance, security, and effective use of big data. As organizations continue to generate and process massive amounts of data, records management will play an essential role in ensuring that data is properly classified, retained, and governed. By adopting RM principles, organizations can enhance data quality, ensure compliance with regulations, protect sensitive information, and optimize their use of big data for strategic decision-making.

This is showed that records management and big data are related to each other. This statement can be proof by seeing Lucy Kibe, (2019) conducted research on big data and records management in Kenya. Lucy Kibe, (2019) believes that big data technology can be the next big thing in records management by enhancing their records management in Kenya through big data. Even though this paper contradictory to research by Lucy Kibe but, we can see that how related these two phenomena which are big data in records management.

Besides, this paper believes ensuring data quality and integrity is another crucial aspect of managing big data, and records management plays a pivotal role in this process. Big data environments often involve a wide range of data sources, each with varying levels of accuracy, consistency, and reliability. Poor data quality can lead to flawed analytics, misinformed decision-making, and operational inefficiencies (Wang, 2019). RM helps mitigate these issues by implementing practices that standardize data collection, validation, and maintenance processes.

Records management provides guidelines for ensuring the accuracy, completeness, and reliability of data throughout its lifecycle. For example, RM frameworks emphasize the importance of verifying data at the point of creation, conducting regular audits, and implementing validation processes to identify and correct errors (Rosenbaum, 2010). By ensuring that big data is high quality, organizations can trust the insights generated from data analytics and make more informed decisions.

In addition, Big data environments often involve the collection of vast amounts of sensitive information, such as personal data, financial transactions, and intellectual property. This raises significant security and privacy concerns, particularly in light of data protection regulations such as the GDPR (Weber, 2015). Records management plays a crucial role in safeguarding this information by implementing security measures that protect data from unauthorized access, breaches, and misuse.

RM frameworks include security protocols such as encryption, access controls, and audit trails to ensure that sensitive data is protected throughout its lifecycle. Additionally, RM practices help organizations comply with privacy regulations by ensuring that personal data is handled appropriately, with proper consent obtained from individuals and unnecessary data disposed of in a timely manner (Smallwood, 2014).

Last but not least, effective records management is essential for supporting data analytics initiatives in big data environments. By ensuring that data is well-organized, high-quality, and accessible, RM enhances the efficiency and accuracy of data analytics processes. Properly managed data allows organizations to perform more meaningful analyses, derive valuable insights, and make data-driven decisions (Riggins & Wamba, 2015).

Records management also facilitates the integration of data from different sources by ensuring that data is structured consistently and adheres to common standards. This improves the interoperability of data analytics platforms, enabling

organizations to combine data from various IoT devices, databases, and external sources into a unified dataset that can be analyzed more effectively (Sweeney, 2015).

Based on proof explained above, the researcher believes records management is suitable in managing big data. Through this study, records management standards will be analyzing either suitable in managing and controlling big data or not. Therefore, it is important to understand the records management and the current records management practices standards before merging them in managing big data.

2.5 Overview of Records Management and Currents Records Management Standards / Practices

According to Insights on governance, risk, and compliance, (2014), it is important to have new, innovative, and scalable technology in collecting and host a huge amount of data gathered. This is needed to make sure the business insight was derived in real-time. Moreover, it is also related to the consumer, risk. performance, profit, productivity management, and enhanced shareholder value. Therefore, in those cases, Records Management was select to see either it can manage the vast number of big data or not.

When we talk about Records Management, generally records professionals will relate it with the continuum model, life cycle of records, and records keeping. To know either Record Management is suitable or not in managing and controlling big data especially, it is important to know the elements in Records Management itself first. In Records Management, there a lot of practices that have been applying to organizations. However, in this research, only a few records management standards have been discussed to see which records management standards can manage big data. In this literature review, you can see ISO 15489-1:2016(E) was selected to be the main standard that including all records management standards that may be applicable to manage big data. Reasons for selection of ISO 15489-1:2016(E) as the main part of all current records management standards were explained below.

2.5.1 ISO 15489-1:2016(E)

In this research, ISO 15489 was selected to be the main part of the analysis in this study to see either it is suitable or not in managing big data. This is because, Pember., M. (2006) mentioned that this standard is an important standard that is well-known and recognized over the world as an excellent baseline that is established in records management. As Connelly (2001) points out, in research by Pember., M. (2006), this standard also provides a blueprint for the establishment, structure, monitoring, and auditing of a best practice records management program. Besides, it is also allowing any organization in this world to be more efficient in retrieve information including decision making, accountability, productivity and helps in reducing information risk.

Not only that, in Records Management, ISO 15489 also was applying in various records formats created from various media either private or public. Moreover, all information created is from various formats either individual or from any activities that need to maintain since the creations, (Standard Australia, 2002). Xiaomi An, (2004) also mentioned that ISO 15489 is very important since it is the first international standard related to Records Management. As cited by Connelly, (2001) in Xiami An, (2004), this standard also function in setting a parameter within the records management program.

Due to the strength of this ISO 15489 standard. The latest edition which is ISO 15489-1:2016(E) was selected to manage and control big data. The previous ISO 15489 is AS/ISO 15489-1:2001 Information and documentation - Records Management Part 1 and 2, is a standard that sets out the principles, processes, and practices associated with records management and sets out accepted good practice within the industry. (Standard Australia, 2002).

ISO 15489-1:2016(E) is the latest standard that is also part of International Standards and Technical Reports that capture and manage records. (ISO 15489, 2016). However, based on Convery., N (2016) the latest version is more focusing on records systems and controls. The latest standard is also more theoretical than the previous version in 2001 that more practical. Besides, she also mentioned that some of the terminologies in the latest standard were changed such as “Appraisal” that more focusing on the value of records for continued support in the business. The methodologies used in the new standard are seen as the biggest change to help in establishing the records management program, (Convery., N. 2016). This new standard

seems can contribute to managing and controlling big data. As cited by Convery,. N, (2016) this new standard can help in managing structured and unstructured data that can provide invaluable to all organizations by applying a theoretical framework that helps in each business activities including the contexts and process.

Here below elements that been abstract in this **ISO 15489-1:2016(E)** where mightily suitable in managing big data:

Table 2. 2

Guidelines in ISO 15489-1:2016 (E) in Term of Data or Information

No	Guidelines in ISO 15489-1:2016 (E) in Term of Data or Information	Description
1	Create	The generation of records is intrinsically linked to the execution of business activities. This process of creating records should encompass both content and metadata. It is essential to evaluate records in the context of business, legal, and other pertinent requirements to determine their creation. Additionally, it is crucial to meticulously document the circumstances surrounding the creation of these records.
2	Capture	Capturing occurs in the context of assessing and identifying the essential information that needs to be preserved and managed over time by incorporating it into a records system. The process of capturing involves the following key elements: a) Assignment of a Unique Identifier: This includes assigning a unique identifier to the record, which can be either machine-generated and readable or human-readable. b) Capture or Generation of Metadata: Metadata about the record is captured or generated at the point of capture, providing context and additional information about the record. c) Creation of Relationships: Establishing relationships between the record and other records, agents, or business processes, which helps to contextualize and link the record within a broader system.

No	Guidelines in ISO 15489-1:2016 (E) in Term of Data or Information	Description
3	Classification and Indexing	Classification serves to connect records with their business context by associating them with categories defined in a business classification scheme. This process of classification can be undertaken by an individual or at any level within the organization, and it can be applied at any time. Records classification typically involves: a) Linking the Record with Documented Business Activities: Associating the record with specific documented business activities, functions, or work processes at any level. b) Providing Continuous Records of Business Activity: Establishing linkages between individual records and their aggregations to maintain a comprehensive record of business activities. Indexing, on the other hand, is crucial for ensuring that records are easily retrievable. The metadata used in indexing can include identifiers such as subjects, locations, or personal names, which serve as key points for capturing and accessing records throughout their lifecycle.
4	Access Control	Access control involves managing and regulating the authorization process for individuals who can access records. Access control rules should be supported by tools that facilitate the delivery of records and metadata exclusively to authorized users. If access control is implemented through an application, the application should log all changes made to the records, including modifications and timestamps. The design of access control rules depends on various factors, including organizational requirements, the nature of business activities, and the associated risks. These rules must be tailored to meet the specific needs of the organization while addressing potential security and compliance concerns.

No	Guidelines in ISO 15489-1:2016 (E) in Term of Data or Information	Description
5	Storing Records	Storing records involves ensuring that records, regardless of format or medium, are preserved in a proper and secure manner. This practice is essential to prevent loss, destruction, theft, and unauthorized access. Effective record storage should include the following measures: a) Use of Appropriate Materials: Employ the correct materials for storing records, including protective materials and special handling procedures when necessary, to ensure the preservation of the records. b) Appropriate Storage Conditions: Implement storage solutions that are suited to the specific environmental conditions and media types of the records. c) Monitoring and Protection: Regularly monitor stored records to safeguard against physical threats and unauthorized access, utilizing routing protection and information security measures as needed. d) Disaster Planning and Training: Develop and test a disaster recovery plan, including conducting authorized disaster drills and recovery procedure tests. Additionally, ensure that relevant personnel receive training on disaster planning to effectively manage and mitigate potential risks.
6	Use and Reuse	To ensure that records remain usable over the long term, several practices should be implemented: a) Applying and Maintaining Appropriate Metadata: Ensure that records are accompanied by accurate and up-to-date metadata, which helps in managing and retrieving records efficiently over time. b) Creating Additional Copies or Converting Formats: Generate additional copies of records or convert them into alternative formats to facilitate long-term accessibility and prevent data loss.

No	Guidelines in ISO 15489-1:2016 (E) in Term of Data or Information	Description
		c) Migrating Records: Regularly migrate records to new storage systems or formats as technology evolves to ensure continued usability and compatibility. d) Developing a Disaster Plan: Establish a comprehensive disaster recovery plan to guarantee continuous access to and usability of records in the event of unforeseen incidents. e) Monitoring Storage Conditions: Frequently monitor and assess storage conditions to maintain the integrity and accessibility of records.
7	Migration or Conversion	Migration or conversion of records is the process of transforming the records from analogs to digital formats or called as digitization. This process should be planned, documented and by having internal external communication between stakeholder on the migration or conversion process.
8	Disposition	Disposition includes the following actions: a) Destruction of Records and Metadata: This process involves securely and systematically eliminating records and their associated metadata to ensure they are completely removed from the system. b) Transfer of Control: When there are significant changes in business operations, such as restructuring, sales, or privatization, responsibility for records may be transferred to the new organization that assumes control of the relevant business activities. c) Transfer to Permanent Retention or External Archives: Records may be moved to a facility dedicated to long-term retention or to external archival services for continued preservation and access.

No	Guidelines in ISO 15489-1:2016 (E) in Term of Data or Information	Description
		The destruction of records should be governed by the following principles: a) Authorization of the Destruction Process: Ensure that the process of destruction is properly authorized and approved to maintain control and oversight. b) Legal Considerations: Do not proceed with the destruction of records that are involved in ongoing legal actions or investigations until these matters are resolved. c) Compliance with Security Measures: Adhere to all security protocols and access restrictions to ensure that records are thoroughly and securely destroyed. d) Documentation of Actions: Keep detailed records of all actions taken during the disposition process to provide a clear and comprehensive history of the disposal activities. With the development of big data analytics tools, there is a growing emphasis on managing and minimizing data effectively. As we can see today, many tools in big data analytics were created to support the emerging of big data. Therefore, through the disposition element, the researcher would like to see either the big data can be control and minimize by disposing of unnecessary data or data that no longer needed for the organization. Only valuable data will be kept for future reference. The goal is to use the disposition process to remove unnecessary or obsolete data, thereby retaining only the valuable information that is necessary for future use and reference.

Notes: Guidelines in ISO 15489:1:2016 (E)

According to ISO 15489-1:2016(E), the discussed elements align closely with various other records management practices and standards. Beyond ISO 15489-1:2016(E), this literature review also delves into several important records management standards:

- **The Life Cycle of Records:** This standard focuses on the comprehensive management of records from their creation to their ultimate disposition, covering every phase of their lifecycle.
- **The Records Continuum Theory:** This theory promotes a continuous and dynamic approach to records management, emphasizing the interconnected and evolving nature of records throughout their lifecycle.
- **The Information Management Framework:** This framework outlines a structured approach to managing information, ensuring that records are effectively organized, maintained, and accessible throughout their lifespan.
- **The International Research on Permanent Authentic Records in Electronic Systems (InterPARES):** This research initiative explores the challenges associated with preserving the authenticity and integrity of permanent electronic records over time.

These standards and theories offer a broader perspective on effective records management practices, highlighting various approaches and frameworks for maintaining and managing records effectively.

2.5.2 The Life Cycle of Records

The life cycle of records is very important in Records Management. According to Federal Enterprise Architecture, Records Management Profile, (2005), the life cycle of records related to the creation of records until disposition. This including the maintenance, use of the records. Here plate 2.8 on the life cycle of records and a description of each stage on the below figure:

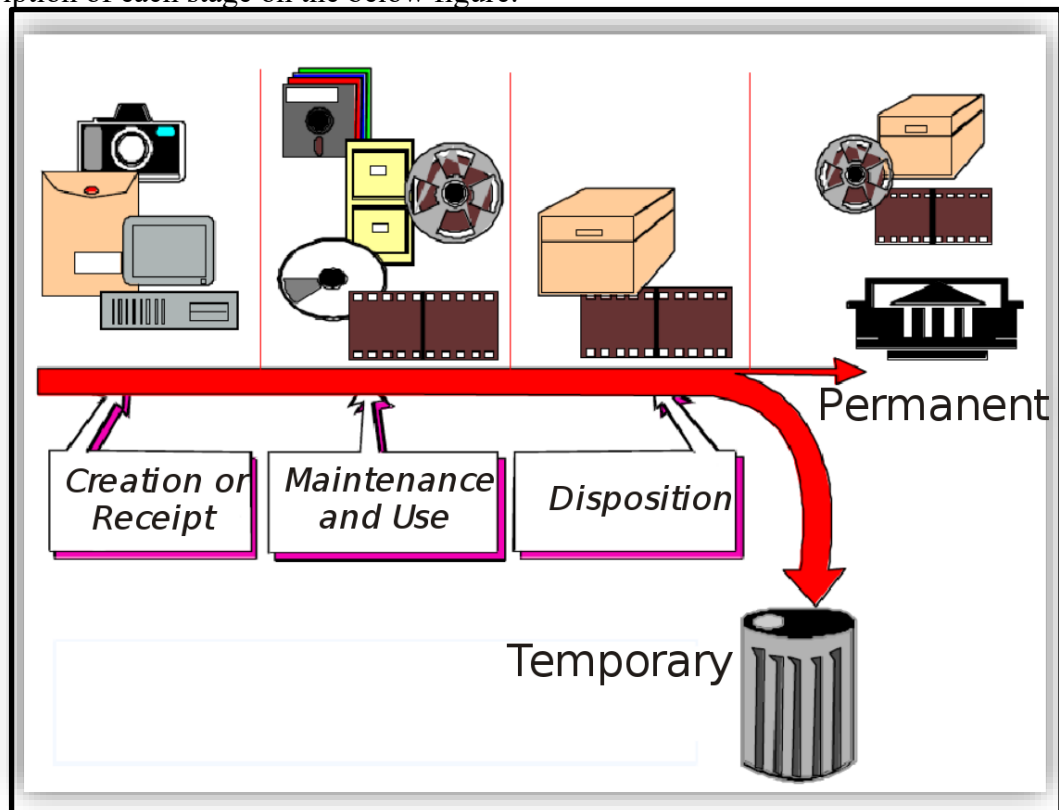


Plate 2.8 Life cycle of records stages

Based on the plate above, each agency must have records management for all records that have been created and maintained in any format or media. According to Federal Enterprise Architecture, Records Management Profile, (2005), each agency must consider having record-keeping requirements by having a plan on how the staff will create the records and maintain them on systems. The disposition of records is either destruction or transfer into the National Archives.

Here below, simple explanation about the life cycle of records from Access Records Management (2019):

Table 2. 3

Life Cycle of Records

Life Cycle of Records	Descriptions
Stage 1: Creation	Creation means the ability to acquire and generate information basically in the electronic or physical form. This is the very first step of a record's life cycle where data or information is created, captured, or transmitted by people, organizations, or systems. After information has been confirmed to be true or authentic, it is essential to transform it to an official record which is organized and formatted suitable for storage. This ensures that the information has been well documented to allow easy retrieval, access and use whenever needed. Records are classified as “active” at this level, as they are still in use, or are required for the conduct of ongoing business and decision making activities. They are also used for documents that are frequently or constantly being used and updated, which are key components in the everyday functionality of the company concerned. The active records must be kept in appropriate ways to ensure their content is not compromised so as to allow the continued performance of certain tasks. Often these records are proof of transactions, decisions, and various actions that were done in the organization, therefore there is a need to preserve the authenticity, reliability and accessibility of these records.
Stage 2: Classification	Once records are created, the next crucial step is classification which is the stage that comes next after creation of records. The created records should be classified in a specific order according to any set criteria in the organization's record management system. Such classification is assigning records into categories based on subjects, departments, legal issues or what each of them contains. This step is crucial as it aids in smoothing out an organized structure through which records are to be managed, produced and retrieved. The classification system is designed and developed mainly focusing on the objectives of the organization, thus being useful in all its operations such as processes and purposes that are regulatory. With a functional classification scheme in place, the employees can efficiently and quickly access and retrieve the records on file which has a positive impact on productivity. Further, the classification scheme should allow for growth, as recording organizations

	generally require additional record types to be recorded as the business processes that would have evolved. In addition to this, the addition of searchable traits for every record category is critical for improving records access. These traits might consist of metadata such as keywords, type of document created, date of creation and business processes linked to the document. By embedding searchable attributes such as these, the organization ensures that recipients of records are able to retrieve them in a timely manner, thereby preventing delays in the access of important information. This is especially true in large firms that have a lot of records in countless departments, where implementing an effective filing and searching system would greatly help the firm in optimizing its operation and making instrumented choices.
Stage 3: Maintenance	Maintenance of records is a critical aspect in ensuring the longevity and reliability of active records. To effectively maintain records, the first step involves the proper storage of physical or electronic copies, which should be organized according to the classification system established in the previous stage. This ensures that all records are appropriately categorized and easy to locate when needed. A key element in successful records maintenance is the choice of a secure and reliable storage method. For both physical and electronic records, it is essential to implement protective measures to safeguard the data. For physical records, this may involve secure filing cabinets, fire-resistant safes, or climate-controlled rooms. For electronic records, it could include utilizing secure servers, cloud storage solutions, or encrypted databases. Moreover, regular hardware upgrades should be considered to accommodate the growing volume of records and to ensure that the storage infrastructure remains reliable and effective. An important practice for ensuring records are well-maintained is to establish a logging system that tracks the use and access of records. This log can provide valuable insights into who accessed the records, when, and for what purpose, which helps prevent unauthorized access and delays when records are needed. By maintaining a log, organizations can ensure that records are always available and can be

retrieved without unnecessary delays, thereby enhancing operational efficiency.

Additionally, records, whether they are active, semi-active, or inactive, must be managed according to their lifecycle. Once a record is no longer needed for regular use, it may either be moved offsite to archive storage or disposed of as per the retention policies established in the records management system. The decision to archive or dispose of records should be made based on their long-term value and legal or regulatory requirements. Archiving ensures that records remain accessible for future reference, while proper disposal ensures that records that are no longer needed are safely destroyed, mitigating any risks related to data breaches.

Above all, maintaining the integrity of data is paramount. It is essential to ensure that records remain accurate, complete, and reliable throughout their lifecycle. Additionally, securing access to the data is vital to protect sensitive information and to ensure that only authorized individuals have the ability to modify or access records. This helps preserve the authenticity and reliability of records for future reference, ensuring they continue to serve as trustworthy evidence of transactions and business activities.

Disposition terminates the life cycle of a record, signifying the finishing of the management phase for records that have become inactive. This phase occurs when the retention period of the inactive records has expired, and those records are no longer required for the business, legal, or operational activities of the organization. The information must now be disposed of, although it has fulfilled its objective, in a manner prescribed by the policy of the organization and the law.

Stage 4: Disposition

Depending on the value of the records and the records management policy of the organization, they may be put in an archive or shredded. Shredding is usually applied to business papers like correspondence files and physical records which are not required anymore and have no further business or historical worth, so that confidential information is securely destroyed to prevent unauthorized access. For instance, however, records which have historical, legal or research interest may be placed in archive storage for long-term preservation. This is necessary if such records which are needed for

research or legal or audit purposes have to be kept and readily available when needed.

For organizations to function optimally, provisions are reinstated to ensure that communication between the legal and the information management team remains effective. Besides, during the disposition process, any actions regarding records' disposition should be aligned with the stipulation of the legal and regulatory bodies. With such coordination in place, the risk of compliance failure by retaining records unnecessarily or disposing of them inappropriately is reduced, eliminating the chance of valuable information ending up lost.

Even though the basic cycles of a record's life are consistent through various industries, the way a business or an organization goes about this process can be modified to meet the needs of an industry or a business. For instance, some might archive records with the aim of preserving them for both historical and research purposes. In such cases, more archival management processes become necessary and even become specific to such needs, which can include longer periods of retention and increased security for the records.

To summarize, the disposition stage is important in the records lifecycle as it guarantees that records are sustained in a way that meets the requirements of the law, are safe, and in line with the organization structure. Following the correct policies and systems enables the organizations to take charge of their records starting from its inception until it has been disposed of, thus protecting their data and ensuring business continuity.

Notes: Life cycle of records details (Access Records Management, 2019)

The theory of records life cycle has been in the use for a long time, It is also delineated in the ISO 15489-1:2016(E) standard. It is ISO 15489 which ensures for a good life cycle management of the records, on ensuring their creation, accuracy, validity, accessibility and legal compliance. This standard focuses on the principles and processes necessary for effective records management practices to be put in place, and the appropriate measures are taken at every life cycle stage to protect the authenticity and usefulness of the records.

The key focus of the researcher is to find out if the various operations which are involved in every stage of the records life cycle – creation classifying, maintaining and disposing, – are instrumental in ensuring there is proper control management of the big data. Big data just like records comes from a greater volume of data and to it possesses appealing similarities to records management in terms of the need to organized, preserved and be made available in for a longer time. Therefore, by applying the records life cycle model on this big data, one is able to assess how each of the stages can help in addressing the challenges that are related to the efficient management and utilization of such large and complex sets of data.

This analysis utilizes records life cycle as it is more compatabe with the processes of big data management. Big data initially and finally follows the same process as records, that is, it is created and disposed of. It Begins with transactions, user activities and other sources which generate data alongside the creation of records. Such information is categorised so that it can be easily accessed later which is referred to as the classification phase. When it comes to maintenance, accurate information and data are required, but both records and big data use effort to sustain their reliability. The management needs to make sure that data and records are updated properly and stored in accordance with the legal rules as well as the company's policies.

The records life cycle model explains the processes and routines which the businesses can adopt and thereby suggesting improvements to the management of the big data resources. Additionally, integration of records management principles into big data management would enhance structures and compliance of the process further improving the efficiency of the organisation when using the data.

2.5.3 The Records Continuum Theory

In the late 1980s, the Records Continuum theory was developed to address a particular set of problems emerging from the records and archival management disciplines in Australia. While it was first articulated in Australia, the challenges it sought to address had global implications, shaping the ways records and archives are understood and managed across nations. Nonetheless, it is critical to point out that the utilization and understanding of the Records Continuum theory cannot be taken as universal as they can differ in their application given the social, cultural and political contexts.

In the 1990s, several Australian archival theorists, among them Frank Upward began to explain and polish the original idea of the Record Continuum theory. While the idea of a continuum had existed in some form for a period, these theorists brought the idea of continuity into focus, adding yet another internal element to the theory and broadening its coverage to current recordkeeping. The Records Continuum model emerged as theoretical trigger of dissatisfaction with the limitations of existing models of recordkeeping which were predominately paper-oriented. These models remained inadequate What trends to around the growing numbers and complexity of records as digital technologies progressed (Iacovino, 2006; Sue McKemmish, 2001; Reed, 2005b; Upward, 1996, 1997).

While a certain Gilliland views it as perhaps the most valuable reorientation of the professional history of the field, others think that Records Continuum Theory is within the most pivotal reforms in the history of records and information management. The theory in question posits that records do not exist in a succession of stages as previously believed, but in an extended range, where the processes of creation, classification and construction, as well as that of dispositional annihilation, exist interconnectedly and exhaustively. In contrast, the paper elaborates on the ongoing and evolving process of records and information management, especially within the sphere of challenges presented by electronic records.

According to Aliza Ismail (2018), the concepts that records professionals raised in the first era of continuum theory had a timing of expansion because of the upsurge of technology. With the emergence and utilization of electronic records, the practitioners began understanding that it was impossible to apply the same strategies as it had been done with the management of paper-based information. Paper on a most part was used as a controlled and stored medium, electronic shifted a tension in format, access, retention and even security. This made it evident that better integration of management of records over time irrespective of format was the way to go.

Frank Upward proposed the Records Continuum Model as a means to meet these challenges, which has developed into one of the key concepts of records management. The model maintains that records are part of a continuum process starting from the time they are created through to their ultimate disposal. It advocates for the monitoring and management of a record even after it has been archived, instead of relegating it the history books after it has served its purpose, and avoiding the misconception that all events are linear. It has been implemented and used out in many national and

international standards, and even ISO 15489 which sets the standard on how records should be efficiently and effectively controlled.

The situation is different in Malaysia in that the record managers and archivists tend to view their relationship slightly differently from other parts of the world where there appears to be a fragmentation of these two professions or functions. In Malaysia, Record managers and Archivists belong to one profession and this gives them a multiplicity of functions causing them to approach records management in a holistic manner. Given this structure, the Records Continuum concept has been of particular importance for the provision of continuity of professional activities applied to the management of physical and electronic records. There is also synergy in the records managers and archivists roles where there is joint decision-making on the record and its long term preservation. For example, records managers and archivists in Malaysia jointly determine which records to be maintained in electronic format, starting from the evaluation process to the decision making process. There is a strong emphasis on a proactive appraisal and management approach which in this collaborative models differentiates it from the simple record life cycle model. In Shenton and Leach model, Anderson et al. (1986) explain that records appraisal moves earlier in the life of the records and is more dynamic as it is responsive to the records holding organization and through information control changes.

The model for the Records Continuum model would motivate for the integration of the stages of record keeping with a focus on the process and management of record keeping activities. The use of this model enables the organizations to better cope with the challenges resulting from preserving of electronic records and that such records are valuable, retrievable and protected throughout their entire lifespan. Here below, the figure for the records continuum model:

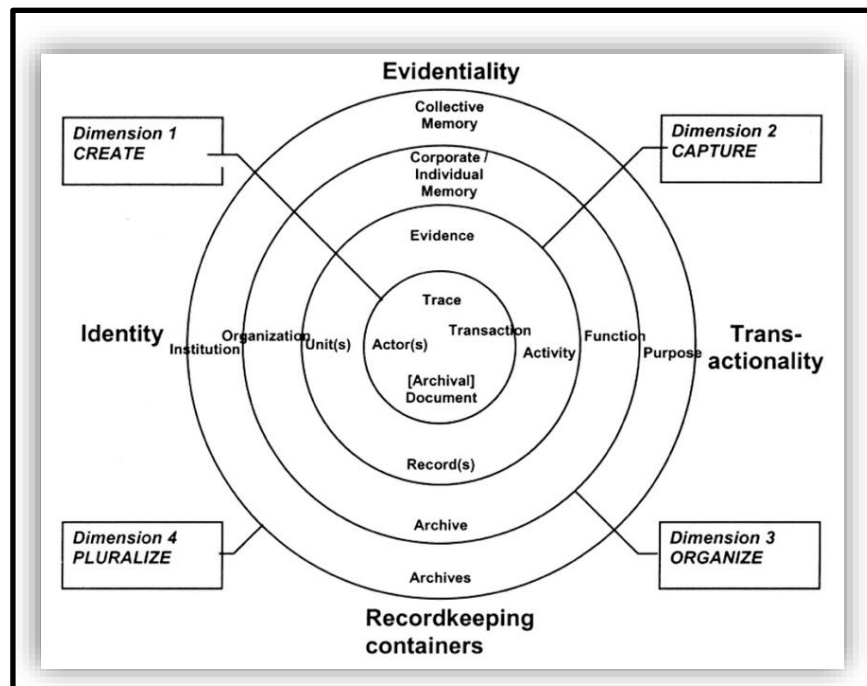


Plate 2. 9 The Records Continuum Model

Each phase in records continuum theory by Frank Upward was summarize in below table:

Table 2. 4
The Records Continuum Theory

Phase	Description
Create	Creation is fundamentally the primary and intersection point in the Records Continuum Model. It acts as a trigger of sorts, where people or organizations undertake activities that lead to the generation or creation of information. At this stage, a record is started – basic information or data is captured and formalized. Rather, information captured at this stage is transformed into actual recorded information, and after that information is disseminated, based on the various people's or organization's activities and decisions. At this point, the action of creation is broad and not confined to a single stand alone activity. Rather it is the result of a combination of several activities and interactions within different contexts or systems. The recording of business operations, legal actions, or personal communications and other types of information is usually the end

Phase	Description
	product of a record in any structure because records are powerful for legal, historical, or operational reasons. In Continuum Model, creation goes beyond simply the physical act of capturing information, it also refers to the processes involved in determining what will be considered a record. At this point, however, the information is in a variety of forms, whether it be a paper document or a digital file, reflecting the range of practices used for capturing and communicating information in contemporary settings. The scenario of this creation is essential, because it guarantees that the record is properly identified, categorized and processed at the further stages of the continuum. Therefore, the creation phase is not a fixed point; it is a fluid and interconnected with other points of the Records Continuum. The information produced in the given phase may change, be cycled through or gain other influences in future contexts that determine the manner and time of its classification, retention and ultimate disposal. The Continuum model considers all these aspects and understands that creation is not a single event but a multitude of intertwined events, thus proposing an integrated and adaptive model of managing records from the time of their creation.
Capture	Capture is a critical part of routinization under the Records Continuum Model. Define how this phrase describes the activity of recording information at the point of generation or receipt, along with capture of activities. This dimension enables information to be captured in a way that allows it to be retained, organized, and retrieved for use in the society or organizational context. Capture is complying with recording of data but also involves creation and maintenance of routines and mechanisms that allow embedding of information as part of recordkeeping. Capture is the activity of capturing important, previously covered, informal, spontaneous or casual, oral information and making structured records of them. It is pertinent to mention that this process facilitates critical information, messages and transactions to be recorded in a way that over time they become relevant, accessible and still remain intact. Regardless of whether the information is in paper or electronic form, capture is configured in such a way as to facilitate the later stages of the continuum such as classification, maintenance, disposition, etc. Capture is significant with the consequence that it provides a context for the work resource that promotes consistent and coherent use of that resource by groups of people. By establishing a uniform criterion for information capture capture, different stakeholders within an organization as well as outside the organization can have, access and use the same information. This consistency is crucial for enhancing the

Phase	Description
	ease of retrieval, sharing and analysis of information in a relevant context so that decision making and coordination across teams or interdepartmental cooperation is maintained at an optimal level.
	From the “capture” the routinization aspect emphasizes that this process should be recognized as routine work. With the increasing dependence of organizations and societies on digital systems, it becomes requisite to capture information in a reliable and consistent manner to preserve order, transparency and accountability. Also reliable capture will ensure that the risks of errors, omissions or misinterpretations are reduced, thus the information which remains trustworthy for its use is maximally protected.
	Capture will then enhance not only the circulation of information in an organization but will also ensure that the proper management of the information in all its stages is possible. In this sense the model advocates the capture of records as one vital dimension in the Records Continuum in which systematic recording of relevant documents is found as vital in the integrated aims of the organization and legal requirements, to say the least, of the organization.
	Organize is an important aspect of the Records Continuum Model as it stands on the prime object of time and space interval. It relates to the iteration when information is structured such to be distributed effectively to a wide range of users who do not have the same interaction framework or contexts with that of the information. This dimension broadens the scope of systems that need to exist in order to alleviate such cross functional differences in perspective, roles, and comprehension in a manner that the information retains relevance and sense to all parties reporting to any context.
Organize	The process of organizing information is a task that requires constructing information in a way that ensures the ease of retrieval, understanding, and use for various individuals or groups. It goes without saying that this process is more than simple classification of information into various containers, its incorporating a wider concept and scope of transcendence in order to enhance usability temporally, spatially, and conceptually. Designing systems to fulfill the stated objectives is a challenge given the diversity of users and their varying purposes.
	The concept of organizing information can equally be viewed in terms of memory organization. Just as human memory organizes the experiences, knowledge, and information of an individual through time, so too should record systems management be concerned with the valuation of information in context by organizing it over different periods. This ‘memory’ creates the opportunity to move from one situation

Phase	Description
	to another and internally retain the unnecessary reliance on critical information so as not to lose it or let it be misinterpreted when it is handed to different users or utilized in different contexts. Organizing information in this way can, indeed, be used as a means for safeguarding the institutional or group memory of an organization, society, or community. Information organization can be said to be effective if there are established systems, frameworks and structures, for instance, taxonomies, metadata schemas, and classification schemes, to allow information to be categorized with regard to the intended purpose of use. These systems are meant to facilitate the use of any information irrespective of the varying ways in which the information is accessed or even used over various end users or contexts. For example, how information is organized – through physical filing systems or digital databases – has to take account of how information will be required and used to further its relevance and utility in the future, which is diversity in its use. The organizing factor as highlighted by the Records Continuum Model puts emphasis on the necessity of creating systems which allow not only storage and access to information but replication and further usage of the information. In this way, the organization of the information has a direct impact on decision-making, collaborations and effectiveness as well as communication over extended periods of time.
Pluralize	As information is captured and organized, it identifies that there is a degree of predictability regarding which dimensions encompasses how the information can be used in the future. Pluralization also embodies how information can be used in an entirely novel context, which the original users of the data did not have in mind while creating it. Therefore, this perspective covers pluralization as the extension and wider exposure of the information for new purposes and uses. Information is not strictly organizational, hence as the pluralizing process takes place it becomes multi-dimensional as the utilization is no longer bound to a dedicated purpose. Such information which is outside of the boundaries now can be put to use in a more versatile and flexible manner, this further encourages new interpretations and prospects. Such applications and diverse interpretation is a demonstration of how pluralization aids information into becoming a more dynamic facet. Therefore, this explains pluralization in an entirely new manner which is more encompassingly focused on the applications and the behaviours of multiple sets of users.

Phase	Description
	This also entails memory: for instance, a deep region in spacetime. The idea of memory here presupposes that the pluralized information can be remembered in different systems and contexts, as part of a larger memory. It is said to be outside an organization or a community that is retained and altered as integrated into other narratives, other systems of knowing, and other practices. The idea of pluralizing is the sign of the global complexity and interdependence of modern systems of information. In society as well as technology, information is comprised in diverse and at times unforeseen uses. It emphasizes that documents are not frozen assets but clay in the blend of an ever-changing information ecosystem. So in this perspective pluralization explains the movement of information across time and space in more complex ways, extending beyond the original purpose for which the information was created. This means that records managers and users alike have opportunities, but also challenges – they must retain an understanding of the various ways that information could be used or changed after its initial purpose.

Notes: Records continuum details (Iacovino, 2006; Sue McKemmish, 2001; Reed, 2005b; Upward, 1996, 1997).

In this exploration of Records Management Practices under the **Records Continuum Theory**, two key elements—**Creation** and **Capture**—have been selected and **integrated with ISO 15489-1:2016(E)**. These elements were chosen for their relevance to the processes of managing information, particularly in the context of big data. Just as in the Records Life Cycle, the **Creation** element has been identified as a pivotal stage, especially when considering the generation of big data within organizations. Big data typically emerges from business activities, transactions, or individual actions, and it is essential to recognize the point at which this data is created in order to manage it effectively.

Once the creation of data is identified, the next crucial step is **Capture**. The **Capture** phase in this context focuses on ensuring that data, whether structured, unstructured, or semi-structured, is accurately captured and preserved for further processing. Structured data, such as information stored in relational databases, is relatively straightforward to capture, while unstructured and semi-structured data, such as emails, social media posts, or multimedia content, present unique challenges for capture and management.

The integration of **Capture** into the Records Management process is critical for handling the diversity of data types in big data environments. Effective capture ensures that all forms of data are properly documented and stored, enabling the organization to maintain consistency, traceability, and accessibility. This is particularly important as organizations face growing volumes of data that span multiple formats, sources, and systems. By focusing on the **Creation** and **Capture** stages, this approach aligns with the principles outlined in ISO 15489-1:2016(E), which emphasizes the need for systematic control over the entire life cycle of records, starting from their creation and through their subsequent capture. The **Creation** and **Capture** elements are integral in ensuring that the data generated within an organization is not only identified but also systematically processed and stored in ways that facilitate effective records management. This is especially critical in the age of big data, where the sheer volume and variety of information require a well-organized, scalable approach to management.

2.5.4 The Information Management Framework

Other than that, the best practice that the researcher has seen is from New South Wales (NSW) government. Few guidelines are providing by NSW can be a guideline in managing and controlling big data. Based on NSW Information Management Responsibilities and Accountability, (2013) **The Information Management Framework** is functioned to support the designing of systems, administers including the uses of data and information. Moreover, this framework also provides a set of guidelines, procedures, and policies which can be implemented either manually or automated through the technology. This framework also can help manage the information or data in being more structured, secure, and consistent manner. The function of this framework will help with the information and data become longer and can be shared or re-used among the organization. (NSW Information Management Responsibilities and Accountability, 2013). This is showed that this best practice might help to manage and control big data since it is focusing on the management of data and information.

In Information Management Framework by NSW, there are seven (7) principles that function to help to support better services and providing a good value investment. These all are by people and technology. In providing better services value there are important key elements which are **Govern; Collect; Organise; Secure; Use; Share,**

and Maintain. According to the NSW Information Management Responsibilities and Accountability, (2013), **Govern** is about the strategy use, operational and administrative value by the NSW government that handling information for the uses of citizens and organizations that will impact it to become a valuable asset. Next, for the “**collect**”, the information that is collected must in line with the quality standard to make sure it can fit for use and share. To make sure the information is following the quality standard; the NSW Government needs to deliver information that is respectful to the privacy of citizens. Once the information is accurate, consistent then, it can be fit and share with others. To make sure the information is easy to retrieve, use and share, it is important to have well-organized information. **Organized** here means each information must link each other to easier the process of retrieval and use. Other than that, organized information can be achieved if the information is integrated into a system. This is will easier the process of tracking. **Secured** in Information Framework is about protecting the integrity of information and respect the sensitivity. Therefore, in the NSW Information Framework, the information was secure by having an auditable and controlled process. This is functioned to avoid negative cases such as alteration, unauthorized access, deletion, or loss, and most important is to protect sensitive information or data. Next, the information can be **used** as evidence if following proper analyses. The use of information can help in support of the planning, decision making can be re-used and provide more benefits. In the information Framework, NSW the **shared** information is made available and appropriate for discovery. This process will allow the value-added, analysis, and development due to the engagement during the shared process. Finally, it is **maintained**. This is the last process in the Information Framework of NSW. The maintained information is by having risk-based measures and cost-effective that can help in facilitating the continuity of business agencies. The information was maintaining as long it contributes value during the share and use process then can be disposed of systematically or archived if need to protect any rights or interest of the citizens and organization.

Here below summarize key elements in the Information Management Framework:

Table 2. 5
Information Management Framework

Items	Descriptions
Govern	The concept "Govern" within the Information Management Framework outlines how information is to be managed strategically, operationally and administratively by the government of NSW. With this, it is assured that the information would be put to good use, making it useful for a person or an organization. Such an approach of governance includes formulating sound policies, standards and approaches on how information should be exchanged. This helps to make it possible for the data indeed created value within the organization to be responsibly used. The end strategic goals of the organization or rather all the stakeholders are well addressed. Understandably, the "Govern" principle intends to focus on the control and guidance of the use of information so that its potential is maximized.
Collect	The 'Collect' principle in the Information Management Framework insists that the information collected should meet certain quality standards to promise it serves its intended purpose properly. This includes the gathering of data that is deemed correct, consistent, and appropriate to be used and shared effectively across the organization. Such a set of quality standards would ensure that the collected information does not lose its worth, safety or their intended practical uses in decision making, planning and other processes within the organization. Also ensuring information adheres to these criteria enhances the credibility of the data and nurtures its appropriate use and sharing with relevant parties.
Organise	In the Information Management Framework, the "Organize" principle emphasizes organizing information with the aim of 'linking up' relevant components together. Such organization guarantees that information is easily located for use when required. Establishing a good connection between the data helps in the easy retrieval of data, efficient data mining and analysis. The correct arrangement of data facilitates the proper incorporation of information into various systems hence improving overall performance and enabling users to obtain relevant data in a short time by avoiding manual searches thus speeding up the decision making.
Secure	The principle of 'Secure' in the Information Management Framework is concerned with safeguarding the integrity, authenticity and confidentiality of information. It ensures that the data is always secured against any unauthorized access, modification, or even deletion. This includes undertaking control measures such as encryption, access controls as well as audits in order to enhance data integrity. Being sensitive to the data means ensuring that particular types of information, especially sensitive or personal data, are restricted to certain

Items	Descriptions
	people so as to comply with privacy laws and to protect individuals and organizations' rights.
Use	The Management of Information Framework utilizes the "Use" concept which regards information as evidence when it is appropriately analyzed. In this sense, information is trustworthy, precise, and is applied consistently. Adhering to some standard practices and analytical techniques, an entity is able to convert information into authoritative evidence for making decisions, planning, compliance checking, or for legal purposes. Analyzed information, in this case, can help in the carrying out of the organization's activities, give credence to strategic decisions and can also be used for accountability or transparency.
Share	The "Share" principle of the Information Management Framework insists on the fact that information should be organized, easily accessible and incorporated to a system that allows for the information to be made available to a selected audience, for sharing and discovery purposes, but in a secure manner. Such means that the needs of those who require that particular piece of information are met, but simultaneously all the required procedures are implemented and mechanisms in place that provide the necessary protection of privacy and confidentiality. The business can foster collaboration, innovation, and transparency by facilitating sharing so that appropriate users can use the data for knowledge creation, further analysis, informed decision making, or subsequent use or development. Also the sharing process should ensure that value is added to the Info shared and that the organizational goals are met, by allowing sharing with the scope audience only.
Maintain	The idea behind the "Maintain" principle of the Information Management Framework is that information is protected and looked after in a manner that guarantees business operations can be carried on. This entails the adoption of risk-based approaches and reasonable efforts to help the protection of the information over time in terms of its integrity, accessibility and usability. The administrative policy needs to stipulate that information is updated, secured and retained while instructions are issued for information that has no more purpose to be appropriately disposed of or archived. Effective information maintenance by the organizations enhances the useful life and application of the data, mitigates operating risks and guards key business resources and legal compliance retails.

Notes: Information Management Framework elements key (NSW Information Management Responsibilities and Accountability, 2013)

In this Information Management Framework, **two (2) elements** were chosen to see either it is suitable or not in managing big data which are, **use and share**. These two elements also consist of ISO 15489-1:2016(E) under use-reuse elements The 'use' element under the framework rests on the premise that information is required to be

made available for analytical and evidentiary purposes. For big data this implies that high volume of information should be transformed into actionable insights, constructive recommendations, strategies, and even solid proof for facilitating productivity in the organization. Over time, an organization must prudently manage big data optimally to ensure that data is accurate, available, and valuable for use in diverse situations.

The “share” element highlights the importance of making information accessible to those who have a need for it. In the case of big data, sharing becomes indispensable since it is important for data to be made available to stakeholders, to the relevant departments and external organizations when needed. This initiative encourages team work, enhances clarity, and assists in the decision – making processes in the organization. Organizations are better placed to achieve their wider business objectives by sharing and consequently maximizing the value of big data.

All of these aspects are crucial to big data management because they guarantee that data is not only kept but also applied in a way that is effective, safe as well as advantageous to the organization.

2.5.5 The International Research on Permanent Authentic Records in Electronic Systems (InterPARES)

This study applies **The International Research On Permanent Authentic Records In Electronic Systems (InterPARES)** under the records management big data perspective as the framework of the research. There are justifications for choosing InterPARES as a best practice for big data handling and control. Guanyan Fan (n.d.) states that the focus of the InterPARES project is on authentic record management, especially when it comes to overseeing the lifecycle of a record from its creation to its formatting technology. This methodology guarantees correctness and availability of the data as times go by, and technology advances. Guanyan emphasized that the InterPARES project is a joint effort with researchers from several countries. In the same context, Alwi Mohd Yunus (2016) points out that InterPARES has made major developments in the international context of protection and preservation of digital records and it’s validity as a project and research is because it seeks to understand the future of digital records.

The InterPARES project began in 1999 at the School of Library, Archival, and Information Studies at the University of British Columbia under the leadership of

Professor Luciana Duranti . Since it's establishment, this project has moved through four consecutive phases, each serving on the development of theories, methods and frameworks for the digital record as the previous one. The first phase included the period from 1991-2001. It included the analysis of recording systems so that they can be managed effectively with goals for long term maintenance of records. According to Guanyan Fan (n.d.), The aim of Phase 1 was to preserve systems and theories while also addressing the participants in the preservation process. The phase in question ended in 2001 and has been essential to the beginning of the next phases of the project.

Between 2002 to 2007 InterPARES started working on government, science and art-oriented projects, that was established during Phase 1 of the project. The global issue of protecting authentic records was reviewed and the period of creation was extended to more precisely include preservation, and several records in the context of authenticity. This Phase 2 ended in 2007 and greatly facilitated the understanding for the preservation of digital objects for the specific environments. This is consistent with the previously admitted claim that in phase 2, the focus was still on architecture design. Alwi Mohd Yunus (2016) confirms that this was taught to be quite the opposite for Phase 2 where governmental activities, scientific research and arts were the primary focus for IoT art preservation.

Final stage InterPARES Framework Transition Project after reviewing recommendations of Phase 1 and 2 began in 2007, with a run through of 5 years until 2012. In order to approach this goal, the focus was shifted towards more practical goals: creating teaching modules, academic curricula, development programs, and also building up small to medium-sized records management units for organizations to employ. This aims to address the issue of protecting records in a practical sense. During this Phase there was much more diversity in the team as well more cultural professionalism. Alwi Mohd Yunus (2016) reviewed that the team had IT experts, lawyers and administrators from 15 countries all over the globe, extending from Asia, America, North Africa and Europe. This diversity in skill and location aided globalization and adaptation of InterPARES framework ensuring contemporary relevance to it. As Part of the Fourth Phase of The Inter pares, Referred To As Trust, The Current Paper Delegates Its Focus Areas On Digital Record Preservation In The Construct Of A Cloud With A Focus On Whether Trust Issues Exist Or Not. Alwi Mohd Yunus (2016) States That Phase Four Primarily Search The Components Of Trust That Would Facilitate The Preservation Of Digital Records Over A Period Never Ended

Interest Of Ensuring The. In order to achieve these aims, the major objectives of the policies for file and record creation consist of identifying multiple theoretical and methodological frameworks that will assist in policy making through the establishment of procedures, regulations, standards and laws at all levels; International, national and local. They ensure integrity of records as well as strengthen nature of public trust, ensure effective governance and assist with growing digital economies. Step by step in Interparest Trust (2018) emphasizes that this section strives to amass the right set of tools that enable the unbroken digital memory history of records thereby enhancing information deemed to be reliable in the within a certain duration of time.

Munoz & Andeo (2020) state that the work of Jasen highlighted the increasing importance of trust in managing and preserving big data in our digital age where the integrity of digital records is of prime importance. Trust when interlinked with Big Data becomes a crucial aspect because as noted by Guanyan Fan are the volume of data generated through the use of Internet applications has been ever increasing, thus worries around the reliability and authenticity of data are very real. To further expand on this, Jasen posed significant concerns around other data-user aspects of Big Data such as the trustworthiness of its storage location (if more than one) and its security.

As the InterPARES project seeks to advance the information governance of time based media, it aims to create a cohesive framework that integrates different facets of archiving, preserving, and control of big data. This bears great significance especially during the time when the records of the world are primarily beginning to store digitally. Moreover, as a large focus of the project is aimed towards investigations of the entire lifecycle of preservation practice, theories and tools, what becomes even more important is the need of building trust and emphasis upon reliability, and security of big data that has become the main concern in today's contemporary world. InterPARES tends to be a part of shaping and transcending the intercede whilst attending to various pressing issues in order to ensure that a correct and a valuable form of data is available to the future.

Here below please find a summary of the elements that conclude all InterPAREST project that seems helpful in managing big data:

Table 2. 6
Elements in InterPAREST Project

Elements in InterPAREST Project	Description
Capturing Information	The term ‘capturing information’ within the framework of the InterPARES Project signifies the process of documenting any statement which is either produced by a creator or sent to a creator with ensuring proper identification and contextualization. This includes recording and capturing of necessary metadata such as chronen- time, documentary time, and preservation details of the recording. Further it also involves establishing context and verifying such documents by capturing such details as people involved in the document creation, how it was authenticated and so forth. This as enunciated gives a certain comprehensive case concerning the records contextualization with emphasis on their credentials and suitability for preservation for future use
Managing information or organize information	As per the InterPARES project, “the process of creation” is deemed as managing, that is, organizing information, as following its systematic organization through its lifecycle..Information management terminology also includes control on records performance to ensure their authenticity, dependability and usability after some time Even this includes the development of tools that aid in the ease of access to the records, and in turn, make the recovery process efficient. This component contributes to organizing information in such a way that record management and access to and utilization of information in necessary situations is made possible and efficient.
Preservation	In the case of InterPARES project the concept of 'preservation' means the active procedure of transforming and enabling information to be both held and retrieved over longer periods of time. Which entails the identification and saving of certain metadata so that the context and authenticity of it is able to be

Elements in InterPAREST Project	Description
	maintained. Preservation also includes fixing and safeguarding against potential problems which are likely to damage or interfere with the integrity of an idea or record and also finding the potential means to mitigate against the risks of loss or deterioration of an asset. It is, therefore, hard to disagree with such theorists that preservation involves all these activities to protect the integrity of valuable information so that it is not only trustworthy and reliable but also available for future applications
Appraisal	As part of InterPARES, “appraisal” is defined as an assessment of information to identify information of enduring value. This includes reviewing forces metadata to determine whether records should be kept or destroyed. The appraisal guarantees that records with permanent value, be it legal, historical, operational, or other purposes, are the only ones retained, while records without such value or which is duplicate are destroyed. This type of selective preservation conserves the reliability and efficiency of the record management systems.
Trustworthiness	As part of the InterPARES project, “trustworthiness” looks into the dynamics of trust in the practice of safeguarding and managing information. It emphasizes the importance of archival records being genuine, dependable, and marketable in the future. Trust is a strategic component to consider when determining what data is relevant and meaningful in the context of massive volumes of data generated in the sense of big data. Hence, the project is confident that it has protected the most pertinent and invaluable data because it has guaranteed trustworthiness, thus making sure that the records will be reliable and useful in the future.

Notes: Elements in InterPARES project with description (Interparest Trust, 2018)

In InterPARES Project, all elements were selected to see either it is suitable or not in managing big data which are **capturing information, managing or organize information, preservation, appraisal, and trustworthiness**. These four elements are

also mentioned indirectly in ISO 15489-1:2016(E). In capturing information, the researcher would like to see the information gain can be guided to the next steps in managing big data. Same as other records management practices, this element in InterPARES more on capturing the metadata of information such as authentication, persons who are involved in the creation, and many more. Through this element, it will help to give a view on managing big data. It is important to understand the data first before we manage it. Next is managing or organize information. In ISO 15489-1:2016(E) this element is under “use and re-use”. Through this element, the researcher would like to see either big data can be managed by monitor the performance of records or information in the organization. This function is to easier the retrieval process and to facilitate the access of information. Next is the preservation element, wherein ISO 15489-1:2016(E) preservation is under storing records element. Through this element, the researcher would like to see either this element can help or not in maintaining the valuable information. Through this InterPAREST project, this element is not only about storage but also about the preservation of the metadata of information for future references. Finally is the appraisal. In this element, the researcher would like to see either information can identify and appraise based on its metadata. Through this element, the researcher combines it with trustworthiness where information that is vital and has value only will be kept through the appraisal process. Appraisal and trustworthiness can be identified in ISO 15489-1:2016(E) under disposition elements. In ISO 15489-1:2016(E), before the disposition takes place to destroy information, the appraisal took place to identify which records have value or not. From that part, we can also see the trustworthiness element where only information that has value will be kept while the rest unnecessary will be destroyed.

2.5.6 Summary of Overview of Records Management and Currents Records Management Standards / Practices

Although several records management frameworks provide guidance for managing digital records, their applicability to big data environments differs significantly. ISO 15489 provides a comprehensive framework for records governance and accountability but does not explicitly address challenges associated with high-volume and high-velocity data environments. The Records Lifecycle model provides a structured approach to managing records across stages of creation, use, and disposition,

yet it may be less flexible in dynamic data ecosystems. The Records Continuum theory offers a more integrated perspective on records management across time and space but remains largely conceptual. Similarly, the InterPARES initiative focuses on ensuring authenticity and long-term preservation of digital records rather than operational management of large-scale data environments. These differences highlight the need to evaluate how existing records management standards can be adapted to address contemporary big data challenges

Several theoretical models and international standards have been developed to guide records management practices within organizations. These frameworks provide different perspectives on how records should be created, managed, preserved, and utilized to support organizational accountability and decision-making. While each framework contributes valuable insights into records management practices, they differ in their conceptual focus and applicability within modern digital environments. Table 2.7 presents a comparative overview of major records management models and standards discussed in this study.

Table 2. 7
Comparative Overview of Records Management Standards

Framework / Standard	Core Focus	Key Principles	Strengths	Limitations in Big Data Context
ISO 15489-1:2016(E)	International standard providing guidelines for effective records management practices across organizations.	Emphasizes authenticity, reliability, integrity, and usability of records. Supports systematic creation, capture, classification, and management of records throughout their lifecycle.	Provides internationally recognized guidelines for records governance and accountability. Applicable across different organizational contexts and supports regulatory compliance.	Originally developed for structured organizational records. Does not explicitly address challenges related to high-volume, high-velocity, and highly heterogeneous big data environments.
Records Lifecycle Model	Conceptual model describing records management processes through sequential stages from creation to disposition.	Stages include creation, maintenance, use, and disposition of records. Focuses on controlling records throughout their lifecycle to ensure proper retention and disposal.	Provides a clear and structured process for managing records systematically within organizations. Widely used in traditional records management practices.	The linear lifecycle approach may be less suitable for dynamic digital environments where records are continuously created, modified, and reused across multiple platforms.
Records Continuum Model	Theoretical framework emphasizing the continuous management of	Focuses on four dimensions: creation, capture, organization, and pluralization of	More adaptable to digital environments compared to lifecycle models. Recognizes the ongoing and	Implementation can be complex in practice, particularly in organizations lacking mature

Framework / Standard	Core Focus	Key Principles	Strengths	Limitations in Big Data Context
	records from creation to archival preservation without fixed stages.	records across time and space. Emphasizes integration of recordkeeping within organizational processes.	multidimensional nature of digital records management.	information governance structures.
InterPARES Framework	International research initiative focusing on the authenticity and preservation of digital records over time.	Emphasizes digital preservation, authenticity verification, and long-term accessibility of electronic records.	Provides strong theoretical and methodological guidance for preserving digital records and ensuring their authenticity in digital environments.	Primarily focused on long-term preservation rather than operational management of large-scale datasets generated in real-time big data systems.
Information Management Frameworks	Broader governance frameworks integrating records management, information governance, and data management practices.	Focus on policies, accountability, and organizational structures that guide the management of information assets.	Supports holistic governance of digital information across multiple systems and platforms.	Often conceptual in nature and may require integration with specific records management standards for practical implementation.

Notes: Comparative overview of records management standards

As illustrated in Table 2.7, each records management framework offers distinct approaches to managing organizational information. Traditional models such as the Records Lifecycle emphasize structured stages of recordkeeping, whereas the Records Continuum model recognizes the dynamic nature of digital records within contemporary information environments. Similarly, ISO 15489 provides internationally recognized guidance for records management practices, while the InterPARES framework focuses primarily on ensuring the authenticity and preservation of digital records. Despite their contributions, these frameworks were largely developed before the emergence of large-scale big data ecosystems. Consequently, further research is required to examine how elements of these frameworks can be adapted to address the challenges associated with managing high-volume, high-velocity, and heterogeneous data environments.

2.6 Big Data 10v's and Records Management Standard, ISO 15489-1:2016(E)

Referring to all Records Management Practices. ISO 15489-1:2016(E) was selected as the main standard to see either Records Management suitable or not in managing big data. The choice of this standard is due to the elements on this standard most likely already included in all elements in Records Management as an overall.

In this study, all elements in ISO 15489-1:2016(E) will be analyzed to see either it is suitable or not in managing big data. There are **eight (8)** elements in ISO 15489-1:2016(E) that will be chosen in this study is per below:

Table 2. 8
Elements in ISO 15489-1:2016 (E)

No	ISO 15489-1:2016(E)
1	Creation
2	Capture
3	Classification and indexing,
4	Access control
5	Storing records
6	Use and reuse
7	Migration/conversion,
8	Disposition.

While, in big data, elements, or issues that will be seen to manage the big data are among the V's of big data itself. Based on a model from Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018), the big data consist of 10 v's. All the big data V's will be discussed to found out the best way in managing big data through records management standard, ISO 15489-1:2016(E). The 10 big data V's are list as per below:

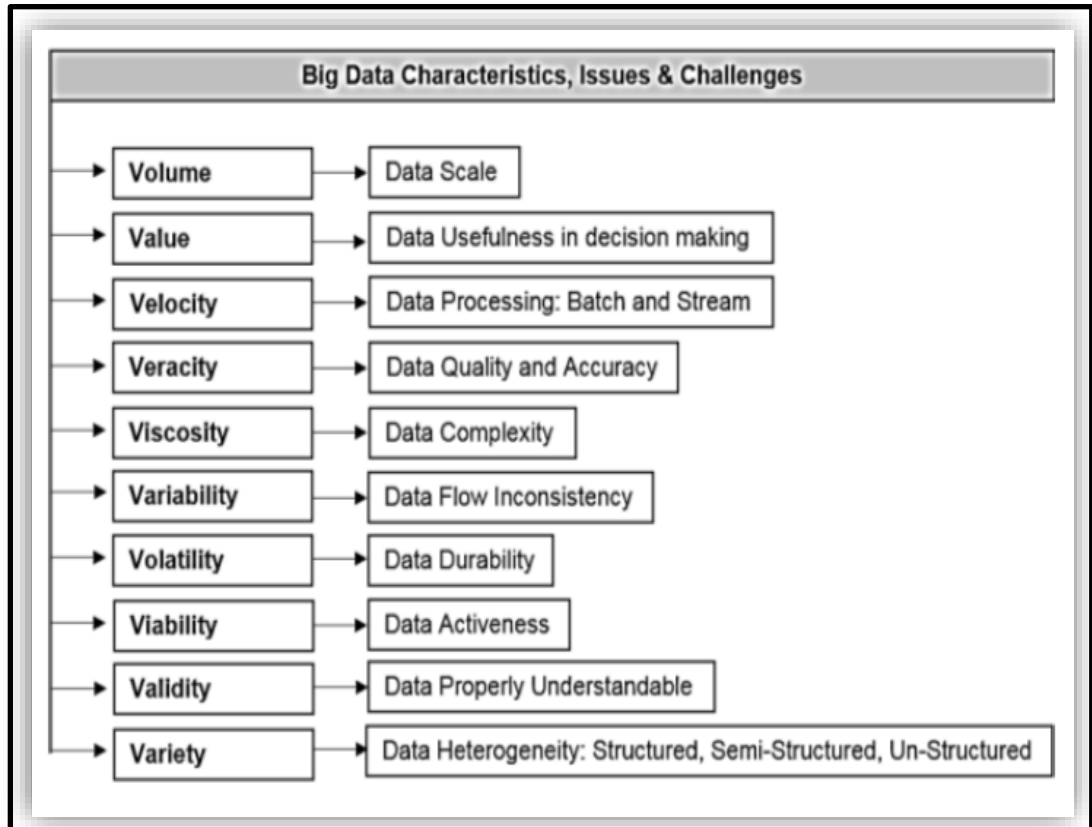


Plate 2.10 10V's Big Data Element based on Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018)

According to the Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018), big data consist of 10v's. Based on their research, this study will see how Records Management Standard, ISO 15489-1:2016(E) can be used in managing big data. The table below showed an explanation regarding big data 10v's based on Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, (2018). From the 10v's, elements in ISO 15489-1:2016(E) will discuss specifically to manage big data issues in big data V's. The explanation is seen as per table matrix analysis below:

Table 2. 9
10V's Big Data Elements

No	10 V's Big Data	Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
1	Volume	1. Creation 2. Disposition
2	Value	1. Capture 2. Classification and Indexing 3. Access Control 4. Storing Records 5. Use and Reuse
3	Velocity	1. Creation 2. Capture
4	Veracity	1. Capture 2. Use and Reuse
5	Viscosity	1. Capture 2. Classification and Indexing
6	Variability	1. Capture 2. Classification and Indexing
7	Volatility	1. Capture 2. Disposition
8	Viability	1. Capture 2. Storing Records 3. Use and Reuse
9	Validity	1. Capture
10	Variety	1. Capture 2. Classification and Indexing 3. Migration or Conversion

Notes: 10V's Big Data Elements (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)

Table 2. 10

The 10V's Big Data and Description Elements in Records Management Standard: ISO 15489-1:2016 (E) that suitable in Managing the 10V's of Big Data.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
1	Volume The increasing volume of data influences the difficulties in decisions making due to the size of data that growing faster compared to the computational power of the processing system	1. Creation According to the function of creation in ISO15489 (2016), the researcher believes by identifying what records or information that needed based on business activity also can help to identify what records can be creating. This can help to control the overwhelming volume of information that created every day without knowing the real purposes of the information creation. 2. Disposition According to the function of disposition in ISO15489 (2016), the researcher believes the element which is disposing or destruction can help to decrease the volume information by dispose the unnecessary information Thus, only valuable and needed information will be kept.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
	Value Value information helps in decision making. Increasing data lead to difficulties in identifying valuable information.	1. Capture According to the function of capture in ISO15489 (2016), the researcher capturing metadata can help in identifying valuable information where needed in decision making. Capturing also able to find the relationship between the records with other records. Hence, it will help to keep the valuable information only. 2. Classification and Indexing According to the function of classification and indexing in ISO15489 (2016) which is to linked records with business activity, the researcher believes classification can help to classify the information in the big data area that has quality and value to the organization. Hence, indexing also can help to retrieve the valuable information to be used for correct purposes at correct times and people. 3. Access Control According to the function of access control in ISO15489 (2016), which can help to allow certain people to access the information that has value; the researcher believes, this element can help to protect the valuable information missing, misuse, and damage in the big data area.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
		4. Storing Records According to the function of storing records in ISO15489 (2016), The researcher believes by having storing records, the valuable information can be used more longer through keeping it at a secure place or platform. 5. Use and Reuse According to the function of use and reuse in ISO15489 (2016), the researcher believes use and reuse elements also needed to make sure valuable information more long-lasting. Therefore, the usability of information also can be maintained either through creating a backup information, convert it into alternative formats, and also by developing a disaster plan.
3	Velocity Velocity of data related to the speed of information flowing leads to the challenges of potential fraud daily. Besides, according to the Nawsher Khan, Solmez Salehein, Mohammed	1. Creation According to the ISO15489 (2016), creations are related to the records created to perform the business activity. From that part, the researcher believes the creation of information should be control and manage by minimize information created at one time. This can help to avoid redundancy of data that leads to confusion at the end.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
	Alsaqer, (2018), challenges occur when around five hundred million per daily needed to predict the customer behavior or churn.	2. Capture According to the function of capture in ISO15489 (2016) that helps in capturing information, the researcher believes it can help to identify correct information among a huge number of data. This will help to overcome fraud challenges and attributes of information that keep changes.
4	Veracity Veracity is related to data quality and accuracy that needed to be trusted in deciding. However, due to the challenges of data inconsistency, and incompleteness, the data is difficult to define	1. Capture According to the function of capture in ISO15489 (2016) the researcher believes, capture is needed in identifying the quality and accuracy of data. Through capturing, certain elements or metadata can be identified to see either the data have value to kept or not. 2. Use and Reuse According to the function of use and reuse in ISO15489 (2016), the researcher believes use and reuse elements also needed to make sure the quality of data can

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
		be referred and use for the long-term period. Maintenance of information is needed to preserve the quality and accuracy of data.
5	Viscosity Viscosity is related to the complexity data where the huge data is coming from different sources, and linking each other in big data structures. This complexity big data leads to a significant effect in systems' behavior either applying small changes or not apply any changes at all.	1. Capture According to the function of capture in ISO15489 (2016), the researcher believes, capture is needed in handling viscosity issues of big data. Through capturing, the relationship of each data created by individuals or organizations can be analyzed. Thus, issues of complexity of data can be managed by identifying the group of data and its relationship. 2. Classification and Indexing After capturing takes place, the researcher also believes classification is as seconds steps that needed in handling complexity or viscosity of data. According to the function of classification and indexing in ISO15489 (2016), through these elements, data that been capture and identify based on a relationship can be structured through classification and indexing. This will help in easier the accessing or retrieval process for the data.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
6	Variability Data Variability is related to the inconsistent data flowing. The challenges occur when there are increasing in usage of digital media that also main root the increasing of data loads.	1. Capture According to the function of capture in ISO15489 (2016), the researcher believes capturing data can identify what types of data created, when and for what purposes. Therefore, it can help to monitor the data flowing. 2. Classification and Indexing According to the function of classification and Indexing in ISO15489 (2016), the researcher believes classification also needed to classify data based on its types. Since data variability is increased in many kinds of data especially in digital media, therefore it is important to implement the classification and indexing method to easier the access.
7	Volatility Data volatility is related to the life duration of data were how long the data need to keeping or stored. The data volatility happens due to the volume, variety and velocity of big data that lead to the increasing of information.	1. Capture The researcher believe data volatility is important to identify types and features of data either it is needed to be kept for long term period or not. According to the ISO15489 (2016), through capturing element, we can identify which information that needed to run the business activity of organizations. From that part we can know period to maintain and keep the information and dispose when it is no longer needed.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
	This will lead to many issues. Therefore, it is important to have understanding, a requirement of the lifetime data to decides the period of data to be stored.	2. Disposition According to the function of disposition in ISO15489 (2016), the researcher believes disposition is important element in volatility of big data. Since the increasing of big data lead to the challenges in term of storing and many more, it is important to know the period of information that can be kept. From this element, only valuable data will be kept, while others information that no longer need and exceed the retention period will be destroy or dispose.
8	Viability Viability of big data is about the capability of data be live and active forever. Viability data helps in developing and producing more data when needed. However, the challenges occur when we need to analyze huge data set in real-time. This is important to carefully select the factors or	1. Capture According to the function of capture in ISO15489 (2016), the researcher believes, the capture element is needed to identify which data that need to be kept for a long-term period. Since information keep increase, it is important to be selective by capturing important data only. 2. Storing Records The researcher believes storing records is needed to keep the data available for a long-term period. According to the ISO15489 (2016), through this element, it is important to have an appropriate storage environment, and to have proper

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
	attributes to predicts the outcomes needed for business organizations.	materials, to keep the information long-lasting, and to monitor the information kept in storage. This will help to lengthen the period of data. Therefore, it will enhance the capability of data be live and active as per needed in viability of big data. 3. Use and Reuse According to the function of use and reuse in ISO15489 (2016), the researcher believes by having use and reuse elements, data that been created can be used and maintained for a long-term period. Through this element, the data needed can be access for a long period. For example, having a backup of data or copies and by having a plan on monitoring to ensure the continued access even in the event of a disaster affecting the information.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
9	Validity The validity may be similar to veracity but they have different concepts and theories. The data that changes from exploratory to the actionable must be valid. The data may not have a veracity problem, but it can be not valid when it not being properly understandable. The validity of big data is important to be used in decision making. Thus, it needs to be correct. In that case, it is important to validate the data where it can be validated for certain usage or specific application and sometimes can be invalid for another usage or application.	1. Capture The researcher believes, the capturing elements are important to capture metadata of the information to validate it. According to the ISO15489 (2016), the capturing element also can help to identify the relationship between records. By identifying metadata and relationship of information, it can help to validate it suits to the origin of information.

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
10	Variety Data variety is related to the degree of organization which consists of structured, unstructured, and semi-structured data. Unstructured data can lack the degree of organization. This is different from structured data that has a high degree of organization. This is because structured data have a unified data format that easy to manage using any database tools. However, unstructured, and semi-structured data is more difficult to analyze. The big data platform should function to handle various big data that comes from various sources such as image, audio, text, video, and many more. The data	1. Capture According to the function of capture ISO15489 (2016), the researcher believes, the capturing elements can help to capture the variety of data such as structured, unstructured, and semi-structured. By identifying the nature of data and its origin, it may help to category the information. Besides, the capturing metadata and identifying the relationship of each information will help to organize it based on types or needs that suit to the organizations. 2. Classification and Indexing According to the function of classification and indexing in ISO15489 (2016), the researcher believes classification can help to group the big data based on types of data that are structured, unstructured and semi-structured. Thus, it will help to easier the process of access and retrieval. 3. Migration or Conversion According to the function of migration or conversion in ISO15489 (2016), the researcher believes migration or conversion elements are needed for a variety of big data. This is because big data comes from various sources especially in internet platforms or media. Therefore, it is important to have this element to

No	10 V's Big Data (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)	Description Elements In Records Management Standard : ISO 15489-1:2016 (E) That Suitable In Managing The 10V's of Big Data
	variety may empower systems in some ways, but it also gives challenges or obstacles in making decisions.	make sure the valuable information can be used for long term period. Moreover, due to the increase in technology nowadays. it is important to have these elements.

Notes: 10V's Big Data description elements with ISO 15489 (Nawsher Khan, Solmez Salehein, Mohammed Alsaqer, 2018)

Based on the table above, we can see a few elements in the Records Management Standard that may be suitable for managing big data. The eight (8) elements from ISO 15489-1:2016(E) was changed based on data collection and analysis. Moreover, the elements of Record Management discussed from ISO 15489 and Big Data V's from Namsher Khan et al. (2018) also consists and supported from models/theories in Records Management such as the Life Cycle of Records, Records Continuum Model, Information Management Framework, InterPARES that was explained in item 2.5. To proof the suitability of Records management Standard Elements from ISO 15489-1:2016(E) in managing big data, it is important to conduct data collection and analysis was discuss in chapter three.

2.7 Chapter Summary

In this chapter, all literature reviews were discussed. All elements related to big data and records management practices were explained and it could be seen that some elements in records management standards might have been suitable and could have been used in managing big data. Issues regarding big data V's were also discussed. From that part, an analysis regarding elements in Records Management Standard, ISO 15489-1:2016(E) was focused on determine whether suitable or not in big data. This chapter also helped in providing a view on the next process of this study which was the research methodology.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodological framework employed in this study, including the research design, philosophical orientation, data collection strategies, and analytical procedures. It provides a systematic explanation of how the study was conducted to address the research objectives concerning the suitability of records management standards in managing big data within organizational contexts. The methodological choices were carefully aligned with the nature of the research problem, ensuring both analytical rigor and practical relevance.

Research methodology is commonly defined as a structured set of principles, methods, and procedures used to guide the research process (Walliman, 2011). The selection of an appropriate methodology is critical, as it directly influences the validity, reliability, and overall credibility of the research findings. In the context of this study, methodological decisions were guided by the need to explore complex interactions between records management practices and big data environments, which require both contextual understanding and analytical depth.

This study focuses on identifying, evaluating, and proposing appropriate records management strategies that can be effectively applied within contemporary big data environments. Given the evolving nature of digital information ecosystems characterised by high volume, velocity, and variety of data - the research requires an approach capable of capturing both technical and organisational dimensions of records management practices. Therefore, methodological alignment with the research objectives was essential to ensure that the findings contribute meaningfully to both theory and practice.

From a philosophical standpoint, social science research is generally underpinned by two dominant paradigms: positivism and interpretivism (Babbie, 2008; Saunders, Lewis, & Thornhill, 2012; as cited in Irwan Kamaruddin, 2014). These paradigms provide distinct epistemological and ontological assumptions that shape how knowledge is generated and interpreted.

The **positivist paradigm**, commonly associated with quantitative research, emphasises objectivity, measurement, and the identification of causal relationships. It typically involves the use of structured instruments such as surveys or experiments, with data analysed through statistical techniques to produce generalisable findings. While this approach is valuable for examining measurable patterns and relationships, it is less suited for capturing the contextual and experiential dimensions of complex organisational practices.

In contrast, the **interpretivist paradigm** adopts a qualitative orientation, focusing on understanding human behaviour, social interactions, and contextual meanings. As noted by Bruce (2000), qualitative research involves the collection of non-numerical data, such as textual or visual materials, which enable a deeper exploration of participants' experiences and perspectives. This paradigm is particularly relevant for examining organisational practices, where meaning is constructed through interactions, policies, and socio-technical contexts. Given the exploratory nature of this study and its emphasis on understanding records management practices within real-world big data environments, an interpretivist orientation was considered more appropriate. However, elements of methodological pragmatism were also incorporated to ensure that the research outcomes remain applicable and actionable. This reflects a **qualitatively driven, multi-phase research design**, integrating exploratory case studies, interviews, and framework development.

The overall methodological approach adopted in this study is summarised in Table 3.1, which presents the taxonomy of research methodologies and highlights the specific methods employed. This structured approach ensures that the selected methods are aligned with the research questions and objectives, thereby enhancing the robustness and credibility of the study.

Table 3. 1
Taxonomy of Research Methodology

Positivist	This Study	Interpretivist / Naturalist	This Study
Laboratory Experiments		Subjective / Argumentative	/
Field Experiments		Reviews	/
Surveys	/	Case Studies	/
Theorem Proof		Descriptive/Interpretative	/

Forecasting	Future Research
Simulation	Role/Game Playing

This table outlined the taxonomy of research methodologies relevant to this study. It distinguished between positivist and interpretivist/naturalist approaches, specifying which methodologies were employed in this research.

3.2 Determining the Research Method For this Study

To achieve the research objectives, careful consideration was given to selecting an appropriate methodological approach that aligns with the research questions, context, and expected contributions of the study. The choice of research method is critical, as it determines the extent to which the study can generate credible, meaningful, and contextually relevant findings. In this study, methodological decisions were guided not only by theoretical considerations but also by the practical need to address real-world challenges associated with managing big data through records management practices.

The research aims to examine how existing records management standards can be applied within complex and evolving big data environments. Given the dynamic and context-dependent nature of this phenomenon, the selected research method needed to capture both organisational practices and experiential insights from practitioners. Therefore, the methodological approach was designed to ensure alignment between the research objectives, the nature of the data required, and the broader contribution to both academic knowledge and professional practice.

In addition to theoretical contribution, this study emphasises practical applicability. As highlighted by Kalu (2017), an effective research methodology should not only advance academic understanding but also generate insights that are relevant to practitioners and decision-makers. In this context, the methodological approach adopted in this study was intended to produce findings that can inform organisational strategies, policy development, and the implementation of records management practices within big data environments.

3.2.1 Qualitative Case Study Methods

This study utilized a qualitative research approach. Qualitative research, according to Cresswell (2009), is usually conducted in a real-world setting where behaviors, people, or events are not artificially changed. This type of inquiry enhanced coalescence between the researcher and the phenomena, reducing the chances of distortions of the truth about the matter being studied. Irwan Kamaruddin (2017) elaborated on this concept further, indicating that qualitative methods did achieve the goal because they provided for a thorough scrutiny of the available articulations, experiences, and behaviors of the respondents, thus enabling a clearer and wider comprehension of the subject under study. The qualitative approach also recognized participants as active agents who made sense of their world and did not only measure it; this meant it yielded intrinsic understandings that could not be adequately expressed in numerical figures.

To achieve the objectives of the current study, the authors analyzed and interpreted the data collected through expert interviews and draft reports from specialists dealing with records in the context of management. The aim was to gather knowledgeable opinions and elaborate on the existing practices within records management pertaining to the context. The overall case study research design was employed as the methodology to obtain the research objectives. Kamaruddin (2014) in his text also mentioned Salkind (2000) and Patton (2008), where both case studies were more dynamic and flexible in their methodology and served the purpose of research within social sciences because they allowed cross-checking and confirming data relative to many different sources and presenting the results in a detailed, descriptive format. An individual, a group, an organization, or an event could be the subject of this type of study, and this made the case study method more effective in providing a wide range of variations in data.

According to Baxter (2008), a strategy for case studies was developed based on the views of two scholars, Robert Stake (1995) and Robert Yin (2003, 2006), who respectively provided different but supporting methods of doing case studies. Both Stake and Yin presented criteria that assisted researchers in their investigation of subjects in detail and order, revealing the phenomena under consideration from various angles. Their concepts included consideration to be given to the case context, case analysis, and case interpretation, considering real-world issues.

Salkind and Patton (2008) (2000) also argued that in this type of research, data was collected in a systematic manner from selected individuals, groups, or even institutions, but the data was unstructured and detailed. That said, such understanding helped the researcher address the case problem in a comprehensive manner as different perspectives as well as contextual details were captured. Gorman and his colleagues (2005) viewed a case study as a probe into a certain territory, bearing in mind a specific event or occurrence, which a practitioner was better positioned to explore and grasp its obscurities in relation to a particular research domain. At the same time, as the cases were detailed, it became possible to begin with case studies and extend research to larger-scale surveys and build new theories or practices.

This study intended to use the case study approach to determine appropriate records management practices for big data. In the present research, the records management practitioners across different organizations were interviewed to broaden further the big data management context and assess the applicability of current records management practices therein. The study intended to identify best practices, key bottlenecks, and potential areas of interest in the context of the management of data on an organization-wide basis by developing suitable research framework.

There were several factors that guided the decision to use the case study method. As Yin (2003) pointed out, this was primarily the need to explore a phrase in real situations and when the phenomenon was not clearly separated from its context. Table 3.2, which was presented below, succinctly listed these criteria and established their relationship to this research, thereby enhancing the rigor of the case study approach in connection with the research aims and questions.

Table 3. 2
Item Considering in Using Case Study and The Reflection Towards this Study.

No	Item Considering in Using Case Study according to Yin, (2003).	Reflection to this study (The Suitability of Records Management Practices in Managing Big Data.)
1	The case study can be used when the focus of the study is to answer certain questions either “how” or “why”.	This study aimed to explore how records management practices can could manage big data, assessing

No	Item Considering in Using Case Study according to Yin, (2003).	Reflection to this study (The Suitability of Records Management Practices in Managing Big Data.)
		whether these practices are suitable or not.
2	The case study can be used when the researcher cannot manipulate the behavior involved in the study.	N/A
3	The case study can be used when the researcher wants to cover the contextual conditions because they are relevant to the phenomenon under study.	The study considered that there was relevance in the philosophy of records management practices that could significantly impact big data management.
4	The case study can be used when the research boundaries are not clear between the phenomenon and context.	There iwas limited research specifically addressing how records management standard can manage big data. Thus, the case study approach helped determine the suitability of these standards.

Notes: Item Considering in Using Case Study) and The Reflection Towards this Study.(Yin, ,2003)

Following the similarity with the case study within the above table, it was stated that the methodology in this scope of aim would be utilized for determining the relevance of records management standards in managing big data. Baxter (2008) observed that a case study as a methodology had distinct steps, and notably, one of these first steps involved defining the ‘case’ or unit of analysis. A case was a bounded event or phenomenon that occurred in defined circumstances and which had an effect on the unit of analysis, as stated by Miles and Huberman (1994: 65) as quoted in Baxter (2008). In this particular study, the “case” was the relevance of records management practices around a certain context of managing big data, for which records management standards would be useful in this case; this “case” was studied. The objectives of this study were to see the applicability and customization of different records management standards

which could be efficiently used to address the problems associated with big data.

Taking this case study into account, the most pertinent issues pertained to developing appropriate facets and guiding principles for big data management with regards to records management. The case study research was adopted for a number of reasons which stemmed from its wide applicability. Case studies, Marshall (2006) as quoted in Jamilah (2002) noted, had been used in many fields, including education, sociology, psychology, management, public administration, and organizational studies. Given this breadth of application, the case study approach was of crucial importance when seeking to investigate multi-faceted phenomena in various domains.

Supporting the role of case studies, Pickard (2007) pointed out that a case study typically could be fractal and multicase and/or comparative, which brought out thorough scrutiny of different instances or contexts. He further asserted that case studies were probably the most appropriate research methodology for studying current events in their contextual realities, especially when the research had no opinion over the boundaries of the event or the elements of the event under focus. This was especially important in this study since big data management was an emerging field and other external factors such as technology and organizational practices could affect the outcome of the study. Merriam, S. B. (2009) pointed out that case studies featured considerable flexibility in approach as they could be based on several sources of information and involve various techniques of data analysis. For instance, case studies allowed researchers to employ content analysis, interviews, or discussions, among others, which further provided a wider scope of grasping an understanding of the subject. The case study method in this work was further supplemented with other methods in order to better comprehend the studied phenomena. Specifically, it assisted in assessing the effectiveness of records management best practices for big data management and for a better understanding of the issues and options involved.

Also, Irwan Kamaruddin (2017), in his own research analysis, asserted that the case study method was the one for records management studies. He claimed that a case study methodology facilitated the researcher's understanding of records management activities and how they might function in various types of organizations. This further justified the rationale for the adoption of the case study approach in this research, since it assisted the researcher in testing the feasibility of different records management mechanisms in relation to the problems that arose due to big data.

3.2.2 Exploratory Case Study Method and Past Studies

Case studies can be thoroughly differentiated into several categories depending on the type of research conducted. Explanatory case, exploratory case, descriptive case, multiple-case, intrinsic case, and instrumental case were among them. There were several subtypes within the framework of case studies that could be further divided. Depending on the type of research questions, the method of a case study brought up different approaches. For this research, the authors determined its method as an **exploratory case study**.

Baxter (2008) cited Yin (2003), stating that when there is little pre-existing research on the topic, exploratory case studies are helpful, especially when the facets of the issue remain vague. Exploratory case studies were conducted to understand poorly understood phenomena and could help in the development of new theory or further existing investigative research fields. This type of case study would be beneficial in investigating new dimensions of complex events where no existing information had been documented. Through this study, new insights were gathered, and key variables or patterns of the processes were discovered.

The researchers aimed to fill this gap through an exploratory case study, as similar literature was scarce. Their findings should have helped prioritize different practices and philosophical approaches to more effectively manage big data. Data management and practices related to data-centric big data management remained underexplored and unexplored, respectively, in conjunction with traditional records management, and related literature underscored the need for further research in this area.

This type of research design also allowed the researcher to investigate records management within the wider scope of organizations that handled both traditional and big data, offering insights into the compatibility issues that arose in such environments. Additionally, this would inform management about whether the elements in the existing records management standards needed to be fine-tuned or redefined to cater to the big data management requisites in the most efficient way possible.

The following are relevant or related case studies that highlighted the use of case study research, especially in an exploratory manner:

Table 3. 3
Past Studies Using Exploratory Case Study

Past Studies of Exploratory Case Study	Summary of Exploratory Case Study
Exploratory Case Study Research on Web Accessibility. (Leitner, M.L., & Strauss, C., 2013)	This research aimed to resolve problems in reservations and suggested an exploratory analysis of web accessibility in business-oriented contexts. The purpose of this study was to develop a conceptual framework for exploring the business implications of web accessibility. In this paper, the exploratory research approach was used from a business perspective, generating the foundation for further research in this area, whether qualitative or quantitative.
Web Services, IT Integration and Value Generation in Egovernment: An Exploratory Case Study (Virili, F., & Sorrentino, M. n.d)	This study focused on exploring the nature of IT integration and providing a preliminary overview, along with further data collection and analysis. Through the case study, interviews and project documents were collected at the project site.
Application of big data in records management in public organizations in Kenya. (Lucy Kibe, 2019).	This study employed an exploratory research approach due to the relatively new concept of big data in public organizations in Kenya. The findings of this research indicated that big data could assist these organizations in managing their records more effectively. Additionally, the results of this study could be used to inform the development of strategies and policies related to big data.
Research of Innovative Trends in Healthcare Records Management. (Smith et al., 2015)	An exploratory case study by Smith et al. (2015) investigated the integration of new technologies in the management of healthcare records. The research focused on how emerging technologies,

Past Studies of Exploratory Case Study	Summary of Exploratory Case Study
	with a future-oriented perspective, influenced the handling of data and patient information in environments where technology was perceived as challenging to understand and adopt.
Research Practices Within the Aspects Of Supply Chain. (Johnson and Lee, 2018)	Johnson and Lee (2018) employed an exploratory case study method to examine a company's supply chain management practices through the lens of emerging logistics solutions. Their research was exploratory in nature, as, to the best of their knowledge, the impact of these strategies on operational efficiency had not previously been thoroughly investigated.
Understanding Organizational Change in Non Profit Organizations. (Taylor, 2020)	Taylor (2020) conducted an exploratory case study to investigate how organizational change operates within the context of charitable organizations. The objective was to evaluate the extent to which policy changes could enhance donor base penetration—an area that, at the time of the study, had received limited scholarly attention.
Procedures of Implementation of Cybersecurity Policies in Small Businesses (Davis and Miller, 2017)	Davis and Miller (2017) conducted an exploratory case study to examine how small retail stores adapt to increasing cybersecurity threats. The primary aim was to understand the strategies these businesses employed to mitigate and respond to evolving cyber risks.

As these examples illustrate, case studies can be useful in exploring issues where there has been little previous research. The case studies make the argument that knowledge creation is also justified because the topics studied have not been researched enough. So, the case studies have done justice to the unexplored domains. Accordingly, this study will also employ an exploratory case study in order to relate the existing

records management procedures with the management of big data.

This is especially necessary since records management and big data are fairly new areas, it will be set out to see whether the existing records management practices and systems in place can be flexible enough to meet the demands of the big data environment. The case study method will provide insights into how existing practices in organizations are likely to evolve to meet the big data challenge. In pursuing this strategy, the study intends to contribute to the body of knowledge and standard of records management within the realm of big data.

3.3 Research Strategy

This study adopts a **flexible and iterative research strategy**, which is appropriate for investigating an emerging and complex research area namely, the role of records management practices in managing big data within Malaysian organisational contexts. Given the evolving nature of big data environments, a rigid methodological structure would be insufficient to capture the dynamic interactions between technology, governance, and organisational practices. Therefore, an adaptive strategy was employed to allow the research design to evolve in response to emerging insights throughout the study.

The primary aim of this research is to develop a set of **suitable and applicable guidelines** for managing big data through appropriate records management practices. To achieve this aim, the study was structured into several interrelated phases, each contributing to the systematic development of findings and ensuring alignment with the research objectives

The first phase involved establishing the academic and conceptual foundation of the study within the Doctor of Philosophy in Information Management (IM 950) programme. This provided the theoretical grounding and research direction necessary to frame the study within the broader discipline of information management. The second phase focused on refining the research problem and defining the scope of the study. The selected research topic *“Assessing the Suitability of Records Management Standards in Managing Big Data: Multiple Case Studies of Malaysian Organizations”* was chosen due to its relevance to current challenges in digital information governance, particularly within the Malaysian context.

The third phase consisted of an extensive literature review, drawing on academic publications, professional reports, and organisational documents. This phase aimed to establish a comprehensive understanding of existing theories, frameworks, and practices related to records management and big data. In addition to academic sources, secondary data were examined, including organisational policies, procedures, and guidelines related to records management and digital data practices. This phase not only informed the theoretical framework but also identified key gaps in existing literature, particularly concerning the integration of records management standards within big data environments. The outcomes of this phase are presented in Chapter Two.

Building on the literature review, the next phase involved the selection of an appropriate research approach. Consistent with the exploratory nature of the study, a **qualitative multiple case study approach** was adopted to enable in-depth investigation of organisational practices within real-world contexts. This approach allows for the examination of how records management practices are interpreted, implemented, and adapted across different organisations managing large-scale data environments. The methodological rationale and design are elaborated in Chapter Three.

This study adopts a multiple case study approach rather than an exploratory single case design. While the research is exploratory in nature given the limited empirical studies examining the integration of records management practices within big data environments - the selection of multiple cases enables cross-case comparison, identification of recurring patterns, and deeper analytical insights. This approach enhances the robustness of the findings by allowing similarities and differences across organisational contexts to be systematically examined, thereby strengthening the credibility and transferability of the results (Yin, 2018). This study employed a **purposive sampling strategy within a multiple case study design**, structured across three sequential phases. The purpose of this approach was to progressively refine the sample to ensure relevance, depth, and alignment with the research objectives.

The use of purposive sampling is appropriate for qualitative research, particularly when the aim is to obtain **information-rich cases** that provide deep insights into the phenomenon under investigation (Merriam & Tisdell, 2016; Patton, 2015). The details of three process of sampling strategy were as follows:

1. **Phase One:** In this initial phase, a large population of organizations that contribute to the generation of emerging big data was surveyed. This broad approach allowed for the identification of relevant organizations that were engaged in big data activities across various sectors.
2. **Phase Two:** Based on the survey conducted in Phase One, three organizations were selected from the larger population. These organizations were chosen based on their significant involvement in big data generation and their relevance to the research objectives, which focused on records management practices.
3. **Phase Three:** In the final phase, records management professionals from the three selected organizations were identified and selected for participation in the study. These professionals will provided insights into how records management practices are implemented within the context of big data, enabling a deeper understanding of the relationship between the two.

By selecting organizations and records management professionals through this purposive sampling strategy, the research ensured that the participants were specifically relevant to the research topic and could provide meaningful data to address the research questions. This approach allowed for a targeted exploration of the suitability of records management practices in managing big data.

The subsequent step involves **research sampling**. The sampling process is guided by specific criteria that define the target population in terms of records management professionals. For this study, **purposive sampling** techniques have been employed to select participants who are most knowledgeable and experienced in records management practices. The **triangulation method** is used as a data collection strategy to ensure the reliability and validity of the findings. Interviews will be conducted based on carefully crafted interview questions, and data will be analyzed to determine whether the research objectives are being met. This triangulation approach enhances the depth and credibility of the findings by cross-checking data from multiple sources.

The final phase of the research involves **data analysis and interpretation**. Qualitative data collected from interviews and documents were analysed using a systematic coding process, supported by analytical tools (e.g., ATLAS.ti), to identify key themes and patterns. Cross-case analysis was conducted to compare similarities and differences across organisations, thereby enhancing analytical depth and enabling theoretical generalisation. The findings are then interpreted in relation to the research

objectives, with particular emphasis on evaluating the suitability of existing records management practices for managing big data.

Overall, the research strategy reflects a **multi-phase, iterative**, designed to address both the research problem. By integrating qualitative inquiry, case study analysis, and triangulation, the study provides a comprehensive understanding of how records management standards can be applied within complex big data environments.

3.4 Research Questions

Table 3. 4
Research Questions that Support and Parallel to The Research Objectives

Objectives	Research Questions
RO 1.0: To evaluate current records management practices used that are suitable in dealing with big data V's.	RQ 1.0: What current records management practices are suitable for dealing with big data V's?
RO 2.0: To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.	RQ 2.0: What are the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizations?
RO 3.0: To design and validate a records management framework for managing big data by integrating suitable elements from established records management standards.	RQ 3.1 : Which elements of records management standards are suitable for developing a framework to manage big data?

3.5 Research Context

This section explains the **contextual and methodological rationale** for selecting research sites, sampling strategies, and informants in this study. Given the study's objective to assess the suitability of records management standards within big data environments, it was necessary to select organisations that actively generate, manage, and utilise large-scale digital data. This ensures alignment between the research context and the conceptual issues identified in this study, particularly concerning data governance, complexity, and lifecycle management in big data environments

3.5.1 Selecting Research Site

The selection of research sites was guided by a theoretical and purposive rationale, focusing on organisations that significantly contribute to the generation and management of big data within Malaysia. These organisations operate across multiple sectors where data-intensive activities such as data production, storage, analytics, and decision making are integral to daily operations. This aligns with prior literature indicating that big data is most prominently generated in sectors characterised by high digital dependency and complex information flows (Talha Ashraf, 2017).

Rather than adopting a single sector focus, this study deliberately employed a multiple-sector case selection strategy to enhance analytical breadth and enable cross-case comparison. This approach is consistent with multiple case study design principles, where variation across cases strengthens the robustness and transferability of findings (Yin, 2018).

The identified sectors including technology, healthcare, education, finance, renewable energy, and construction represent data-intensive environments where large volumes of structured and unstructured data are continuously generated. These sectors were selected not only due to their contribution to big data but also because they present diverse records management challenges, thereby providing a suitable context for examining the applicability of records management standards.

Importantly, the selection was not intended to achieve statistical representativeness but rather analytical generalisation, where insights derived from selected cases contribute to broader theoretical understanding of records management

practices in big data environments.

The specific organizational fields that were identified as major contributors to the generation of big data, as pointed out by Talha Ashraf (2017), are given below. These sectors were relevant in shedding light on the creation and utilization of big data in Malaysia and, at the same time, assisted in better understanding the application of records management practices in practical situations.

Table 3. 5
Early Lists of Selecting of The Research Site

No	Organization Fields	Example
	Technology /	
1	Commerce Company	Google, Facebook, Netflix
2	Healthcare	Hospital, Pharmaceutical Industry
3	Education	University / High School
4	Miscellaneous / Production	Factories
5	Oil and Gas (O&G)	Petronas
6	Financing	National Bank Malaysia ; Maybank ; CIMB ; etc
7	Renewable Energy Company	Solar; Wind Power; Hydroelectric Energy; Biomass; Geothermal Power; etc
8	Construction Engineering	Gamuda; UEM Berhad; YTL Corporation Berhad; Malaysian Resources Corporation Berhad (MRCB); Sunway Construction ; etc

Notes: Selecting of the research site was based on organization fields that contributed to the huge number of big data (Talha Ashraf, 2017)

There were a few reasons for selecting field organizations as a research site. In this study, a few research fields that led to big data were discussed. Through analysis by Talha Ashraf (2017), it was concluded that organizations that produced information through **technology** showed a high production of big data. For example, as cited by

Talha Ashraf (2017), Xu et al. (2015) mentioned that social platform accounts produced huge amounts of information every day. Netflix used big data analytics in analyzing millions of real-time data points through the viewers to identify which successful shows were presented on Netflix. Besides, as cited by Talha Ashraf (2017), Provost and Fawcett (2013) stated that Facebook provided and hosted data of over 500 terabytes every day. This included uploaded photos, users' posts, and likes. The same occurred with Google, where this company succeeded in collecting \$54 billion for the US economy in 2009 (Labrinidis and Jagadish, 2012). The same was true for Amazon, where this commerce/technology company also used lots of data and utilized it from various points to identify and personalize the client experience (Talha Ashraf, 2017).

Next was the **healthcare** field. Burg (2014) believed that big data had a significant impact on healthcare, where the information could provide and enable a transparent healthcare system. This was supported by Tormay (2015), who believed that the increase in data, which was fast and voluminous in nature, combined with advances in technology, could help pharmaceutical R&D as the engine for the pharmaceutical industry, which had been declining in productivity for over the last 20 years. Moreover, this became more challenging when the field required high costs and demanded better standards and productivity. Therefore, it was important to have proper management in managing big data.

Education was also a field that contributed to big data. Erwin R. (2015) believed that students were more literate in their abilities to use data. This would increase the information created. This was supported by Gunter (2007, as cited by Talha Ashraf, 2017), where there was increasing data literacy among students, particularly in project-based learning, which helped students to solve real-world problems, build skills, and meet the demands of the business. The use of big data in education was also evident when Rijmenam, M. (2014) believed that big data could change the way teachers and students interacted with each other. For example, in the United States, Gwinnett, in suburban Atlanta, Georgia, became the 14th largest school system, with almost 23,000 employees and providing transportation for people every school day using Delta Air Lines (Talha Ashraf, 2017). This showed that all the activities were generating information, and more of it was captured digitally. This led to the importance of managing big data. Moreover, Talha Ashraf (2017) also stated that the school system's leaders started to seek educational solutions by exploring how analytics could help investigate information for patterns, relationships, and more.

Miscellaneous fields also produced information and used big data analytics to increase their profit in business. For example, in 2014, the Big Data Strategy framework created in Servitization was proposed by Opresnik and Taisch (Talha Ashraf, 2017). This also occurred in 2015 when Zhau et al. al. proposed an optimization model for green supply chain management, helping minimize the risk of hazardous materials and economic costs. The same applied to Nike, as mentioned by Galbraith (2014), cited by Talha Ashraf (2017), where the increase in information leading to big data, if organized properly, would lead to the complexity of new business. Moreover, if big data were used and analyzed correctly, it would contribute to a good economy. This was proven between 2012 and 2017 when the UK economy increased by almost £24 billion through the benefits of big data.

Another field of an organization that contributed to big data was **Oil and Gas (O&G)**. Inkpen, A.C., and Moffett, M.H. (2011) stated that O&G companies were some of the largest industries worldwide with facilities in various locations. Farris, A. (2012) mentioned that some O&G operations depended on data for production operations, seismic surveys, exploration, and critical decisions in the exploration of new projects. This showed how important data was. Moreover, as cited by Muhammad Saleem Sumbal et al. (2019), Sumbal et al. (2017) mentioned that the increase in data was generated much faster with advancements in technology from various activities that finally gave rise to the term "big data." The increase in big data raised concerns for O&G companies, where they began to investigate the use of data (Hems et al., as cited by Muhammad Saleem Sumbal et al., 2019).

Kazim Hussain & Prieto, E. (2016) believed that the **finance industry** also faced issues in managing large quantities of customer data and had been intensively data-driven for many years. According to Technavio (2013, as cited by Kazim Hussain & Prieto, E., 2016), the big data market in the financial sector would keep increasing by 56.7% over the period from 2012 to 2016. In 2020, this number had likely increased. Kazim Hussain & Prieto, E. (2016) found that the reason for the increasing big data in financial growth was the need to meet financial regulations. However, the lack of skilled resources in managing big data had become one of the challenges for the finance sector.

Renewable energy companies or industries also did not miss out on facing emerging information that led to big data. According to Ceci, M. et al. (2014), due to the continuous research on improvements to the world generated every day in renewable industries, it led to big data. This data received great attention to create value. This data

started from the phase of data acquisition until it became useful when analysis was performed. Moreover, the idea of predicting energy production from renewable industries also gained significant attention from research communities. This led to an increase in big data (Ceci, M. et al., 2014).

Siti Aisyah Ismail et al. (2018) believed that there was an increase in data generated through the **construction industry** due to the use of technology. She also added that there was a data explosion that led to big data, which could impact and disrupt the paradigm of the construction industry. Garyaev, N. (2019) added that huge data were generated in the construction field. This included design data, financial data, corporate resource planning system (ERP) data, and more. Garyaev, N. (2019) also explained that big data engineering started generating in construction during the design of systems for processing, collecting, and storing data. This process allowed petabytes of data to be processed, leading to the access of various users for the results of data.

Based on research on the field of organizations, we can conclude that there was a huge amount of information created every day. This information was coined as big data. Some big data analytics helped organizations, but there were still failure problems occurring in every organization that needed a solution. Most big data analytics were created technologically, but how about through the records management field? This will be explored further in this research. At the end of the research, we can identify whether records management standards are suitable for managing big data or not.

3.5.2 Sampling Strategy for this Study

This study employed a **purposive sampling strategy within a multiple case study design**, structured across three sequential phases. The purpose of this approach was to progressively refine the sample to ensure relevance, depth, and alignment with the research objectives.

The use of purposive sampling is appropriate for qualitative research, particularly when the aim is to obtain **information-rich cases** that provide deep insights into the phenomenon under investigation (Merriam & Tisdell, 2016; Patton, 2015). The details of three process of sampling strategy were as follows:

- **Phase One:** In this initial phase, a large population of organizations that contribute to the generation of emerging big data was surveyed. This broad

approach allowed for the identification of relevant organizations that were engaged in big data activities across various sectors.

- **Phase Two:** Based on the survey conducted in Phase One, three organizations were selected from the larger population. These organizations were chosen based on their significant involvement in big data generation and their relevance to the research objectives, which focused on records management practices.
- **Phase Three:** In the final phase, records management professionals from the three selected organizations were identified and selected for participation in the study. These professionals will provide insights into how records management practices are implemented within the context of big data, enabling a deeper understanding of the relationship between the two.

Based on above, in Phase One, eight organisations were initially identified through a purposive screening process. This number was considered sufficient to provide variation across sectors while remaining manageable for qualitative assessment.

From this initial pool, three organisations were selected for in-depth case study analysis. The selection of three cases is consistent with qualitative multiple case study research, where a small number of carefully selected cases allows for depth of analysis while still enabling cross-case comparison (Yin, 2018; Creswell & Poth, 2018).

The decision to limit the study to three organisations was guided by several considerations. First, the study prioritises analytical depth rather than breadth, which is a key principle in qualitative inquiry. Second, practical considerations such as time constraints, access to organisations, and the need for rich, detailed data influenced the scope of case selection. Third, the concept of data saturation was taken into account, where additional cases were unlikely to generate substantially new insights relevant to the research objectives.

Therefore, the selected sample size is considered methodologically appropriate and sufficient to address the research questions and support meaningful cross-case analysis which bring to phase 3.

By selecting organizations and records management professionals through this purposive sampling strategy, the research ensured that the participants were specifically relevant to the research topic and could provide meaningful data to address the research

questions. This approach allowed for a targeted exploration of the suitability of records management practices in managing big data.

3.5.2.1 Sample Size for Survey in Phase 1

In Phase One, this study employed a **preliminary qualitative screening process** to identify and select potential organizations for an in-depth case study. A **purposive sampling strategy** was applied, focusing on organizations that demonstrated relevance to the research topic, namely the intersection of big data practices and records management standards. Rather than employing a quantitative survey instrument, the researcher conducted a **survey-like inquiry through direct communication** such as phone calls, emails, and informal discussions. The purpose of this early-stage interaction was to evaluate the organizations' suitability based on key criteria: their level of engagement with big data initiatives, the maturity of their records management practices, and their willingness to participate in further research. This phase helped narrow down the pool of organizations from eight to three, based on both relevance and accessibility, which were essential in qualitative case study selection (Merriam & Tisdell, 2016).

Survey Checklist

To guide the screening process, an **internal survey checklist** was developed to assess each organization based on predefined inclusion criteria. The checklist functioned as a qualitative screening instrument rather than a quantitative survey tool. Its purpose was to ensure systematic and transparent selection of organisations based on predefined inclusion criteria aligned with the research objectives.

This checklist addressed several key aspects, including **sector and industry relevance** (e.g., public sector, finance, technology), the **level of big data usage** and volume of data handled, the existence or awareness of records management standards (such as ISO 15489), the presence of a dedicated records/information management function, the availability of key informants for interviews, and the willingness of the organizations to participate in Phase Two of the study.

Although the checklist bore similarities to a survey, its purpose was not to generate statistical data. Instead, it **served as a qualitative decision-making tool** designed to ensure that the organizations selected met the minimum criteria for

meaningful participation in the case study phase. The summary of checklist included items such as:

- Sector and industry relevance (e.g., public sector, finance, technology)
- Level of big data usage and data volume handled
- Existence or awareness of records management standards (e.g., ISO 15489)
- Presence of a dedicated records/information management function
- Availability of key informants for interview
- Willingness to participate in Phase Two

From the initial pool of eight organizations involved in Phase 1, three organizations were selected for in-depth analysis in Phase 2. This selection was made based on a methodological approach that aligned with the study's research objectives and practical considerations. The selected organizations represented three distinct sectors that are strategically significant within Malaysia: public technology/commerce, financing, and renewable energy. These sectors were chosen for their substantial reliance on digital systems and the high volume of information processed daily. Moreover, their operations intersected with big data practices, regulatory compliance, and digital transformation initiatives—each of which is highly relevant to the focus of this study, which investigates the role of records management standards within the context of big data (Creswell & Poth, 2018).

The organizations selected for this study exhibited relatively mature records management systems and demonstrated active information governance practices. Based on findings from Phase 1, these organizations not only adhered to internal records policies but also displayed awareness of international standards, such as ISO 15489. The maturity of their records management systems made them suitable candidates for examining the applicability and effectiveness of records management standards within big data environments (Yin, 2018; Merriam & Tisdell, 2016). Furthermore, the selected organizations dealt with vast and complex datasets on a daily basis, including transactional data, customer information, technical documentation, and regulatory records. The richness and complexity of these data environments provided an ideal context to explore how records management standards are adapted to support decision-making, compliance, and digital continuity (Patton, 2015).

One of the key practical considerations in selecting these organizations was their willingness to participate and engage with the research. The informants within these organizations were approachable, responsive, and enthusiastic about the research topic. They facilitated early access to background information and were actively involved in pre-interview discussions, which significantly eased the data collection process. This level of cooperation is crucial in qualitative research, as it directly influences the depth and quality of the data obtained (Creswell & Poth, 2018). Additionally, these organizations are recognized as major players within their respective sectors and are considered leaders in innovation and digital transformation within Malaysia. Studying them offered valuable insights not only into their internal practices but also into broader sectoral trends, challenges, and best practices. The influence of these organizations made them ideal candidates for theoretical generalization (Eisenhardt, 1989).

While all eight organizations in Phase 1 offered unique perspectives, resource constraints and the need for in-depth qualitative engagement necessitated a more focused selection. Choosing three organizations allowed for a deeper exploration within the time constraints of the doctoral research project, ensuring both analytical depth and research quality (Yin, 2018).

This study aimed to examine the suitability of records management standards in managing big data through multiple case studies of selected Malaysian organizations. The organizations chosen were drawn from diverse industries, including technology, finance, and renewable energy, each of which deals extensively with large volumes of records and data. The selection of these organizations was driven by several key factors. First, they were subject to regulatory and compliance requirements that necessitated robust records management practices. Second, these organizations had adopted various records management standards and frameworks, which provided a foundation for a comparative analysis of their effectiveness in managing big data. Third, these organizations were actively engaged in digital transformation initiatives, making them particularly relevant as case studies for understanding the intersection of traditional records management principles and emerging data-driven technologies.

By focusing on these organizations, the study aimed to provide a comprehensive understanding of how records management standards are applied in real-world big data environments through development of research framework. This approach allowed for the identification of challenges, best practices, and potential areas for improvement. The findings from this study are not only academically valuable but also practically relevant

to policymakers, industry professionals, and researchers in the fields of records and data management. Here below was the sampling strategic, that was used in this study based on three (3) phase of strategy:

Table 3. 6
Sampling Strategies of This Study

Sampling Stage	Strategy	Main Justification
Phase 1: Selection of eight (8) organization field that contributes to the emerging of big data	Purposive Sampling	Purposive sampling was chosen due to the reason for the big population where based on article review and survey, there are lots of organizations that contribute to the big data. Therefore, this purposive sampling will help to solve this problem by specifying the organization based on its field.
Phase 2: Selection of three (3) organizations from eight (8) fields listed before.	Purposive Sampling	To reduce the problem on a large population, purposive sampling was chosen to narrow it by choosing only three (3) organizations from eight (8) based on field and contribution to the big data.
Phase 3: Selection of records professional in the three (3) organization that can represent others field of organization	Purposive Sampling	At this phase, the selection informants were carefully taken care of. By using purposive sampling, the term records professional is clearly defined. The different informant from a different organization will be selected is needed to verify and validate data that been collected in phases 1 and 2.

3.5.2.2 Sample Size for In-depth Interview Phase 2

Phase Two involved conducting semi-structured interviews to refine the selection of organisations and validate their relevance to the study. These interviews provided preliminary insights into organisational practices related to big data and records management.

3.5.2.3 Sample Size for Phase 3

Phase Three focused on the selection of **key informants** within the chosen organisations. Informants were selected based on their direct involvement in records management, data governance, or organisational decision-making processes. This ensured that participants possessed the necessary expertise to provide meaningful and contextually grounded insights. This sampling criteria in this study is guide based on ISO 15489-1:2016(E):

Table 3. 7
Sampling Criteria in This Study

No	Records Professional Criteria	Example of Position
1	Records professionals who that responsible either wholly or partly of managing records that including the design, implementation, and maintenance of records systems. This is including the operations, training of users on their responsibilities, and records systems operations as they affect individual practices.	Any profession that deals and manages records. Example, Records Officer, Document Controller.
2	Records professionals or others responsible for involving managing records. This professional staff also responsible for developing, implementing and maintaining metadata schemas and other controls, in association with other personnel.	Information Technology Professionals, Business Managers and Legal Professionals
3	Senior managers who are responsible for providing or ensuring the support for the development and implementation of policies on the management of records	Senior Managers

4	Managers that have responsibilities in ensuring all requirements for records of work processes conducted in their business areas are met	Records Managers
5	Systems administrators are people responsible for ensuring the continuous and reliable operation of records. Besides, these people also need to control and ensuring that all systems documentation is complete and up to date.	Systems Administrators / Admin Executive / Project Coordinator
6	All personnel involved in creating and keeping accurate and complete records of their business activities.	Any others.

[Notes:](#) Sampling Criteria in this study (ISO 15489-1:2016(E))

Based on above, the inclusion of informants across different hierarchical and functional roles strengthens **data triangulation and enhances the credibility of findings**, as multiple perspectives on records management and big data practices are captured within each case. Here were the details of the selected three informants who fit and met the records professional criteria based on ISO 15489:1:2016 (E):

Informant A:

- **Position:** Head of Section - Solar Renewables APAC Energy Systems
- **Criteria Fit:**
 - a) **Criteria 1** (Records professionals responsible for managing records systems): As a head of section involved in project management, Informant A was responsible for ensuring that engineering drawings and project documents were managed correctly, which aligned with the role of overseeing records systems and ensuring their smooth operation.
 - b) **Criteria 4** (Managers ensuring records requirements are met): Informant A's role in managing projects and documentation required them to meet the records management requirements for their business area.

Informant B:

- **Position:** Manager of Records Management & Archives Unit
- **Criteria Fit:**
 - a) **Criteria 1** (Records professionals responsible for managing records):
As the manager of the records management unit, Informant B directly handled records, overseeing the archiving, curation, and management of records, ensuring they met regulatory and organizational standards.
 - b) **Criteria 4** (Managers ensuring records requirements are met): Informant B ensured that the organization's records management policies and practices were met, particularly for inactive records.
 - c) **Criteria 5** (Systems administrators responsible for system documentation): While not directly mentioned, Informant B's role likely involved overseeing systems that ensured records were properly archived, indicating a connection to systems administrators' responsibilities.

Informant C:

- **Position:** Chief Operating Officer (COO)
- **Criteria Fit:**
 - a) **Criteria 3** (Senior managers responsible for supporting the development of records management policies): As the COO, Informant C was responsible for supporting organizational policies on big data and records management. Their strategic position enabled them to ensure that policies were developed and implemented, which supported the records management framework at a high level.
 - b) **Criteria 4** (Managers ensuring records requirements are met): Although Informant C's primary role was focused on operations, their involvement in overseeing data management policies aligned with ensuring that all work processes, including records, were managed effectively.

- a) **Criteria 6** (Personnel involved in creating and keeping accurate records): Informant C's team likely handled records in the context of IT services and GIS, aligning with this criterion, particularly when ensuring accurate and complete records for operational use.

In summary, the three informants covered a broad range of the criteria, from managerial and strategic roles to operational and technical responsibilities, providing a comprehensive insight into how records were managed in various sectors.

3.5.3 Justification for Choosing Informants from Three Different Organizations:

3.5.3.1 Diverse Sectors Represented

The three informants represented distinct sectors: renewable energy, financing, and technology/commerce. This diversity ensured that the research captured a wide range of perspectives on the intersection between big data practices and records management. Each sector dealt with unique challenges and employed different approaches to data and records management, thereby enriching the study's overall findings.

Informant A, from the renewable energy sector, contributed in-depth understanding of project management processes, including the handling of engineering drawings and project documentation within the context of large-scale solar energy initiatives.

Informant B, from the financing sector, offered insights into the management of records in a highly regulated environment, with particular emphasis on the handling of inactive records and the post-processing analysis and curation of big data.

Informant C, from the technology/commerce sector, provided a perspective on managing various forms of data—structured, semi-structured, and unstructured—within IT services, GIS, and digital transformation initiatives.

3.5.3.2 Holistic Coverage of Big Data Management

The selected informants addressed critical dimensions of big data management, encompassing data creation, storage, analysis, archiving, and final curation. **Informant A** contributed an operational perspective, particularly in managing project-related documents and data that support decision-making. This insight was crucial in

highlighting the creation, retention, and accessibility of big data within active projects. **Informant B** focused on the lifecycle of inactive records, illustrating how archived data could be curated and re-utilised to generate new knowledge. This demonstrated the strategic role of archival processes in the broader big data ecosystem. **Informant C** shared expertise in managing the variety and velocity of data, especially concerning the operational challenges of handling diverse datasets to support business intelligence and digital transformation efforts.

3.5.3.3 Comprehensive Representation of Roles in Big Data and Records Management

The inclusion of informants occupying both managerial and technical roles ensured a multi-dimensional understanding of records management within big data contexts. **Informant A** and **Informant C** held senior leadership positions (Head of Section and Chief Operating Officer, respectively), offering strategic viewpoints on the integration of records management within organisational objectives and big data initiatives. **Informant B**, while serving in a managerial capacity within a dedicated records management unit, contributed technical knowledge regarding the archiving, curation, and long-term management of records. This role was instrumental in exploring how inactive records contribute to the value and longevity of big data assets.

3.5.3.4 Rich Qualitative Data for Research

As part of this qualitative study, the informants provided diverse, experience-based narratives that added contextual depth and empirical richness. Their combined knowledge enabled the exploration of multiple facets of records management and big data practices across sectors. Their professional experience in implementing and overseeing records management systems offered detailed insights into the handling of records throughout their lifecycle—from initial creation to final analysis. These insights played a key role in validating and refining the proposed theoretical framework and in identifying practical challenges and best practices relevant to records management in the era of big data.

3.5.3.5 Sampling Limitation

Despite the strengths of the purposive sampling approach, several limitations should be acknowledged. First, the selection of only three organisations may limit the statistical generalisability of the findings. However, this is consistent with qualitative research, where the emphasis is on analytical rather than statistical generalisation (Yin, 2018).

Second, the reliance on organisations willing to participate may introduce self-selection bias, as organisations with more established records management practices may be more inclined to participate. Third, access constraints limited the inclusion of additional sectors, which may affect the breadth of perspectives captured.

Nevertheless, these limitations were mitigated through triangulation, cross-case analysis, and the inclusion of diverse sectors, which enhance the robustness and credibility of the findings.

3.5.3.6 Conclusion

The selection of informants from three distinct sectors facilitated comprehensive coverage of the research topic and significantly contributed to the understanding of records management within the context of big data. Their varied expertise enabled a nuanced exploration of how records and data are managed across industry contexts. This triangulated, sector-based approach strengthened the depth and validity of the study's findings and ensured that the conclusions drawn were both applicable and transferable to a range of organisational settings.

3.6 Strategies Used in Persuaded the Sampling to Invest Their Time.

This study adopted a strategic approach to participant engagement, recognising that access to knowledgeable informants is critical in qualitative research (Patton, 2015). Gaining cooperation required careful site selection, building trust, and leveraging professional networks to facilitate access (Smithson, 2000; Nassar-McMillan & Borders, 2002).

Krueger (1988) highlights the importance of selecting a site that will facilitate answering the research questions. To streamline the process of gaining permission and engaging the community, Nassar-McMillan and Borders (2002), along with Smithson (2000), recommend leveraging personal contacts within the community. This can

include the informants themselves, which allows for smoother access and greater trust. Shenton and Hayters (2004) further emphasize the need to identify a key informant who can guide researchers in connecting with individuals who are knowledgeable and capable of providing valuable insights for the research.

In this study, the initial contact with individuals from various fields helped identify suitable informants. One key connection, a lecturer from an engineering school in Pulau Pinang, suggested focusing on miscellaneous or production companies, which play a significant role in generating big data. Based on this recommendation, the study's focus was narrowed to engage informants who could not only comprehend the research objectives but also offer relevant and practical insights into the topic of big data and records management.

By employing these strategic approaches, the study aims to effectively engage participants and secure their willingness to contribute valuable information. This, in turn, will enhance the overall quality, depth, and relevance of the research, ensuring it makes meaningful contributions to the field.

3.7 Strategies Used in Overcoming the Skewness Through this Study

Chen, J. (2019) defines skewness as the distortion or asymmetry of the normal curve in a set of data, emphasizing its importance in understanding the distribution of data. He notes that this distortion can manifest as a curve shifted either to the left or the right, which quantifies the extent to which a given distribution deviates from the idealized normal distribution. In a normal distribution, skewness is defined as zero, indicating perfect symmetry. This definition provides a foundational understanding of data distribution analysis and is particularly crucial when assessing whether data meet assumptions for parametric statistical tests. The concept is further reinforced by Gay, L. R., & Airasian, P. (2003), who elaborate that in a normal distribution, the mean (average) and the mode (the peak or maximum point of the curve) are equal. This equality reflects the balanced nature of the data, where the majority of values cluster around a central point.

In the context of qualitative data analysis, skewness can have a slightly different but equally significant implication. Grbich, C. (2007) highlights that skewness, in this domain, refers to biases that may influence the validity and reliability of research findings. Such biases, if unaddressed, can compromise the integrity of the study and its

outcomes. To ensure robustness and credibility in qualitative research, researchers must remain vigilant in identifying and mitigating these biases. Silverman, D. (2006) provides a comprehensive framework to address this challenge by categorizing biases into five major groups: moderator bias, biased questions, biased answers, biased samples, and biased reporting. These categories serve as a guide to systematically examine potential sources of skewness and develop strategies to minimize their impact.

This study adopts Silverman's guidelines to proactively manage and mitigate skewness or bias throughout the research process. Specifically, it outlines strategies tailored to each category of bias to ensure the study's findings are as accurate and unbiased as possible. By adhering to these recommendations, the study aims to enhance the validity and trustworthiness of its conclusions, thereby contributing to a more reliable body of research in the field. The following outlines strategies to overcome these biases in this study:

Table 3. 8
Strategies in Overcoming Biased in Research Study

Overcoming Biased	Description Method
Overcoming biased moderator	• Ensure the moderator is neutral and does not influence the participants' responses. • Use trained moderators who can facilitate discussions impartially. • Implement a standardized protocol for conducting interviews and focus groups.
Overcoming biased samples	• Avoid choosing the wrong respondent where is not represent in the group of interest (Silverman, 2006) • Avoid having poor screening and recruiting samples (Grbich, 2007) • Reduce the number of sampling selected from research area (Salkind, 2000)
Overcoming biased questions	Moderator biased can give an impact on the quality of data. Moderator biased can be detected through the moderato's body language, facial expression, tone, and

Overcoming Biased	Description Method
	manner of dress (Irwan Kamaruddin. (2014). However, according to Patton, M. Q. (2008), physical influences can be controlled. Therefore, Fairclough, N. (2013) suggested to not provide opinion during moderating. Therefore, to overcoming biased questions, this research can follow below lists: • Design questions that are open-ended and neutral to avoid leading participants towards a specific answer. • Pre-test questions with a small sample to ensure they are unbiased and clear. • Regularly review and revise questions to maintain their neutrality throughout the study.
Overcoming biased answers	Biased answers are mean untrue or partially true statements (Salkind, 2000). Therefore, it is important in this study to avoid biased answers in interviewing because untrue statements will affect the results of the study. To avoid biased answer, this research can follow below tipss: • Encourage participants to provide honest and comprehensive responses by creating a comfortable and non-judgmental environment. • Avoid suggesting or implying any preferred answers during interactions. • Use follow-up questions to clarify ambiguous or incomplete responses.
Overcoming biased reporting	Patton, M. Q. (2008) suggest having more than one analyst is checking the quality of the report to avoid biased in reporting. Different people will help to spot skew reporting and thus help to reduce biases. Therefore, to overcoming biased reporting, this study can follow below:

Overcoming Biased	Description Method
	• Present findings objectively, avoiding selective reporting of data that supports preconceived notions or hypotheses. • Include all relevant data and acknowledge any limitations or potential biases in the study. • Use peer review and feedback to check for unintentional biases in the reporting process.

Notes: Strategies in Overcoming Biased in Research Study (Silverman, D. (2006))

In adhering to such strategies, efforts are taken to reduce skewness and biases that may otherwise affect the integrity and accuracy of this assignment's conclusions. This research aims at maintaining both the validity which is the degree to which the study measures what it is supposed to measure and the reliability which is the degree to which the result can be repeated in similar conditions through the careful application of these measures. These fundamental aspects of research integrity are important in ensuring the results obtained from the research are methodologically accurate and practical to tangible social situations.

This methodology aims to provide reliable, robust results that can be utilized within various contexts. Such outcomes may relate within the educational paradigm and assist in shaping the curriculum, instructional policies, assessments systems to make them evidence-focused and unbiased. For instance, in professional practice, the outcomes of the research can assist the practitioners in ensuring that they engage in finding the most suitable strategies to engage and empower clients. Furthermore, in terms of policy application, the unbiased nature of the research serves as a valuable insight for policy makers on how to develop and enforce laws that are equitable and considerate of many perspectives. Finally, in project management these outcomes are useful in planning, implementing and evaluating processes of the projects so as to ensure that the errors are limited and stakeholders are satisfied.

This research takes measures to address and eliminate certain sources of bias as well as detail methods on how the study was conducted thus increasing the researches credibility and the potential impact the study has on the research community. It sets a standard on how other researchers and scholars can eliminate bias and skewness and bias thus enabling a change in research towards openness and high standards of professionalism.

3.8 Research Design

The issues in the research objectives form the basis for the design matrix of the study (Walliman, 2011). These objectives as outlined also prescribe the methods for data collection and analysis that is to be done. On the other hand, this specific study has been designed in three phases to meet specific objectives of research. In terms of using qualitative data collection methods, all three phases are not the same, and are further customized to look at different facets of the research issue so as to fully address the breadth of the issue at hand.

3.8.1 Phase One: Objective Formulation and Research Questions

For this study, the first stage seeks the aim of this research to meet its main objective of addressing the research problem by formulating the problem and the associated questions. This part of the research consists of several important procedures starting with an exploratory research that seeks to investigate the issues and challenges of big data. To this end, the researcher undertakes surveys and analyses to elucidate these issues. Moreover, this phase consists of an analysis of the role and importance of Records Management in the environment of big data.

In the effort to add breadth and depth to the research objectives, a more detailed literature review is conducted. This review seeks to find relevant literature and theories related to big data and Records Management practices and indicates any gap in the existing knowledge. Such insights assist in the construction and further development of the research questions, so that they are in consonance with the aims of the study. In addition, the data collected in the course of the preliminary activities is processed using matrix analysis. This approach entails the various elements in relation to big data and Records Management practices being identified, researched and cross-related. The results of this matrix analysis are of great importance since they determine which Records Management practices would be the most appropriate in the management of big data. All these then become part of a conceptual framework which provides a guide to the subsequent stages of the research.

3.8.2 Phase Two: Data Collection

This part of the research is built on qualitative data collection assuming the work already done in phase one. During this phase the investigators are tasked with ensuring that only participants with relevant experience are selected, this is done through purposive sampling. The goal of participant selection during this phase is to collect high quality data, which meets the research objectives outlined in the research questions.

The systematic approach and methodology for locating informants and target focus groups are implemented in this phase in the form of case studies and interviews. Case study analysis aids in examining the inception of Records Management in correlation with big data. We are able to interview informants that have useful insights regarding whether the present Records Management practices are set up in order to sufficiently manage big data. The basis of the interview is of course built on the conceptual framework and its constructs and elements. That said, it is ensured that the information collected is relevant and directly correlates with the overarching goal of the research.

3.8.3 Phase Three: Data Analysis and Findings

The final phase of the research proceeds to assess the qualitative data collected in the previous stage. This involves interpreting the conversation during the interview and discussing the findings in a manner that meets the aims of the study. The key concern of this phase is to propose possible practical recommendations or minimum standards on Records Management practices designated for the issues and complexities of big data management.

In this phase analysis is also conducted. This analysis means in depth evaluation of the interview data in order to come up with patterns, themes and insights that suitably address the issues of the study. This analysis provides an opportunity to formulate as well as recommend the most appropriate Records Management practices meant for the maximizing the handling of big data. Such recommendations are based on the findings of the study and conceptualized to be practical and applicable in the real world. Being an extension of the study objectives, the study through this phase come out with final framework which define the best practices for working with big data in the context of Records Management.

In order to give an unambiguous and all-encompassing depiction of the research design, the one figure attempts to simplify the whole process as illustrated in Figure 3.1. This figure describes the specific activities and phases in their specific sequence in order to provide the reader with a succinct description of the research strategy of the study:

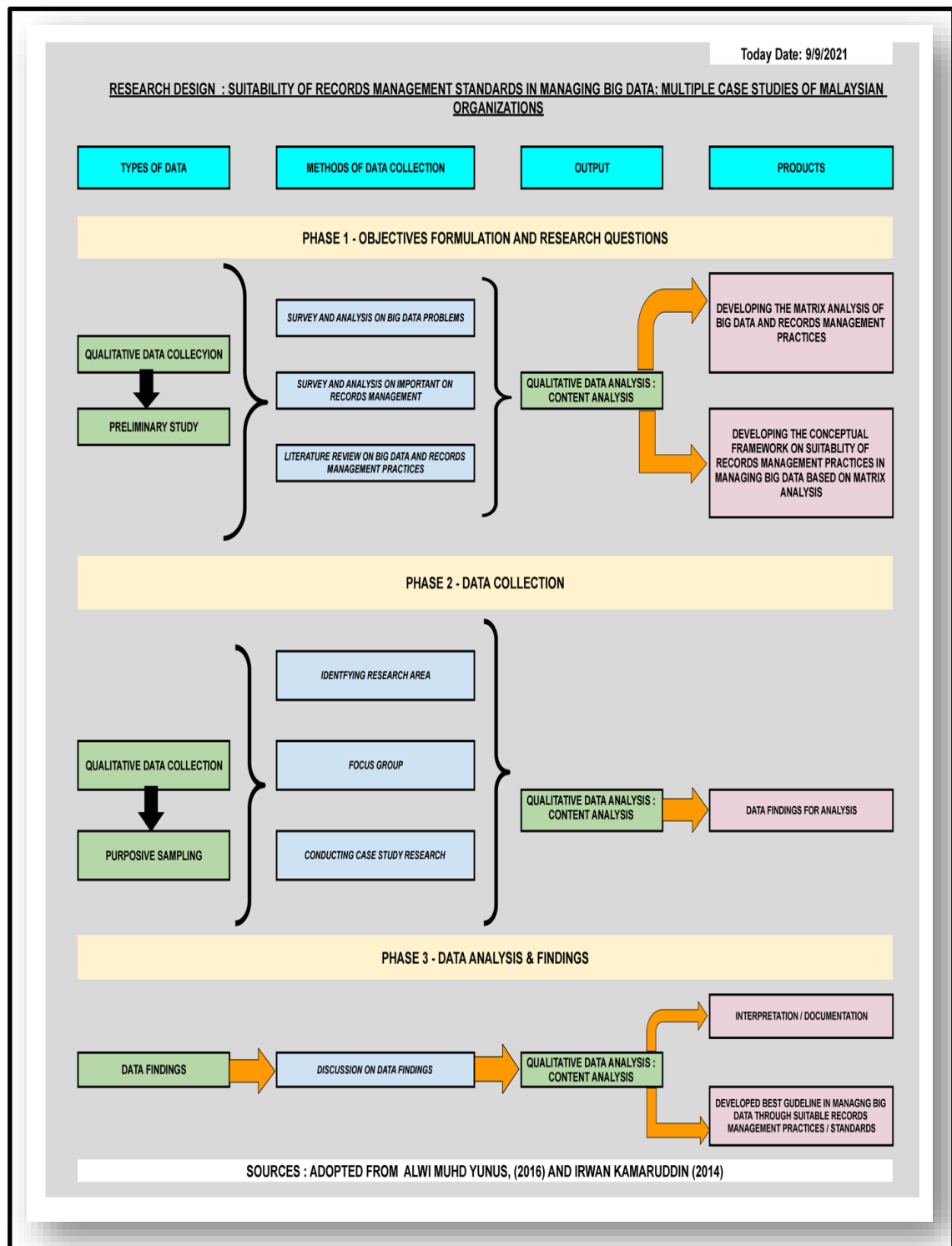


Figure 3. 1 Research Design of This Study

3.9 Matrix Analysis

Matrix analysis served as a tool in this study to determine specific elements within the Records Management Standard that can resolve the multi-dimensional problems that come with big data management. In this context, Google Spreadsheets were useful as programming tools to facilitate the filing, linking, and analyzing of data. The topic analysis was based on the internationally accepted standard for Records Management, ISO 15489-1: 2016 (E). This standard was adopted because it has detailed procedures and is appropriate for assessing the suitability of Records Management techniques for dealing with the complexities of the V's of Big Data: Volume, Variety, Velocity, Veracity, Value, Variability, Visualization, Volatility, Validity, Vulnerability.

The matrix analysis started after all the preparations were done, and it was accompanied by a shorter literature review. This literature review was important in eliciting background context concerning the relationship between Records Management techniques and big data problems. The literature review generated insights not only on what had been discovered, thus creating an understanding of what was required in order to manage big data, but also what thus far had not been done, hinting on how Records Management techniques could intervene. These findings informed the design and the scope of the matrix analysis so that it was not only extensive but also consistent with the aim of the research.

The researcher, having prepared life matrices, proceeded to fill them out in a more organized manner. A corpus of data was sourced by conducting a range of surveys and examinations into the practical implications of Records Management standards in big data environments. These surveys were directed towards eliciting a rather broader range of opinions, especially from those professionals or experts having dealt with large amounts of data. This amassed data was then arranged in a systematic hierarchy based on Google spreadsheets which facilitated the definition and grouping of key factors.

The main aim behind this particular matrix analysis was to create a conceptual model that could delineate with great precision the correlation between the different components of the ISO 15489-1:2016(E) standard and the big data problem. Each component of the standard was carefully evaluated with almost only one goal in mind what kind of specific issues with the 10 V's of big data can one element contribute in solving. For instance, factors about making records classification, retention and disposition, were tested to find out their ability to help solve challenges regarding data's

Volume and Velocity. Additionally assessing issues of Veracity and Value, components that highlighted media's integrity and ease of access were included in the scope of analysis. From the perspective of these findings, the matrix analysis emphasized the enhancement and expansion of the principles and practices, indicated in the ISO 15489-1:2016(E), to meet the real-life requirements for the management of big data. The resulting conceptual framework not only functioned as a roadmap for further stages of the study but also shed light on the real-life complementarity of the Records Management standards for the big data context. By situating the analysis in a well developed methodological framework, the study enhanced the trustworthiness of the findings and their relevancy to the existing praxial problems.

The matrix analysis incorporated the 10 V's of Big Data, which are:

1. **Volume** – Refers to the amount of data.
2. **Value** – Indicates the worth of the data.
3. **Velocity** – Describes the speed at which data is generated and processed.
4. **Veracity** – Pertains to the accuracy and trustworthiness of data.
5. **Viscosity** – Reflects the complexity and difficulty in extracting useful information.
6. **Variability** – Concerns the inconsistencies in data.
7. **Volatility** – Relates to how data changes over time.
8. **Viability** – Assesses the data's usefulness for specific purposes.
9. **Validity** – Ensures the data is accurate and reliable.
10. **Variety** – Covers the different types of data and sources.

In parallel, the matrix analysis examined eight key elements of the Records Management Standard, ISO 15489-1:2016(E), which include:

1. **Creation** – The process of generating records.
2. **Capture** – The methods for collecting and recording data.
3. **Classification and Indexing** – Organizing and categorizing records for easy retrieval.
4. **Access Control** – Managing who can view or modify records.
5. **Storing Records** – Techniques for preserving records in a secure and accessible manner.

6. **Use and Reuse** – The application and reapplication of records.
7. **Migration/Conversion** – The process of transferring records to new formats or systems.
8. **Disposition** – The final management of records, including their destruction or archiving.

The analysis was designed to systematically match each element of the ISO 15489-1:2016(E) standard with the specific challenges posed by the 10 V's of Big Data. These 10 V's—Volume, Variety, Velocity, Veracity, Value, Variability, Visualization, Volatility, Validity, and Vulnerability—represent the complex and dynamic nature of big data, making it essential to evaluate how effectively the Records Management Standard can address these issues. This comparative approach provided a structured way to assess the applicability of various elements within the standard, ensuring that their relevance and utility in big data management were thoroughly examined.

The primary goal of this analysis was to identify which aspects of ISO 15489-1:2016(E) could be most effectively leveraged to mitigate the specific challenges associated with managing big data. For instance, the standard's guidance on classification schemes and metadata management was analyzed for its potential to address issues related to the Volume and Variety of data. Similarly, the standard's provisions on retention and disposal were evaluated for their capacity to handle Volatility and ensure data remains manageable over time. This in-depth comparison allowed the researcher to pinpoint the strengths and limitations of the Records Management Standard when applied to the unique demands of big data environments.

The findings derived from this matrix analysis were informed by a detailed literature review, which provided critical insights into both the theoretical and practical intersections between Records Management and big data. This literature-based foundation ensured that the analysis was grounded in existing knowledge while also highlighting gaps where further exploration was needed. Each element of ISO 15489-1:2016(E) was carefully examined in light of these findings, enabling the development of a comprehensive framework that aligns Records Management practices with big data challenges.

To enhance understanding and clarity, the findings of this analysis are visually presented, offering a clear representation of how the various elements of the Records Management Standard align with the specific challenges identified within the 10 V's

framework. This visual representation serves as a practical tool, illustrating the connections between Records Management principles and big data issues in a way that is accessible and actionable for practitioners and researchers alike.

Through this approach, the study provides valuable insights into the adaptability of ISO 15489-1:2016(E) to big data management. By identifying which components of the standard are most effective in addressing specific challenges, the findings contribute to the development of tailored Records Management practices that are both relevant and robust in the context of big data.

3.9.1 Matrix Analysis of The 10V's of Big Data and Records Management Standard : ISO 15489:2016 (E) (For Conceptual Framework Purposes)

SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: A MULTIPLE CASES STUDIES OF MALAYSIAN ORGANIZATIONS										
<u>MATRIX ANALYSIS : THE 10V's OF BIG DATA AND RECORDS MANAGEMENT STANDARD : ISO 15489:2016 (E) (FOR CONCEPTUAL FRAMEWORK PURPOSES)</u>										
Date: 7/13/2020										
No	THE 10V'S OF BIG DATA	ELEMENTS IN RECORDS MANAGEMENT STANDARD : ISO 15489-1:2016(E) THAT SUITABLE IN MANAGING THE 10V's OF BIG DATA								REMARKS
		CREATION	CAPTURE	CLASSIFICATION AND INDEXING	ACCESS CONTROL	STORING RECORDS	USE AND REUSE	MIGRATION / CONVERSION	DISPOSITION	
1	VOLUME	☒	☐	☐	☐	☐	☐	☐	☒	1. Creation 2. Disposition
2	VALUE	☐	☒	☒	☒	☒	☒	☐	☐	1. Capture 2. Classification and Indexing 3. Access Control 4. Storing Records 5. Use and Reuse
3	VELOCITY	☒	☒	☐	☐	☐	☐	☐	☐	1. Creation 2. Capture
4	VERACITY	☐	☒	☐	☐	☐	☒	☐	☐	1. Capture 2. Use and Reuse
5	VISCOSITY	☐	☒	☒	☐	☐	☐	☐	☐	1. Capture 2. Classification and Indexing
6	VARIABILITY	☐	☒	☒	☐	☐	☐	☐	☐	1. Capture 2. Classification and Indexing
7	VOLATILITY	☐	☒	☐	☐	☐	☐	☐	☒	1. Capture 2. Disposition
8	VIABILITY	☐	☒	☐	☐	☒	☒	☐	☐	1. Capture 2. Storing Records 3. Use and Reuse
9	VALIDITY	☐	☒	☐	☐	☐	☐	☐	☐	1. Capture
10	VARIETY	☐	☒	☒	☐	☐	☐	☒	☐	1. Capture 2. Classification and Indexing 3. Migration or Conversion

Figure 3. 2 Matrix Analysis of This Study

3.10 Conceptual Framework

In achieving the objective of this research study which is to provide the best guideline that is suitable for managing big data through Records Management Practices, the conceptual framework was designed as per below:

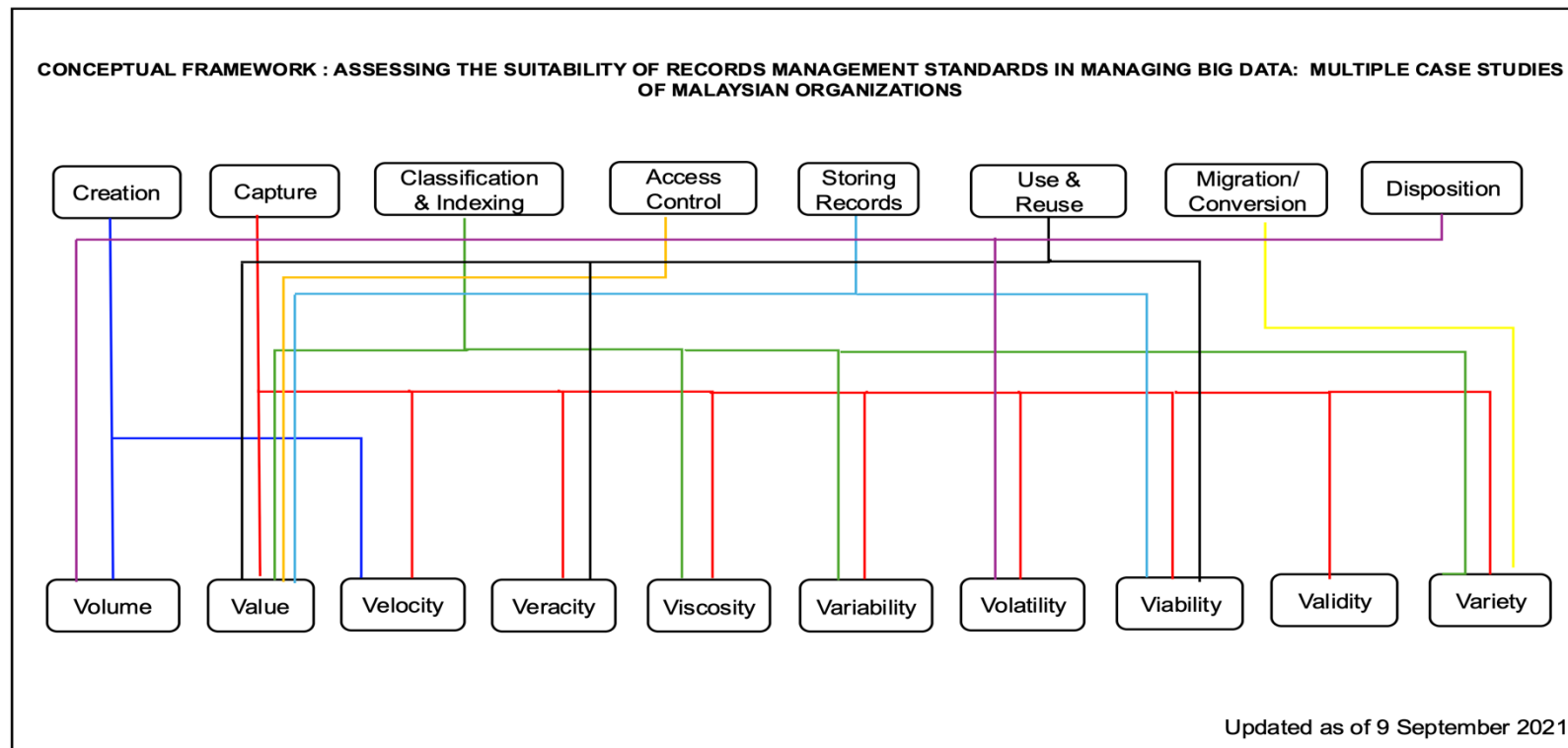


Figure 3. 3: The Conceptual Framework of This Study

This conceptual framework in this research showed a relationship between Records Management Practices and Big Data. A few challenges in big data and elements in records management practices that have been adopted from the literature review and matrix analysis was been presented in this framework. In this research, each element for Records Management Standard, ISO 15489-1:2016(E) was specifically narrowed to each big data V's. This study believes, Records Management Standard, ISO 15489-1:2016(E) can help in managing big data.

Each function of elements in the Records Management Standard, ISO 15489-1:2016(E) was explained in Chapter Two (2). Total numbers in Records Management Standard, ISO 15489-1:2016(E) that selected to see either it is suitable or not in managing big data is different based on function in handling issues in Big Data V's.

As you can see in this conceptual framework, some elements in Records Management Standard, ISO 15489-1:2016(E) that able to manage big data can be more than one. For example, the **“creation”** element can help in managing two (2) elements in big data which are **Volume and Velocity**. Each element Records Management Standard, ISO 15489-1:2016(E) that suit together in Big Data V's is based on its function itself. As we know, creation elements are very important to identify what types of information need to create based on business activity for each organization. At the same time, creation also can help to minimize the total number of information created based on the needs of organizations. Based on those reasons, the researcher believe creation can help in managing volume and velocity issues in big data. Since the volume of big data that keeps increase and continuous flowing of information in velocity can give impact on decision making, thus creation element seems can helps in control this issue.

Next is the **“capture”** element. Based on this study, this element may be able to manage 9 V's of big data which are **value; velocity; veracity; viscosity; variability; volatility; viability; validity; and variety**. Since the capture element is important to capturing valuable information that has a relationship with each other's, it is needed in identifying value data in big data areas; Capture elements also function to identify correct information in a huge amount in the velocity of big data. Besides, veracity issues that related to data quality and accuracy also need capture elements in Records Management Standards ISO 15489-1: 2016 (E) in capturing the quality of data; This is same goes to the viscosity issues that need capture element to the analyzed relationship between data created by individuals or organizations to manage the complexity of data

by grouping the data based on the relationship of each data; Next, its variability. The variability of big data also needs capture elements to monitor the flowing of data that inconsistent. Through capture element, it can help to identify the types of data created together with the purposes; Besides, volatility issues of big data that related to the life span of data also need the capture element. This is because, capture element can help to identify types and features of data that still needed for the organization to decide which data need to be kept or destroyed; This same goes with viability issues of big data that need capture element to make sure the data can be accessed and live for long term period; Others than that, validity big data also need the capture element. This is because, in data validity, it is important to have correct data in making decisions. Therefore, capturing may help to capture the metadata of data suit to the origin of the information. Last but not least, is a variety of big data also needs to capture elements to identify types of data either structured, unstructured, or semi-structured. By capturing information on the types of data it will easier the process of grouping each information for access and retrieval process.

Other than that, in this conceptual framework, element “**classification and indexing**” in Records Management Standard, ISO 15489-1:2016(E) was narrowed for four (4) V’s of big data which are **value, viscosity, variability, and variety**. In value big data issues, a classification element is needed to classify each data that has value as one group. From that part, it will easier the process of retrieval valuable information through indexing element; This is the same in viscosity that needs classification and indexing element to easier the retrieval process of data. The Viscosity that related to the huge of data that is complex, need this element to structured each data that have a relationship with each other. Thus, it will easier the process of accessing data in the future; Next is variability. In the variability big data, classification and indexing are needed to classify data based on types. Since the increase of data is in many various especially in digital media, therefore it is important to have classification and indexing element to classified it into correct types to easier the retrieval process; Lastly, the big data v’s that may able to be managed using classification and indexing element is variety. The same goes for the rest, a variety of issues also need classification and indexing to group the different types of data which are structured, unstructured, and semi-structured. Thus, it will help with retrieval and accessing the data.

The next element in Records Management Standard, ISO 15489-1:2016(E) that showed in this conceptual framework is “**access control**”. This element only narrowed

to one big data v's which is **value**. This is because, since the value data need to be controlled to avoid any misuse or missing, the access control element is needed to provide the level of access to the valuable data. From that part, only certain people can access the data. Therefore, the value of data will be protected for the long-term period.

Besides, in this conceptual framework, the element “**storing records**” in Records Management Standard, ISO 15489-1:2016(E) was narrowed the two (2) v's of big data which are **value and viability**. The researcher believes since valuable information is important for long-term use, thus it is important to have proper storage or platform to keep it. This is the same in the viability of big data. Since the viability of data is related to the capability of data to live and active forever, it is important to have an appropriate environment of storage, to have proper materials, to monitor the data, and many more. These all function to make the data can be access in long term periods.

The “**Use and re-use**” element in Records Management Standard, ISO 15489-1:2016(E) was narrowed to the three (3) big data v's which are **value, veracity, and viability**. In data value, it is important to make sure the data can be access and use for a long-term period. Therefore, through the use and re-use elements, the usability of information can be maintained either through creating a backup of data, develop the disaster plan, or converting it into alternative formats. The same goes for the veracity data that need to be kept for the long-term period, the use, and re-use function to help it by preserving the quality and accuracy of data by maintaining it.

Next, is the “**migration/conversion**” element in Records Management Standard, ISO 15489-1:2016(E). In this conceptual framework, the migration/conversion element was narrowed to the only one of big data v's which is the **variety**. The big data variety that is related to the various types of data such as structured, unstructured, and semi-structured can give an impact on the level of organizations. Moreover, since the various types of data increase every day from various sources of media can give challenges in making decisions. Therefore, through the migration/conversion element, valuable information from various formats can be used for a long-term period. The process of migration/conversion based on the passage of time can help the valuable data available at any time.

Last but not least, is the element “**disposition**”. The element disposition in Records Management Standard, ISO 15489-1:2016(E) was narrowed to the two (2) big data v's in this conceptual framework. The big data v's here are volume and volatility.

Since volume is related to the increasing of big data and volatility is related to the lifetime of data, it is important to have a disposition element to control the increase of data. Through the disposition element, only valuable data that needed to support the business of organizations will be kept, the rest that not unnecessary will be destroyed or disposed of. The researcher believes, the disposition element not only will help to reduce the storage of information but can help to avoid confusion in decision making due to the increase of big data.

In this conceptual framework, all elements in Records Management Standard, ISO 15489-1:2016(E) can be verified either it is really can manage big data or not during data collection and data analysis. Some elements may not be suitable as results later. In conclusion, the reason for developing the conceptual framework is to give a clear view of this research. Each element in the Records Management Standard, ISO 15489-1:2016(E) will be verified later.

3.11 Process or Procedures Taken Data Collection

There is a critical value in obtaining approval from the Research Ethics Committee (REC) before commencing the data collection phase. The work undertaken by the Research Ethics Committee (2018) stated that the REC approved the study after ensuring that all procedures for data collection met the set requirements. Such an approval should be obtained in addition to having all laws applicable to the research program as a vested requirement of the ethics review. The aim here is not about compliance alone. The most important aim of this approval is to protect the safety of all the participants, their rights, and their welfare in general who are associated with the research project. Following these ethical considerations, this research seeks to maintain the research principles of equity, dignity and honesty (Research Ethics Committee, 2018). There were predefined, streamlined procedures encompassed in the REC application and approval process, all of which were scrupulously executed to satisfy the hard requirements set in place by the committee. The following illustrates the timeline of this procedure:

Prior to initiating any form of data collection, an interview protocol was thoroughly drafted with the hope that the research goals and ethical requirements were sufficiently met. The protocol clearly articulated the layout of the interviews, the set of questions that would be asked, sorts of information and methods of information storage

and analysis. Once it was completed, the protocol was distributed to the participants who were chosen according to the criteria that were delineated in Chapter Three of this research. These criteria were delineated to limit participants to those relevant to the research questions.

Prior to sending out the interview requirements or guidelines via email, each potential participant was contacted in person by the researcher for confirmation of their willingness and availability to be part of this study. This was not only important in attending to informed consent but also beneficial in fostering the participants trust and rapport. The communication of intention to participate to the participants was carried out in a professional and sensitive manner to avoid coercion assuring them that participation is voluntary and they can decide to withdraw from the study at any point with no repercussions.

This phase of data collection took about two weeks to prepare and was in the year of 2021. In this period of two weeks, the researcher set out to find the best suitable organizations which met the set exclusion criteria. These institutions were chosen due to their appropriateness to the objectives of the research as indicated in chapter three. This phase also included preparing for the interviews by addressing logistical problems such as travelling, time management and communication with the participants.

As a significant element of this phase of the project, securing the ethical clearance from the Research Ethics Committee (REC) for the Universiti Teknologi MARA (UiTM) became necessary. The process of application demanded the investigator to provide in detail the study plans, the intents of the study, the methods to be employed and the sociological impact on the selected participants in fulfilling the study. The nature of case study enabled the Ethics board to review such a proposal to evaluate its ethical compliance to research standards. The committee provided such approval only when it was established that the case study met all ethical and legal prerequisites for the said study.

The pre approval from the REC on interviews, allows the study to demonstrate that it approaches the research application with due ethical consideration. This approval in advance poses no problem whatsoever for the conduct of the study but instead supports the advocacy approach to the project by ensuring that all components of the research and ERC processes are respectful of the participants' rights and integrity.

3.11.1 Research Ethics Committee (REC)

To ensure full compliance with ethical standards and legal requirements, approval from the Research Ethics Committee (REC) was sought and secured before initiating any data collection activities. The role of the REC is pivotal in ensuring that all research activities are conducted in alignment with established laws, guidelines, and ethical principles. By doing so, the REC helps to safeguard the rights, safety, and overall well-being of participants involved in the study, thereby reinforcing the integrity and credibility of the research process (Research Ethics Committee, 2018).

The REC approval process is meticulously designed to protect participants from potential harm, ensure their rights are respected, and maintain the highest standards of research ethics. This rigorous process involves a thorough review of the proposed study to assess its adherence to ethical guidelines, with a particular focus on issues such as informed consent, confidentiality, and the fair treatment of participants. The following provides a detailed chronology of the steps taken during the application and approval process for REC approval in this research:

1. Preparation of Ethical Documentation:

The initial step involved the preparation of comprehensive documentation detailing the research objectives, methodology, and ethical considerations. This included a detailed research proposal, a participant information sheet, and a consent form. These documents outlined the purpose of the study, the procedures to be followed, and the measures in place to protect participant confidentiality and rights.

2. Submission of the Application:

Once the necessary documents were prepared, an application for ethical clearance was submitted to the Research Ethics Committee at Universiti Teknologi MARA (UiTM). The application included a description of the data collection methods, the criteria for participant selection, and the steps taken to minimize risks to participants.

3. Review and Feedback:

Upon submission, the application underwent a rigorous review process by the REC. During this phase, the committee examined the ethical implications of the research design, ensuring that all potential risks to participants were adequately addressed. Feedback from the REC was provided to the researcher, highlighting any areas that required clarification or modification to meet ethical standards.

4. Revisions and Resubmission:

Based on the feedback received, the necessary revisions were made to the documentation and methodology to align with the committee's recommendations. This iterative process ensured that the study adhered to the highest ethical standards before final approval was granted.

5. Approval and Clearance:

After thorough review and confirmation that all ethical requirements were met, the REC granted approval for the study. This approval was a critical milestone, signifying that the research could proceed with the confidence that it complied with all legal and ethical obligations.

By securing REC approval prior to commencing data collection, the study demonstrates a strong commitment to ethical research practices. This process not only protects participants but also enhances the credibility and reliability of the research findings. The chronology outlined above highlights the rigorous nature of the ethical approval process, emphasizing its importance in upholding the principles of integrity, transparency, and respect for participants in research.

As added, below is a detailed chronology with duration period of the application and approval process for REC:

Table 3. 9
Chronology of RCE Application and Approval

NO	ACTIVITY	PERIOD	REMARKS
1	Preparation of Application Research Ethics	Dec 2020 – April 2021	Preparation involved amending the research report and filling out the required REC forms.
2	Application Research Ethics (by email)	28 th May 2021	Received a response from FIM requesting amendments to the form. The amended form was resubmitted on 10th June 2021
3	Response from REC on application. Correction of Form needed (Form 2 & 4)	19 th July 2021	Amendments to the forms were made and resubmitted to REC on 31st July 2021
4	Results from REC. Minor Amendment needed	26 th Aug 2021	Minor amendments to the report and forms were made and resubmitted to REC on 9th September 2021.
5	Follow up with REC since no response after an amendment has been submitted on 9 th Sept 2021	29 th Oct 2021	Follow-up was necessary as the REC took time to respond, affecting the data collection process. Continuous follow-ups were conducted to expedite the process.
6	Approval of UiTM Research Ethics	Approved on 29 th Nov 2022 (letter date) - Ref : 600-TNCPi (5/1/6)	Although the approval letter is dated 29th November 2021, the email confirmation from REC was received on 10th December 2021.

Notes: Chronology researcher to get and approval from REC, UiTM

According to the outlined timelines, it took almost one and a half years to get the required permission from REC so that the interviews could be conducted. Such an extended course persisted caused complications especially in delaying the beginning of

the information gathering stage. Going through the REC was a challenging task as the researcher had to invest a lot of time and energy since the entire process was gradual and the committee's comments had to be answered and the follow ups made to facilitate the REC's approval.

On the other hand, being given that much time proved challenging in the sense that the original plan to undertake the research was affected, new completion times for the project were set and there was the requirement to actively follow up with the committee to ensure the application was moving forward. Notwithstanding these hitches, the researcher was determined to maintain the professional code of ethics and worked hard towards getting the approvals.

With all the efforts being put in by the researcher, on 29th November 2021, permission to conduct the interviews was granted as formal ethical clearance was obtained. This event marked the end of an extensive and comprehensive approval process needed for the interview as the researcher was more than confident in its ability to meet all the requirements in terms of ethical and legal requirements.

Although the long timescale of the REC process approval created real difficulties, it demonstrated how important it is to have equity in research. The final approval demonstrated how the researcher ensured the ethical principles of the research including the rights, safety and welfare of the participants at all times.

3.11.2 Summary of Interview Process of Three (3) Informants

In this study, three informants were selected for interviews based on the criteria explained in this chapter. The process included approaching the informants and conducting the interviews. Below is a summary of the chronology for the three informants:

Table 3. 10
Chronology Period of Informant A

NO	ACTIVITY	PERIOD	REMARKS
1	Approaching the informant	10 th Aug 2021 – 11 th Jan 2021	The informant agreed to participate after being briefed on the research objectives and aims.
2	Sending Official Interview Invitation Letter via Email	21 st Jan 2021	An invitation letter, interview guideline with research questions, and Microsoft Teams link were sent to the informant.
3	Conducting Interview Session	3rd February 2022, Thursday, 02.00 pm - Microsoft Team	The interview lasted for 2 hours, 30 minutes, and 27 seconds.

Notes: Chronology period with informant A for conducting interview

Table 3. 11
Chronology Period of Informant B

NO	ACTIVITY	PERIOD	REMARKS
1	Approaching the informant	19th February 2021 – 11th January 2022	The informant agreed to participate after being briefed on the research objectives and aims.
2	Sending Official Interview Invitation Letter via Email	25 th January 2021	An invitation letter, interview guideline with research questions, and Microsoft Teams link were sent to the informant.
3	Conducting Interview Session	4th February 2022, Friday, 10.00 am - Microsoft Team	The interview lasted for 2 hours, 11 minutes, and 23 seconds.

Notes: Chronology period with informant B for conducting interview

Table 3. 12
Chronology Period of Informant C

NO	ACTIVITY	PERIOD	REMARKS
1	Approaching the informant	19 th Feb 2021 – 20 th Jan 2022	The informant agreed to participate after being briefed on the research objectives and aims.
2	Sending Official Interview Invitation Letter via Email	20 th Jan 2021	An invitation letter, interview guideline with research questions, and Microsoft Teams link were sent to the informant.

NO	ACTIVITY	PERIOD	REMARKS
3	Conducting Interview Session	4th February 2022, Friday, 02.00 pm - Microsoft Team	The interview lasted for 1 hour, 50 minutes, and 39 seconds.

Notes: Chronology period with informant C for conducting interview

Based on the table above, the interview process was quite challenging. The complexity of scheduling and obtaining confirmation from informants took at least a year before the interviews could be conducted. This timeframe overlapped with the period of awaiting REC approval. The process began with approaching the informants, which was done in parallel with waiting for the REC's approval. Despite these challenges, each interview was successfully conducted following the initial approach and subsequent confirmation.

3.11.3 Provision of Trustworthiness

To ensure the trustworthiness of this qualitative study, several strategies were employed to establish its credibility, dependability, confirmability, and transferability. These criteria, proposed by Lincoln and Guba (1985), served as the foundation for evaluating qualitative research rigor.

Credibility

Credibility referred to the confidence in the truth of the findings. In this study, credibility was enhanced through:

- **Prolonged Engagement:** The researcher maintained consistent communication with the selected organizations, ensuring a deep understanding of their records management practices and big data usage.
- **Triangulation:** Multiple data sources, including interviews, organizational documents, and field notes, were utilized to cross-verify information and provide a comprehensive view of the research context.
- **Member Checking:** Participants were given the opportunity to review and confirm the accuracy of the data collected from them, ensuring that their perspectives were accurately represented.

Dependability

Dependability pertained to the consistency of the research findings over time. This was achieved by:

- **Audit Trail:** A detailed record of all research activities, including decisions made during the selection process and data collection procedures, was maintained. This allowed for an external review of the research process and decisions.
- **Peer Debriefing:** Regular discussions with peers and mentors provided an external check on the research process, helping to identify any biases or inconsistencies.

Confirmability

Confirmability ensured that the findings were shaped by the participants and not by researcher bias. This was addressed through:

- **Reflexivity:** The researcher maintained a reflective journal to document personal biases and how they might have influenced the research process and interpretations.
- **Triangulation:** As mentioned, the use of multiple data sources helped to confirm the findings and reduce potential researcher bias.

Transferability

Transferability referred to the extent to which the findings could be applied to other contexts. This was facilitated by:

- **Thick Description:** Detailed descriptions of the research context, participants, and findings were provided, allowing readers to determine the applicability of the results to other settings.

These strategies collectively enhanced the quality and reliability of the study, positioning it as a credible and rigorous contribution to qualitative research in records and information management.

3.11.3.1 Member Checking

In ensuring the credibility of this qualitative research, member checking was employed as a key validation technique. This method was widely recognized for its ability to confirm the accuracy and integrity of data interpretations by directly involving the participants in reviewing the findings (Birt et al., 2016; Thomas, 2017). In this study, member checking was conducted following the completion of data collection and analysis, specifically in April 2024.

The researcher developed a test form validation package, which consisted of two components: (1) the early framework constructed from preliminary thematic analysis, and (2) the refined final framework derived after cross-case comparison and deeper analytical synthesis. These materials were sent to the previously selected informants, who had participated in the interview phase of the research. Each informant also received a formal invitation letter requesting their voluntary participation in validating the final outcomes. A sample of the test form validation and the invitation letter was provided in **Appendix 6** for reference and the results was explained in **Chapter 6**.

The purpose of this process was to verify the accuracy, relevance, and applicability of the proposed framework within the context of their respective organizational environments. Informants were asked to review whether the framework reflected their lived experiences and perspectives on records management and big data practices. Their feedback was crucial in identifying any misrepresentations or gaps in the interpretation of the qualitative data.

The decision to utilize member checking over other trustworthiness strategies, such as peer debriefing or expert panel validation, was based on several methodological and contextual considerations. Firstly, member checking provided direct affirmation from the actual data sources, thereby offering first-hand validation of the findings. Secondly, given the applied nature of the study—where the framework was intended for organizational use—it was essential to assess its practical acceptance and contextual accuracy from practitioners in the field. Lastly, the selected informants had previously shown willingness and accessibility, which made follow-up communication feasible and efficient.

By incorporating member checking as a post-analysis step, this study not only reinforced the credibility and confirmability of the findings but also aligned with best practices in applied qualitative research, where stakeholder validation was essential for knowledge utilization and framework adoption (Nowell et al., 2017).

3.12 ATLAS.TI 2023

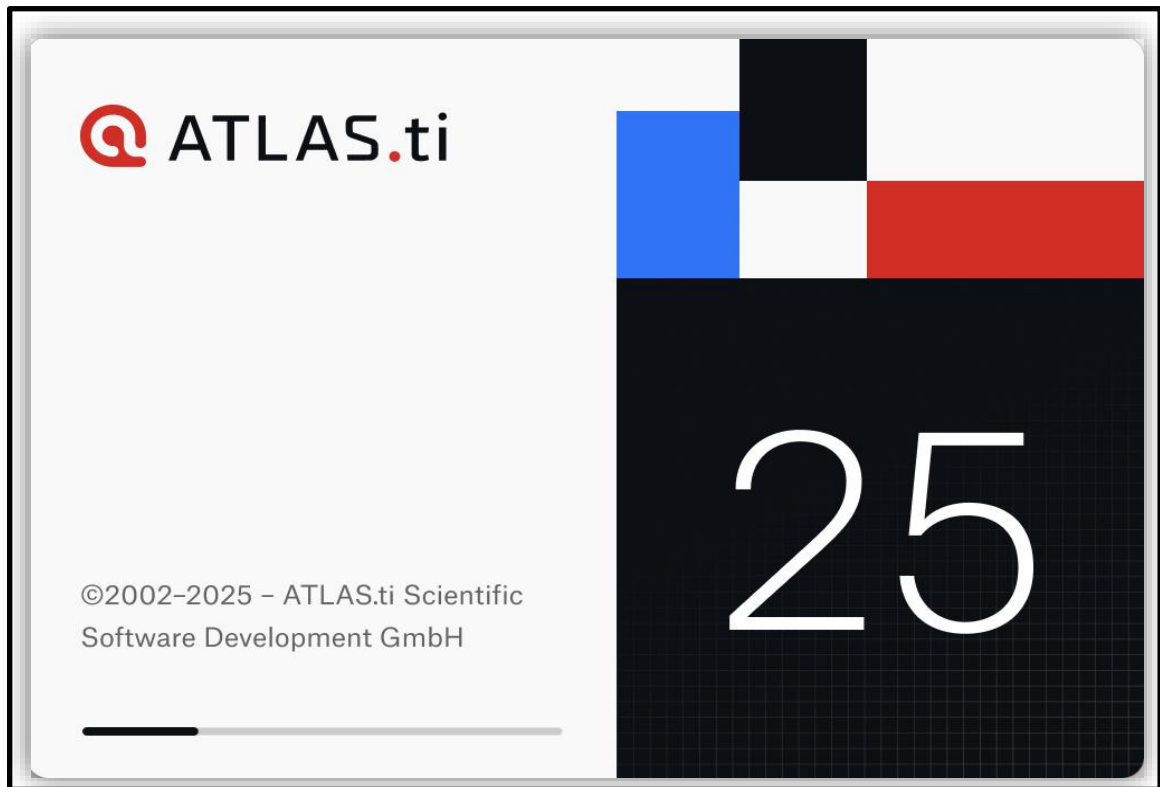


Plate 3. 1 :ATLAS. ti 2023 Software

ATLAS.ti 2023 is employed in this study as a qualitative data analysis (QDA) tool to support the systematic organisation, coding, and interpretation of qualitative data derived from multiple case studies. The software enables the integration and management of diverse data sources, including interview transcripts, organisational documents, and field notes, within a structured analytical environment.

The selection of ATLAS.ti is aligned with the methodological requirements of this research, particularly the need to analyse complex, multi-layered qualitative data across cases. Its functionalities such as coding, memoing, query tools, and network visualisation facilitate the identification of patterns, relationships, and themes in a transparent and systematic manner. These capabilities are essential in enhancing analytical rigor, particularly in studies that involve iterative and comparative analysis (Silver & Lewins, 2014; Friese, 2019).

Furthermore, the use of ATLAS.ti contributes to the dependability and confirmability of the study by enabling the creation of an audit trail, where coding decisions, analytical reflections, and theme development are documented systematically. This supports transparency in the analytical process and strengthens the overall trustworthiness of the research.

3.12.1 The Process of Using ATLAS.ti 2023 in Qualitative Data Analysis

The qualitative data analysis in this study follows a systematic, iterative, and theory-informed approach supported by ATLAS.ti 2023. The process integrates both inductive and deductive strategies, allowing themes to emerge from the data while also being guided by existing theoretical constructs related to records management and big data. The overall analytical workflow is summarised in Table 3.13, illustrating the progression from raw data to thematic interpretation and framework development.

Table 3. 13
Process of Using ATLAS.ti on this Study

Step	Process Stage	Description
1	Data Collection	Collection of qualitative data from interviews, organisational documents, and secondary sources.
2	Data Preparation	Transcription of interviews, data cleaning, and organisation of collected materials.
3	Data Familiarisation	Repeated reading of data to develop initial understanding and identify preliminary insights.
4	Initial Coding	Application of inductive and deductive coding using ATLAS.ti to segment and label data.
5	Code Refinement	Reviewing, merging, renaming, and structuring codes to improve consistency and clarity.
6	Categorisation	Grouping related codes into broader categories based on conceptual similarity.
7	Thematic Development	Development of key themes that represent patterns within the data.

Step	Process Stage	Description
8	Pattern Identification	Use of query tools and co-occurrence analysis to identify relationships and trends.
9	Validation Process	Ensuring rigor through memoing, peer debriefing, and iterative review of codes and themes.
10	Interpretation and Synthesis	Linking themes to research objectives and synthesising findings across cases.
11	Framework Development	Development of a framework for managing big data using records management practices.

The analysis begins with data preparation, involving transcription, verification, and organisation of qualitative data. This is followed by data familiarisation, where repeated reading allows the researcher to develop an in-depth understanding of the dataset and identify preliminary insights (Creswell & Poth, 2018).

Subsequently, coding is conducted using both inductive and deductive approaches. Inductive coding allows themes to emerge directly from the data, while deductive coding is informed by theoretical constructs. ATLAS.ti facilitates this process by enabling systematic tagging and retrieval of data segments, including the application of multiple codes to capture data complexity (Miles et al., 2014).

The coding process is iterative, involving continuous refinement to improve clarity, consistency, and analytical depth. Codes are reviewed, merged, and structured hierarchically to support further analysis.

Following coding, related codes are grouped into categories, which are then developed into broader themes that reflect patterns within the data. ATLAS.ti's network visualisation tools support the exploration of relationships between codes, categories, and themes, enhancing interpretive depth (Charmaz, 2014).

Pattern identification is conducted using analytical features such as code frequency and co-occurrence queries. These functions enable systematic cross-case comparison, which is particularly important in multiple case study research for identifying similarities and differences across organisational contexts (Yin, 2018).

To ensure analytical rigor, a validation process is embedded throughout the analysis. This includes memoing to document analytical decisions, peer debriefing with supervisors, and iterative refinement of codes and themes. These strategies contribute

to the credibility, dependability, and confirmability of the findings.

The final stage involves interpretation and synthesis, where themes are aligned with research objectives and integrated across cases. Based on these findings, a framework is developed to guide the implementation of records management practices in managing big data.

Overall, the use of ATLAS.ti 2023 supports a structured and transparent analytical process, ensuring that findings are systematically derived from the data and aligned with the research objectives.

3.12.2 Coding and Code Development

Coding serves as the foundational stage of qualitative data analysis, enabling the systematic organisation and interpretation of data. In this study, ATLAS.ti 2023 is used to segment qualitative data into meaningful units and assign codes that represent key concepts, ideas, or patterns.

A combination of inductive and deductive coding is employed. Inductive coding allows themes to emerge directly from the data, while deductive coding is guided by theoretical frameworks related to records management and big data. This dual approach enhances both analytical flexibility and theoretical alignment.

ATLAS.ti facilitates coding through features such as multi-coding, hierarchical structuring, and memo integration. These tools enable the researcher to capture the complexity of qualitative data, where a single data segment may represent multiple concepts simultaneously (Miles et al., 2014).

Codes are continuously refined throughout the analysis process. This includes renaming, merging, and restructuring codes to ensure conceptual clarity and consistency. The development of well-defined codes forms the basis for higher-level analysis, including categorisation and theme development.

3.12.3 Categorisation and Thematic Development

Following coding, related codes are grouped into broader categories based on conceptual similarity and relevance to the research objectives. This process represents a transition from descriptive analysis to more abstract and analytical interpretation.

Categories are further developed into themes, which capture significant patterns across the dataset. These themes provide a structured representation of the data and form

the basis for addressing the research questions.

ATLAS.ti supports this process through code grouping and network visualisation tools, which enable the exploration of relationships between codes and categories. This facilitates deeper analytical insight and supports the development of a coherent thematic structure (Charmaz, 2014).

The categorisation process is iterative, allowing continuous refinement as new insights emerge. This ensures that themes remain grounded in the data while also contributing to theoretical understanding.

3.12.4 Pattern Identification and Interpretation

Pattern identification involves examining relationships, trends, and recurring concepts within the dataset. In this study, ATLAS.ti's query tools, including code frequency and co-occurrence analysis, are used to identify significant patterns across cases. This stage is particularly important in multiple case study research, as it enables systematic comparison between cases and supports analytical generalisation (Yin, 2018). By identifying similarities and differences across organisational contexts, the analysis provides a more comprehensive understanding of the research phenomenon.

The interpretation process involves linking identified patterns to the research objectives and theoretical framework. This ensures that findings are not only descriptive but also analytically meaningful and relevant to the study.

3.12.5 Validation and Trustworthiness of Analysis

To ensure methodological rigor, this study adopts established criteria of trustworthiness, including credibility, dependability, confirmability, and transferability.

Credibility is enhanced through prolonged engagement with the data, iterative coding, and peer debriefing.

Dependability is supported by maintaining a systematic and well-documented analytical process using ATLAS.ti.

Confirmability is ensured through memoing and the creation of an audit trail that documents analytical decisions.

Transferability is addressed through detailed descriptions of the research context and findings.

ATLAS.ti supports these criteria by enabling transparent documentation of coding structures, analytical reflections, and data relationships. Memoing functions allow the researcher to record interpretations and decisions throughout the analysis, contributing to reflexivity and transparency (Silver & Lewins, 2014). These validation strategies ensure that the findings are robust, consistent, and grounded in the data, thereby meeting the expectations of PhD-level research.

3.12.6 Summary

The application of ATLAS.ti 2023 in this study provides a structured and systematic approach to qualitative data analysis. Through processes of coding, categorisation, pattern identification, and validation, the software supports rigorous and transparent analysis of complex qualitative data. This ensures that the findings are analytically robust and aligned with the research objectives, ultimately contributing to the development of a framework for managing big data through records management practices.

3.13 Chapter Summary

This chapter has outlined the research methodology adopted to investigate the suitability of records management standards in managing big data within Malaysian organisational contexts. A qualitative multiple case study approach was employed, supported by purposive sampling and triangulation of data sources, including interviews and document analysis. The methodological design was developed to ensure alignment with the research objectives and to enable in-depth exploration of organisational practices and challenges.

The chapter also detailed the data analysis procedures, including the application of ATLAS.ti 2023 to support systematic coding, categorisation, and thematic development. In addition, the use of matrix analysis facilitated the mapping between ISO 15489-1:2016 and big data challenges, contributing to the development of the study's conceptual framework. Considerations of research ethics and trustworthiness were incorporated to ensure the credibility, dependability, confirmability, and transferability of the findings.

Overall, the methodological approach provides a rigorous and structured foundation for the analysis presented in the subsequent chapter. Chapter Four builds upon this methodology by presenting the findings and discussing the emerging themes in relation to records management practices and big data management.

CHAPTER 4

FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and interpretation of empirical data collected to examine the suitability of records management practices in managing big data. The data were obtained through semi-structured interviews with three informants (Informants A, B, and C) representing different organisational contexts.

As outlined in Chapter Three, the interview data were analysed using a systematic coding process supported by ATLAS.ti 2023. The analysis involved iterative coding, categorisation, and theme development to identify patterns, similarities, and variations across cases.

The findings are organised according to key themes derived from the data, focusing on informants' perspectives on big data, records management practices, and their interrelationship. Particular attention is given to how these perspectives reflect broader challenges associated with big data characteristics, including volume, variety, velocity, and veracity.

By integrating empirical insights with theoretical perspectives, this chapter provides a foundation for evaluating the applicability of records management standards in addressing the complexities of big data environments.

In addition to exploring informants' perspectives, this chapter further examines specific elements of records management standards, particularly ISO 15489-1:2016, to identify which components are most suitable in addressing big data challenges. This integration allows for a deeper understanding of how theoretical principles align with practical experiences.

4.2 Informants' Perspectives on Big Data and Records Management

4.2.1 General Perspective of Big Data

The findings indicate that informants conceptualise big data from different yet complementary perspectives, particularly in relation to data volume, integration, and organisational pressures. These perspectives reflect key characteristics of big data, especially volume, variety, and velocity, as outlined in existing literature.

Informant A emphasised the role of large-scale data processing capabilities in enabling organisations to understand **consumer behaviour**:

“...there are a kind of volume of data... very easy for a big company like Google or Amazon to process this...”

This perspective highlights the significance of data volume and analytical capacity in supporting decision-making processes. It aligns with the argument by Vasilopoulou et al. (2023) that big data enables organisations to extract insights from consumer behaviour through large-scale data analysis. In this context, big data is not merely defined by size but by its potential to generate actionable insights.

In contrast, **Informant C** associated **big data growth with organisational pressure to collect data without structured governance**:

‘..when organization required more data.. so data dah start masuk banyak..If tak di control .. dia akan mempengaruhi secara langsung peningkatan big data..’

(..when organization required more data... data will start increasing... if not controlled... it will directly increase big data..)

This finding suggests that the expansion of big data is not only driven by technological capability but also by organisational practices and external pressures. The absence of standardised control mechanisms contributes to uncontrolled data accumulation, reflecting challenges related to data volume and governance. This observation is consistent with Thanasas et al. (2022), who identify data volume as a critical challenge requiring systematic control.

Meanwhile, **Informant B** viewed **big data as the result of data integration across multiple sources**:

'..compile data from many others agencies, dia combine together then will be big data.'

(..compile data from many agencies, combine together then will be big data.)

This perspective emphasises the role of data variety and integration, which are central components of big data as conceptualised by 3Vs of Big Data (Laney, 2001). The integration of datasets from different sources increases both the volume and complexity of data, thereby enhancing analytical potential (Manyika et al., 2011).

Beyond defining big data, informants also highlighted challenges associated with its use. **Informant C** pointed to issues of data reliability and usability:

'..In term of the frequency of update, the accuracy, the relevancy, .. kadang-kadang.. dah jadi macam sesuatu yang dah tak fit utk dipakai lah..'

(..frequency of update, accuracy, relevancy... sometimes not fit to be used..)

This reflects concerns related to data veracity, where the quality and reliability of data affect its practical application. Additionally, issues of duplication and redundancy were identified as contributing factors:

'..kita banyak jumpa data yang duplication punya error. Redundant data..create confusion..'

(..we found lots of duplication error... redundant data... create confusion..)

These findings suggest that the uncontrolled growth of data not only increases volume but also reduces data quality and usability. This aligns with Bhadani and Jothimani (2016), who argue that large-scale data accumulation can lead to inconsistencies and reduced reliability if not properly managed.

Overall, the findings demonstrate that big data is perceived not only as a technological phenomenon but also as an organisational and governance challenge. While its benefits lie in enhanced decision-making and insight generation, its rapid expansion introduces complexities related to data quality, control, and usability. These challenges highlight the need for structured management approaches, including records

management practices, to ensure that data remains reliable, accessible, and meaningful within organisational contexts.

4.2.2 Structured and Unstructured Data

The distinction between structured and unstructured data emerged as a recurring theme in the interviews, particularly in relation to the complexity of managing big data. Across all informants, there was a consistent view that structured data is comparatively easier to manage, while unstructured data presents greater challenges in processing and analysis. **Informant A** highlighted the technical differences between the two data types:

‘One thing that you mention around, a structured and unstructured data, I guess if you looking at a scraping data or putting together others to abstract them, much easier to do in structured data vs unstructured data’

This perspective reflects the inherent characteristics of structured data, which is typically organised in predefined formats that allow for easier processing and retrieval. As noted by AltexSoft (2024), structured data is commonly stored in tabular formats, enabling efficient querying and analysis. In contrast, unstructured data lacks a predefined schema, making it more difficult to process using conventional systems.

A similar understanding was expressed by **Informant B**, who associated structured data with simplicity and unstructured data with complexity:

‘..structured senang, macam nombor combine kan. Unstructured.. kena link to the big platform yang lain..’

(..structured data, you just need to take and combine it.. like number just combine it..Unstructured.. need to link with the others big platform..).

This observation suggests that structured data aligns closely with numerical and transactional data that can be directly processed within systems, whereas unstructured data requires additional integration and interpretation. The need to “link” unstructured data across platforms reflects the challenge of managing data variety, which is a core characteristic of big data.

Further clarification from **Informant B** emphasised organisational practices, particularly in banking environments:

‘Normally, bank manage structured data sahaja yang ada numbers, figures, value because that one can run dalam system. Unstructured more bit complicated, because its deal with huruf, perkataan semua. So, that will be more complicated compare to the numbers’

(Normally at bank, they only manage structured data only that consist numbers, figures, value because it can be run in systems. The unstructured data is more complicated because it deal with alphabet and words. So, it will be more complicated compare to the numbers).

This indicates that organisations tend to prioritise structured data due to its compatibility with existing systems and processes. However, this also implies a limitation, as a significant portion of big data—such as text, images, and multimedia—is unstructured and therefore more difficult to manage.

Taken together, these findings highlight that the complexity of unstructured data contributes significantly to big data challenges, particularly in terms of processing, integration, and analysis. While structured data supports efficiency and system compatibility, unstructured data introduces issues related to interpretation and management. This reinforces the importance of adopting structured management approaches, including records management practices, to handle diverse data types effectively within big data environments.

4.2.3 Internet of Things (IoT) Lead to The Increasing of Big Data.

The role of the Internet of Things (IoT) in driving the expansion of big data was strongly acknowledged by all informants. Their responses indicate that IoT contributes significantly to the increasing volume, velocity, and variety of data, while simultaneously introducing challenges related to control, security, and data quality.

Informant A described **IoT from a practical, everyday perspective:**

‘I mean even IoT or something of that only vaguely familiar with but, just using example in our home, as this devices comes into our homes more often than not

even boring concern most people probably use them for some degree so, because the using the data definitely go there. So, absolutely I agree on that question'

This illustrates how IoT extends beyond organisational contexts into daily life, continuously generating data through connected devices. The increasing presence of IoT devices contributes directly to data volume and velocity, as data is generated in real time and at scale. However, Informant A also raised concerns regarding **data control and security**:

'We have ten thousands customers were data have been hacked, we working very hard to make the situation under control and I think we also see a lots of these press release in the increasing if the data not in control and managed''

This highlights the vulnerability associated with large-scale data environments, particularly when governance mechanisms are insufficient. The concern over data breaches reflects broader issues of data security and trust, which are critical in big data ecosystems. Importantly, **Informant A** linked these challenges to the **absence of proper management practices**:

'What is the caused not being control ? I guess, I maybe I would be not educated security or not educated document management control and procedure. Maybe that's come how into play and maybe in term or records management in term security and control very critical to enabling the IoT world because when it's out of control, people will going to start losing trust that maybe holding back data'

This suggests that inadequate records management practices may contribute to data mismanagement, reinforcing the need for structured governance frameworks. In this context, records management is seen as a mechanism for establishing control and maintaining trust in data systems.

From a different perspective, **Informant B** focused on the **functional benefits of IoT**:

‘Orang kata, knowledge yang kita tak tahu pun dia akan keluarkan. So, dia akan memudahkan kita untuk buat decisions making. So, internet is one of it daripada application yang kita adalah. Dia membantu and kadang-kadang terlalu overwhelming.’

(People said that, the IoT can provide all input including knowledge that we do not know. Therefore, it will help us on decisions making. So, internet is one of application that we have. It can helps and sometimes can become overwhelming)

This indicates that while IoT enhances decision-making capabilities by providing extensive data inputs, it can also lead to information overload. The issue of overwhelming data reflects challenges related to data volume and value, where excessive data does not necessarily translate into meaningful insights. **Informant B** further emphasised the importance of user **input and objectives**:

‘..kalau objektif kita tak tepat, mungkin apa yang keluar itu bukanlah apa yang kita mahu. Mungkin apa yang keluar, kita dapat banyak, overwhelming..’

(..if our objective is not accurate, it might be provide results that is not the one we looking for. Maybe the results that appear and what we get is more and overwhelming..)

This highlights the **role of human factors** in managing big data. Even with advanced technologies, ineffective data use may result from unclear objectives, leading to inefficiencies in analysis.

Meanwhile, **Informant C** provided a more **technical explanation** of IoT:

‘So IOT from our understanding ialah mengambil kira kebanyakan data-data yang ada dikeluarkan ni yang boleh diguna pakai dan extract utk di laksanakan proses dipanggil data arrangement. Data arrangement ni dimana kalau kita ada satu set of basic data, apabila kita masuk kan third party info daripada IOT, services, iot ni banyak sebenarnya. Kalau iot orang kata the fit management system also

iot. The gps chip pun iot juga pada mereka. Jadi bila component ini digabungkan memang akan membuatkan increasing of big data. Dia akan mempengaruhi secara direct.'

(So based on our understanding, IoT is about various of data that used and extract for a process that called as data arrangement. Data arrangement is about basic data that combine with third party information from IoT and services it will become big. People also said that fit management and GPS chip also consider IoT. Therefore, when we combine all component at the end it will lead to the increasing of big data. It will influence directly.

Based on above statement, Informant C believe that the emerging of data through IoT need to be control. Following with question on impact not being control, here response from Informant C:

'Secara total from my point of view untuk IOT ni, dia punya keperluan utk dikawal memang sangat tinggilah. Sebab bergantung kepada organization dan individu tersebut apabila dia manage data tersebut adakah semua benda dia akan ambil atau dia akan filter. Otherwise dia akan jadi issues kpd volume.'

(In my point of view as overall regarding IoT, the needs to control is very high. This is depends on organization and individual in managing data is either the take all information or they will filter it. Otherwise, it will be an issues to the volume)

The informant C also added that if the data not been filter correctly, it will affect data veracity where can create confusion and do not have quality and accuracy. Here below statement from this informant regarding this issue:

'Dan another question dia akan jd kepada veracity. Pada quality and accuracy. Benda tu something yang directly impact lah pada saya. Sebab bila data terlalu banyak pun akan create confusion. Sebab ada orang kata data banyak volume banyak might have a high chances utk menjumpai data yang tepat tapi kalau data banyak tak filter dengan betul dan quality is not there, dia akan menambahkan masalah lah.'

(and another question it will lead to the veracity, quality and accuracy. That things are something that directly impact to me. This is because when the data is to many it also can create confusion. People always said, if the data is too high in volume, there are chances to get an accurate data but, if the data not properly filter, the quality also not there and it will give more trouble).

These observations relate directly to challenges of data veracity and value, where excessive and unfiltered data may reduce accuracy and usefulness. The emphasis on filtering highlights the importance of data governance in ensuring data quality.

Overall, the findings suggest that IoT is a significant driver of big data growth, contributing to increased data generation and integration. However, without proper control mechanisms, IoT can also exacerbate challenges related to data volume, quality, and security. These insights reinforce the importance of implementing structured management approaches, such as **records management** practices, to regulate data flow, ensure quality, and maintain trust in IoT-driven environments.

4.2.4 Important of Having Proper Records Management Standard or Guideline

The significance of implementing proper records management standards emerged consistently across all informants, indicating a shared understanding of their role in ensuring systematic data control, organisational efficiency, and long-term accessibility of records. Within the context of increasing digital data environments, these practices align closely with the principles outlined in ISO 15489-1:2016, particularly in relation to control, reliability, and lifecycle management of records.

In this study, their responses suggest that structured records management practices are essential for ensuring data organisation, accessibility, cost efficiency, and operational effectiveness, particularly within data-intensive environments.

Informant A emphasised the **role of standards** in ensuring proper data handling and organisational accountability:

'I think talking about records management standards and the important of records management standards. So, if you are no standard like there are known standard, then so that's this data could be managed anyhow by whatever company things either best, the cheapest. Maybe they just want get the data but

they don't want to have interesting managing properly. Because managing properly costs money. Money and resources, so perhaps records management standard and the works you doing is hoping to improve the quality, security so that everything and rolls up to the public'

This perspective highlights that, in the absence of formal standards, data management practices may become inconsistent and inefficient. The emphasis on cost and resources also suggests that organisations may prioritise data collection over proper management, potentially compromising data quality and security. This aligns with broader concerns in big data environments, where rapid data accumulation often outpaces governance mechanisms.

This concern also reflects the absence of structured governance mechanisms, which directly contradicts the ISO 15489 requirement for systematic control of records creation, capture, and management. Without such control, records may lack reliability and authenticity, thereby limiting their value for operational and evidential purposes.

Informant A further illustrated the operational risks associated with poor records management :

'Let's say when you sign a contract that digital versions of contract, you cannot just store in employee computer hard drive because what if that employee computer get damage store, what if the employee leave the organization. It's that means the company will have no records of that contract between A and its customer. So, you need to have a proper records management system for this critical documents and information.'

This observation aligns with the ISO 15489 principle of records capture and control, which requires organisations to ensure that records are systematically captured into official systems rather than being dispersed across personal storage environments. Failure to implement such controls compromises accessibility, integrity, and continuity, particularly in organisational contexts with high staff mobility.

Moreover, it also reflects fundamental records management principles, particularly the need for centralised control, reliability, and long-term accessibility of records. It also highlights risks related to data loss and lack of continuity, which are critical issues in both traditional and digital environments.

In addition, **Informant A** linked effective records management to organisational efficiency:

‘...when you have good data control, good records management... I can know really exactly where to find information..’

This suggests that proper records management supports information retrieval and reduces inefficiencies in daily operations. Conversely, poor records management can lead to confusion, duplication of effort, and reduced productivity.

This also reflects the ISO 15489 emphasis on classification and indexing, which facilitates efficient retrieval and use of records. Proper classification structures enable organisations to manage increasing data volumes by ensuring that information remains accessible and usable over time.

Similarly, **Informant B** emphasised the organisational benefits of having a structured records management function:

‘Of course, if they have proper records management section or unit..kita akan tahu macam mana nak simpan those data, berapa lama nak simpan and probably you no need bigger records room, sampai sahaja tahun yang perlu di dispose, kita dispose and destroyed those data. So, it is manageable..’

(Of course, if they have a proper records management section or unit..we can know how to keep all those data and how long to keep and probably you no need the big records room because we can dispose or destroy records once the time comes. So, it will be more manageable)

This indicates that poor records management may lead to unnecessary storage costs and inefficiencies. The need to outsource storage further reflects the financial burden associated with uncontrolled data accumulation.

The statement also corresponds with ISO 15489 requirements for records retention and disposition, which ensure that records are maintained for appropriate periods and disposed of systematically when no longer required. Such practices are essential in addressing issues of data accumulation within big data environments.

In addition, **Informant B** highlighted risks related to **legal and retrieval challenges**:

'If you tidak manage better it will affect the costs, mungkin simpan tidak proper, you susah nak cari, simpan terlalu banyak, lepas tu, kalau ada isu-isu macam legal punya isu, susah nak cari, tidak dapat and if very complicated legal issues, can be loose in court or any debate'

(If you not manage properly, it will affect the costs. Maybe if the information or records not being keep properly, or we keep too many data, it will make the difficulties to find or retrieve it. Especially if there are many issues such as legal issue, unproper records management will make the case become complicated and lastly we can lose in court).

This reflects the ISO 15489 principle that records must serve as evidence of business activities, requiring them to be authentic, reliable, and accessible. Poor records management practices undermine evidential value, which may expose organisations to legal and regulatory risks.

This also underscores the importance of records management in ensuring legal compliance and evidential integrity. In big data environments, where data volume is significantly higher, the ability to retrieve accurate and reliable records becomes even more critical.

From another perspective, **Informant C** provided **insights based on practical implementation**:

'Pada saya sepatutnya untuk company dia memang akan memberi impact yg sangat baik... kita ada buat classification code walaupun storage tak cukup.. Tapi kita still ada buat cuma tak selengkap macam follow standard yang kita belajar dulu lah.. Memang dia akan bagi impact yang baguslah..'

(I think, the proper records management will give a good impact to the company..we also assign classification code even our storage is not enough. We still do the classification by following standard that we learn even not really in details. The records management really give a good impact).

This reflects the application of classification systems, which are central to ISO 15489 in structuring records according to organisational functions and activities. However, the limitation in storage capacity suggests that classification alone is insufficient without integrating other elements such as retention and storage infrastructure.

Across all informants, there is also recognition that the effectiveness of records management depends not only on policies but also on **compliance** by **Informant A**:

'I think, one thing that I like to said on this is that, you can probably have great records management on paper, like process flow and procedure but if the company or employee is not following it, then its almost no use. So, you probably need to have both. A good records management procedure and sets a control like a ways to ensure the organizations to follow that procedure or outline. So, in term of following, I think that's it's pretty clear how this organization would ensure it through annual audit of management systems to ensure that the organizations is doing what it said and what is does.'

This highlights a critical issue in practice which is implementation gaps. Even well-designed records management frameworks may fail if organisational culture and enforcement mechanisms are weak. The reference to audits further suggests the need for continuous monitoring to ensure compliance. This observation also aligns with ISO 15489's emphasis on governance, accountability, and compliance mechanisms, including policies, training, and auditing processes. The effectiveness of records management systems depends not only on their design but also on consistent implementation across organisational levels.

Overall, the findings indicate that proper records management standards play a fundamental role in managing data within organisations. They support data organisation, improve retrieval efficiency, reduce costs, and ensure legal compliance. More importantly, in the context of big data, structured records management practices can help address challenges related to data volume, control, and reliability. However, their effectiveness depends on consistent implementation, organisational commitment, and adherence to established procedures.

This relationship can also be interpreted through the lens of the 10 V's of big data, where effective records management practices contribute not only to managing

the volume and variety of data, but also to enhancing veracity, value, and validity by ensuring that digital records remain accurate, structured, and reliable for organisational use.

4.2.5 Relationship between Records Management Standard and Big Data

This study seeks to assess the suitability of records management standards in managing big data. As such, it is essential to understand how these two concepts are perceived in relation to one another. To explore this, informants were asked to describe the relationship between records management and big data based on their organisational experience.

Informant A viewed records management and big data as distinct but interrelated concepts, particularly in terms of their functional roles:

‘But, it seems to me the records management is around what you do with that data. Do you do nothing or do you process it, manage it, archive it, what’s the procedure and how you manage it. That’s the relationship to me so, it seems to be related but I guess it seems for me the big data is not records management. Big data seems separately. Big data is data, records management is management of the data.’

‘Seems like, they are not really similar, there are two different items to me that records management has relations to big data but, there are not the same things’

These responses indicate a clear conceptual distinction between data and its management. Informant A positions big data as the raw resource, while records management represents the structured processes applied to that data, including organisation, storage, and preservation. This distinction reflects the principles of ISO 15489, where records management focuses on ensuring that information is properly captured, controlled, and maintained throughout its lifecycle.

Similarly, Informant B emphasised that the relationship between big data and records management is primarily established through the act of capturing and storing data as records:

'Okay, dia ada relate bila kita simpan. Kalau tidak simpan, tidak jadi. Bila kita simpan, simpan ke records room it is become records. So, berapa banyak yang nak simpan itu, yang itu terpulang kepada users. So, any data kalau kita simpan dia akan jadi rekod. Kalau data itu kita rasa penting tapi, yang penting for records management is outcome from the Big Data. Kalau Big Data itu terlalu besar, nak simpan macam mana? Kalau nak simpan dalam bentuk digital or electronic, itu tidak ada isu... So, dia punya relationship is dengan records management is bila you simpan.'

(Okay, it has a relationship when we keep the data. If the data is not kept, it does not become records. Once it is stored, it becomes records. The amount to be stored depends on the users. Any stored data becomes a record. Important data becomes an outcome of big data. However, if the data is too large, how can it be stored? If stored digitally, it is not an issue. Therefore, the relationship between big data and records management is when data is stored.)

This perspective highlights the transformation of data into records through formal capture and retention processes, which are central to ISO 15489. It also introduces a critical challenge which is data volume where the increasing scale of big data raises questions about storage, selection, and retention decisions. This aligns directly with the volume and value dimensions of big data, where not all data can or should be retained as records.

In contrast, **Informant C** acknowledged both the differences and the complementary nature of the two concepts:

'Okay. so the similarity between big data and records management. Pada saya dia ada perbezaan sebab record you kena manage record tu dengan betul. Proper manage. Tapi big data ni dia merangkumi banyak element lain.'

(Okay, so the similarity between big data and records management. For me, there is a difference because records need to be properly managed, whereas big data consists of many other elements.)

'Saya nampak dia ada perbezaan la dekat situ. Dia tak similar tapi dia penting untuk big data.'

(I see that there is a difference there. They are not similar, but records management is important for big data.)

Informant C's view reinforces the idea that records management does not encompass the entirety of big data but plays a supporting and structuring role within it. While big data involves multiple dimensions such as analytics, processing, and technological infrastructure, records management contributes specifically to organisation, control, and reliability of information.

Across all informants, a consistent pattern emerges: records management and big data are perceived as distinct yet interconnected domains. Big data is understood as the source of large-scale, diverse data, while records management provides the framework for organising, controlling, and preserving selected data as records.

From an ISO 15489 perspective, this relationship is reflected in key processes such as:

- Capture → transforming data into records
- Classification → structuring information
- Retention and disposition → controlling data volume
- Access and use → enabling retrieval and decision-making

These processes are particularly relevant in addressing challenges associated with big data, especially in terms of volume, variety, and veracity. While big data environments generate vast and complex datasets, records management ensures that only relevant, reliable, and usable information is retained as organizational records.

However, the findings also indicate that the integration between records management and big data remains conceptually recognized but practically underdeveloped. Informants acknowledge the importance of records management, yet challenges such as data volume, storage limitations, and user-driven decisions suggest that systematic application of records management standards is not fully realized.

In summary, the findings suggest that records management and big data are not equivalent concepts but are inherently connected. Records management serves as a critical mechanism for structuring and governing data generated within big data environments. Its role is particularly significant in ensuring data reliability, accessibility, and long-term value. Nevertheless, the effectiveness of this relationship

depends on how well records management principles are integrated into organizational practices, especially in environments characterized by rapidly increasing data generation.

These findings directly address the research question of this study by demonstrating that, although records management and big data are conceptually distinct, records management standards provide a structured approach that is potentially suitable for managing selected and meaningful data within big data environments.

4.2.6 Perspective Informants towards Suitability of Records Management in Managing Big Data.

Each informant was asked to provide their perspective on whether records management standards are suitable for managing big data, particularly in relation to big data characteristics. The findings indicate that while most informants recognise the relevance of records management, there are differing views regarding its applicability depending on organisational context.

Informant A expressed strong agreement that records management standards are suitable in managing big data, particularly in relation to data control and trust:

‘..proper management of big data is necessary.. if it is not managed well, people may misuse the data... then users will lose trust..’

‘.. for example this recording must be properly controlled... I hope there are good records management standards to manage this information... so yes, it is very suitable.’

These responses highlight the importance of control, security, and trust in big data environments. Informant A associates records management with safeguarding information from misuse, which aligns with ISO 15489 principles related to records control, protection, and reliability. This also reflects the veracity dimension of big data, where trust in data is essential for its continued use.

Similarly, **Informant C** supported the suitability of records management standards, particularly in providing structure to large and complex datasets.

‘So then, did you believed records management standard is suitable in managing big data? Yes, pada saya records management standard memang penting sebab once you follow the standard, you ada structure sendiri untuk data tersebut. You akan memudahkan data tersebut untuk diletakkan dalam mana-mana saja system untuk digunapakai.’

(So then, did you believe the records management standard is suitable for managing big data? Yes, for me the records management standard is really important. This is because, once you follow the standard the data will have their structure. It will be easy to allocate the data in any system that can be used).

Based on statement above, Informant C was asked with follow up question regarding his opinion on records management that can help to decrease any issues in organization especially related to big data management and here below is the response from Informant C:

‘Yes records management sangat membantu dalam mengurang kan isu dalam organisasi especially dalam managing big data. Saya dah lama dalam bidang ni dan masalah nya rekodnya tidak terjaga dengan elok dan bila big data ni datang semua dalam keadaan tidak tersusun dan tidak tersedia untuk diserve. So records management approach ni sangat membantu lah’

(Yes, records management is very helpful in reducing issues in organizations, especially in managing big data. I have been in this field for a long time and the problem is that the records are not maintained properly and when this big data comes, it is all unorganized and not available to be served. So this records management approach is very helpful).

These responses emphasise the role of records management in structuring, organising, and preparing data for use, which corresponds to ISO 15489 elements such as classification, organisation, and accessibility. In the context of big data, this supports managing variety and volume, where data must be organised systematically to remain usable.

In contrast, **Informant B** presented a more conditional perspective, suggesting that the suitability of records management depends on the context and scope of application:

'Its depends... records management guideline is about records, not fully about data... data may involve other acts or regulations...'

'..records management covers life cycle... starting from creation, which begins with data..'

Additionally, **Informant B** emphasised organisational factors:

'..depends on how the institution manages records... structure and arrangement will determine the guideline..'

This perspective highlights that while records management provides a structured framework, it may not fully address all aspects of big data, particularly those related to analytics, processing, and governance beyond records. However, Informant B acknowledges that records management remains relevant at the early stages of the data lifecycle, which aligns with ISO 15489's emphasis on creation, capture, and lifecycle management.

Across all informants, there is a consensus that records management standards are relevant to managing big data, particularly in ensuring data control, organization, and reliability. However, differences arise in the extent to which records management is perceived as sufficient in addressing the broader complexity of big data environments.

Informants A and C demonstrate a strong belief in the suitability of records management, particularly in addressing issues related to data structure, accessibility, and trust. These findings align with ISO 15489 principles, which provide a systematic approach to managing information throughout its lifecycle.

In contrast, Informant B introduces a critical perspective, highlighting that records management may not fully encompass all dimensions of big data. This suggests that while records management contributes to managing structured and meaningful data, additional frameworks may be required to address aspects such as data analytics, governance, and regulatory compliance beyond records.

From a big data perspective, the findings indicate that records management plays a significant role in addressing key dimensions such as:

Volume → through retention and control

Variety → through classification and organisation

Veracity → through ensuring reliability and trust

However, its role is primarily focused on selected and managed data, rather than the entirety of big data ecosystems.

In summary, the findings suggest that records management standards are generally perceived as suitable for managing big data, particularly in supporting data organisation, control, and reliability. Nevertheless, their effectiveness is influenced by organisational practices, implementation strategies, and the scope of application. While records management provides a strong foundational framework, its integration with broader data management and governance approaches remains essential in addressing the full complexity of big data environments. These findings directly support the research objective of this study by demonstrating that records management standards have the potential to contribute to the effective management of big data, particularly in structuring, controlling, and preserving relevant organisational information.

4.2.7 Perspective Informants towards Records Professional

This section examines informants' perspectives on the role of records professionals in managing big data within organisational contexts. Understanding this perspective is important, as records professionals are traditionally responsible for ensuring the systematic control, organisation, and governance of records, which are i

All informants acknowledged the importance of having dedicated roles or teams responsible for managing large volumes of data. **Informant A** highlighted the need for structured responsibility, suggesting that managing big data requires coordinated effort rather than reliance on individuals: increasingly challenged by the scale and complexity of big data environments.

'Probably yes. Probably maybe there is not somebody or group but maybe is not like one persons but, maybe like a team or something of people. I guess maybe it is out of control or too much data, maybe it can be use properly. So I think yes, should be some people or group of people that help the organizations and manage all these especially as company that getting more and more data that they use.'

Based on above statement from Informant A, we can see that the informant believe it is needed in organization to manage the data. Even though Informant A is not the records professional in the organization, therefore another follow up questions has been asked by asking the informant A to put himself as records professional and what he would do in handling bigdata and here is the response:

‘Okay, one thing is that, I would be possible control the data directly because there are too much data, too much information. So, I would tend to think that in organization can have people in records management actually managing all the data because that’s done by the employees. We all create data and works. So I tend to think records professional probably need to manage the procedure and helps the organization establish the procedure then, whether maybe they need to hired technology. Not necessary hands on, analyse the data themselves. I think that will not be responsibility records professional . It is more on procedure aspects. The standardization will be probably part of that.’

The informant A believe that think that records professional need have a good action by focusing on the procedure first. To confirm on his opinion, the Informant A reply by saying:

‘Yes, like you pointed to the ISO standard. The records professional probably need to know that standard very well. Make sure the organization comply to that standard because maybe there are reasons the company doesn’t comply and then, help and ensure the company not only have the standard but follows it. So maybe, do audit or something like that to make sure in employee day to day life, they know about big data and following proper records management procedure.’

Based on the above explanation, Informant A believes that records professionals are important in managing big data. The procedure needs to be setup first and the records professional needs to know the standard very well to allow whole people in the organization to follow the standard. Therefore, from this, we can see how important of Record Management standard is in managing big data.

The view regarding records professionals that are needed in managing big data just does not stop here. Informant B also own view where the statistics department and others department in his organization is the team responsible for managing big data before transferring it to the records department:

‘So, in bank, the statistic department and also others department is handle the big data. Some departments do collect some data from bank at Malaysia. So, basically records department will collaborate with others sections or department where at data stage is under each department, while when it becomes records it will handle by us.’

Based on Informant B, the statistics department and others department is the team that handles data in the bank. The records department will collaborate with them from other departments and handle the data that changes to records.

Informant B also emphasizes that a records professional is one of the professionals responsible for managing data by knowing the evolution of data and how to handle it:

‘It’s very important. But, we need to understand the evolution of data to become records or knowledge. So, it’s very important because the data maybe we will use in next 100 years. We also do know. So, the records professional must understand it first for the importance of the institution. Maybe, in future, the record manager or records management in institution must have high digital influence where they need good in system and digital. So that we can reduce the physical records when all in digital. That persons, also need to make sure the records is manageable in the institution. Let’s say, in future we no longer have physical records, we should have records manager that can handle digital or electronic records efficiently and able to assist in anything related to records and data in the institution.’

Informant C also have same perspective on how important records professional in managing big data. Here below the response:

So pada saya records professional dia datang dulu lah daripada yang lain. Kalau you tak maintain record dengan betul, dia tak park data dia dalam flow

yang betul dia akan menyesatkan perjalanan semua perkaralah. Itu pandangan saya lah.'

(So, for me the records professional come first than others. If you do not maintain records correctly, the data will not be in the right flow. It will mislead the journey of everything. That's my view)

Informant C also believes that managing big data is just not responsible and needs to be handled by records professionals but every person in the organization also needs to play important roles in managing big data especially roles from the top management. Here below perspective from Informant C:

'Okay , pada saya semua pihak dalam organisasi. Kalau bercakap dalam context IT dia akan jadi tugas jabatan teknologi maklumat atau ICT division. Tetapi, sekiranya organisasi tersebut sangat besar, melibatkan data yang berjuta, millions of record, you need to have your data warehouse team you yang sendiri. Mungkin 5-10 org untuk handle data-data macam ni. Pada saya dia tidak tertakluk kepada individu saja, dia tertakluk kepada topdown punya approach. The top must understand records management ni important.'

(Okay, for me all parties in the organization. If speaking in the context of IT, it is under the information technology department or ICT division. But, if the organization is huge, involving millions of records, you need to have your data warehouse team. Maybe 5-10 people to handle data like this. In my opinion, it is not subject to the individual, it is subject to the top-down approach. The top must understand that records management is important.)

Through responses from all informants, we can conclude that records professionals and everyone in the organization that handles the data are really important in managing big data. All people in the organization especially the records professional need to know their roles and understand well what to do in dealing with data.

4.2.8 Integrated Interpretation of Informants' Perspectives on Records Management and Big Data

This section synthesises the findings from Sections 4.2.1 to 4.2.7, providing an integrated interpretation of informants' perspectives on the role, relevance, and applicability of records management practices in managing big data within organisational contexts.

Across all informants, a consistent understanding emerges that while big data and records management are conceptually distinct, they are closely interconnected through the processes of data control, structuring, and preservation. As highlighted in Section 4.2.5, big data is primarily viewed as a large and complex collection of data, whereas records management is concerned with the systematic governance of that data once it becomes meaningful and valuable to the organisation. This indicates that records management operates as a governance layer within the broader data ecosystem.

Furthermore, findings in Section 4.2.6 demonstrate that records management standards, particularly ISO 15489, are perceived as relevant and applicable in supporting the management of big data. Informants consistently emphasised the importance of structured procedures, standardisation, and compliance in ensuring that data remains organised, accessible, and reliable. However, it is also evident that records management alone is not sufficient to address all dimensions of big data, particularly technical challenges such as data volume and velocity.

The role of records professionals, as discussed in Section 4.2.7, further reinforces this perspective. Rather than acting as direct handlers of large-scale data processing, records professionals are positioned as facilitators of governance, responsible for establishing policies, ensuring compliance, and managing the lifecycle of records. At the same time, the findings highlight the importance of organisational-wide responsibility, including collaboration across departments and strong top management support, indicating that effective big data management requires a holistic and integrated approach.

When interpreted through the lens of the 10 V's of big data, the contribution of records management is particularly evident in addressing elements such as veracity,

value, and validity, by ensuring that data is accurate, structured, and trustworthy. However, elements such as volume and velocity remain largely dependent on technological infrastructures and data management systems. This reinforces the view that records management should be integrated with other organisational and technological capabilities to effectively manage big data.

Overall, the findings suggest that records management standards provide a strong foundational framework for governing organisational data within big data environments. Their effectiveness, however, depends on consistent implementation, organisational awareness, and integration with broader data management practices. These insights directly support the research objective by demonstrating that while records management alone may not fully address all aspects of big data, it plays a critical role in ensuring the structure, control, and reliability of digital information within organisations.

4.3 Summary of Informants' Perspectives

This study has presented the findings derived from the qualitative analysis of data collected from the informants, focusing on their perspectives regarding the role and applicability of records management in managing big data within organisational settings. Through a structured thematic approach, the chapter examined key areas including the understanding of big data, the role of records management practices, the relationship between records management and big data, and the responsibilities of records professionals in this evolving environment.

The analysis demonstrates that while big data and records management are conceptually distinct, they are closely interconnected in practice. Informants consistently indicated that records management functions as a mechanism for organising, controlling, and preserving data once it attains value within the organisation. In this regard, records management provides a structured approach that supports the governance of digital information, particularly in ensuring that data remains accessible, reliable, and compliant with organisational and regulatory requirements.

In addition, the findings reveal that records management standards, particularly ISO 15489, are perceived as relevant in supporting the management of organisational data within big data environments. Elements such as standardisation, lifecycle management, and procedural control were frequently highlighted as critical in maintaining the integrity and usability of records. However, it is also evident that

records management alone is not sufficient to address all aspects of big data, especially those related to technical dimensions such as data volume and processing speed.

The role of records professionals emerged as an important theme throughout the findings. Rather than acting as direct handlers of large-scale data, records professionals are positioned as facilitators of governance, responsible for establishing policies, ensuring compliance, and guiding organisational practices related to records. At the same time, the findings suggest that effective data management requires a broader organisational commitment, including collaboration across departments and support from top management.

When viewed in relation to the characteristics of big data, the findings suggest that records management contributes most significantly to ensuring data quality, reliability, and value. This highlights the importance of integrating records management practices within broader data management frameworks to address the increasing complexity of digital information environments.

Overall, the findings of informants' perspective provide empirical support for the study by demonstrating that records management plays a critical role in supporting the governance of organisational data in the context of big data. These insights form the basis for the subsequent chapter, which further examines how records management standards can be applied and adapted to enhance the management of big data within organisations.

Based on these perspectives, it is essential to further examine which specific elements of records management standards are perceived as suitable in managing big data. The following section analyses these elements in detail based on informants' responses.

4.4 Records Management Elements for Managing Big Data

This section further analyses specific elements of records management standards, particularly ISO 15489-1:2016, to determine their suitability in managing big data. It will further analyze what challenges these elements can tackle from the various V's of big data. In this research, all empaneled informants suggested what could be the relevant components of records management standards that can help in handling the intricacies of big data management in regard to the five Vs of big data as volume, velocity, variety, veracity and others.

The results showed that, as with big data, previously set elements of records management standards can be used, but only to a limited extent. These factors will be examined in further detail in this chapter with an emphasis on their relevance to the management and preservation of big data challenges. Also, some of the elements which were said to be more complementary to the big data scenario include expertise in data governance, metadata management and practices involved in digital preservation, etc.

In contemporary data environments, metadata plays an important role beyond traditional records description. With the increasing use of artificial intelligence (AI) and machine learning (ML), metadata supports data classification, organisation, and decision-making processes. Well-structured metadata improves data discoverability and interoperability by providing meaningful context to datasets. In the context of big data, metadata also contributes to data veracity and governance, which is consistent with the principles outlined in ISO 15489.

The section takes an innovative stance on discussing the existing records management standards, identifying their weaknesses, and through this analysis addressing their inability to manage big data adequately. Using the reviewers' responses, this chapter will highlight those portions of records management that will be needed to be amended or improved towards facilitating big data management practices.

This section also serves the purpose of showing the practitioners in the domain of records management how they can effectively modify their controls to make themselves fully suited for the era of big data by relating the views of informants to bigger concepts of records management and big data.

4.5 Elements in Records Management that Suitable in Managing Big Data

ISO 15489-1:2016(E) is selected as the baseline standard because it provides a holistic approach to Records Management Practices. Indeed, this standard was picked because it is widely used in the field of practical record management and it contains primary components that are cited within other frameworks for the management of records as well. These components are as contained in iso 15489-1 2016 E believed to be able to address a number of facets of Big data Management.

In Chapter Three, eight (8) key components structured around the ISO 15489 1 2016 E standard were elaborated in depth. Such components constitute the foundation upon which the practices of records management examined in the present study. All the informants were expected to respond with their understanding of the management of big data by linking it to applicable strategies of each of the above and their answers form part of the concluding analysis and results of this inquiry.

This study comprises the following components:

Creation: The ability to create records which in the case of big data may be getting access to numerous data from various points of origin.

Capture: This is the process of getting and presenting information with the aim of keeping its integrity over a long period of time.

Classification and Indexing: Compiling files into subcategories and an in-depth index which promotes easy retrieval and management, and is necessary for extensive data sets.

Access Control: Implementing protocols that allow only specific users the permission to view or alter records, especially when it comes to sensitive big data.

Storing Records: Keeping records safe using the appropriate storage methods, eg: cloud databases or less remote options, ensuring data continues to be safe and obtainable in future years.

Use and Re-use: Planning out how records are used, re-used so that data is not only available but is put to good use especially in ever changing big data scenarios.

Migration/Conversion: Moving within or from converting one type of record to a different one as it is to be expected that big data systems will change and diversify from time to time.

Disposition: The act of keeping or shredding documents permanently and securely when there is no further use for them cutting across the versatility of dealing with big amounts of data that have outlived usefulness.

The following sections will focus on the informants' narratives regarding each record management element and analyze them. Such responses will clarify what aspects of records management are better suited for big data management and pinpoint places that require improvement so that the issues connected with big data are better resolved. The study works towards addressing these principal aspects and endorsing ways to change conventional records management approaches to suit the present day requirements of big data.

4.5.1 Creation Element

This finding directly relates to earlier discussion in Section 4.2.1 and 4.2.3, where informants highlighted issues of increasing data volume and uncontrolled data generation. The 'creation' element therefore plays a critical role in controlling data production at the initial stage.

To know if the '**creation**' element in records management is suitable or not in managing big data, each informant was asked about their view and understanding of this 'creation' element. Here below, the answer from Informant A:

'I think, it is about describe what data should be created or not created. Maybe, there are certain requirements to say that "only create the data, and need this criteria". If not have this criteria maybe ignore or do not create. Something like that.'

In perspective of Informant A, 'creation' element is about creation of data, which is either to create or not depends on certain criteria. Following up with a question on which elements in big data V's that that can be manage by 'creation', Informant A direct stated it will helps in managing **volume** and **velocity**:

'Yes creation can manage volume and velocity.'

Informant A, also been asked on which others big data V's that can be manage by 'creation' element and here below is the answer:

'Maybe "Value" is bit difficult, but I guess could be a roles there. Maybe whether it can be create or not, then you need to know it is valuable. But, you might know it is valuable until you have all the processes and then can use it. So, maybe that's will be difficult one to use.'

Based on above statement, Informant A believes that creation element also can help manage **value** of data by identify the documents have value or not before decide to create it.

Next, Informant B believe that 'creation' element need to have objective in order to arrange the data and to decide the data need to be create or not as per below:

'Okay, kalau dari creation kita kena ada objektif lah, contohnya kita kena decide nak buat apa dengan data tersebut. Maknanya, apa yang tak perlu awal-awal kita dah buat cleansing ke. So, based on objective dan kita akan decide. Creation ni adalah level yang whoever yang create, dia akan ada objective create. So, dengan those objective, kita tahu data tersebut berapa besar kita nak pergi. I think that is very important part. If dari awal tak betul sampai ke hujung, kita mungkin akan dapat data yang terlalu overwhelming lah'

(Okay, the creation needs to have an objective, for example, we have to decide what to do with the data. It means, what is not necessary we have already done cut in the beginning. So, based on objective we will decide. This creation is a level where whoever creates need to have objectives of creating. So, with those objectives, we know how big the data we want to create. I think that is a very important part. If it is not correct from the beginning to the end, we may get data that is too overwhelming.)

Informant B, also believes that creation elements can help in control the volume and velocity of data:

'Yes betul creation need for volume and velocity.'

(Yes, correct creation is needed for volume and velocity)

Informant C also believes that creation elements is important in managing big data V's:

'Berkenaan dengan 6.6 can the creation element help in managing big data V'?. Yes, such as volume and velocity, yes sure. Creation ni the first thing yang akan membuatkan big data punya volume ni tinggi kalau tidak dihandle dengan baik lah.'

(With regard to 6.6 can the creation element help in managing big data V's ? Yes, such as volume and velocity, yes sure. Creation is the first thing that will increase the big data volume if it is not being control.)

Based on the above, informant C also believes the creation element can manage big data V's which are volume and velocity. Informant C also thinks that the creation element can help in managing the '**Value**' of data as per below statement:

'saya rasa untuk creation, bila kita create record ni pertama kita tengok volume of record itu akan ada. Paling penting bila record tersebut kita create, value dia apa? Pada saya bila satu-satu rekod tu dicipta, it must have a value. Apa value dia bila kita create. Kalau tak ada value buat apa kita create?.'

(I think for creation, when we create records, the first thing that we look at is the volume of records that have. The most important thing is when we create the record, what is the value? In my opinion, when a single record is created, it must have a value. What is the value when we create? If there is no value, why do we create it?.)

Based on the above this research identifies the '**creation**' element is suitable and can manage big data V's which are **volume, velocity, and value (3 V's)**.

4.5.2 Capture Element

The **‘Capture’** element is one of the elements in records management that may be suitable for managing big data. To know the suitability, each informant was asked about the capture element. In this analysis, there are no clear answers from informants on the capture. Here below is one of the statements from an informant in this research.

‘Probably nothing. Because “capture” sounds like “creation” to me. So, I must not be understand on something nor the different between creation and capture. So, I do not know the differences.’

Based on the above we can see that the capture element is not suitable for managing big data.

4.5.3 Classification and Indexing Element

All informant was asked about their view regarding the **‘classification and indexing’** element and whether the element is suitable or not in managing big data. Here below response from Informant A:

‘Classification I think is like tagging the data with some kind method data to said that.. maybe if you have bunches work of pages, you may have a tag to say that this is name, like somebody name and then the work will be classify under the “name” column for example.’

‘I am trying to thinking in term of if there are big data sets and I need to tag then I will be able, easier to manage the variety. I mean you have data sets right, so if I can group them then I can looked that group and will be less variable. Like I have all the name together, all addresses together, zip code together, country together. So I will be able to reduce the variation at least in that group. So that’s were I come to the conclusion, maybe variety make sense but, variability sounds similar to variety’

Based on the above, informant A justifies that classification is like tagging and classifying the data. Informant A also believes that having classification and indexing, this element will help to group the variety of data and reduce the variation of data by having a specific group for each data. From this, informant A believes, this element can help and is suitable for managing 'variety' data.

Informant B also have the same view on classification and indexing that suitable in managing big data. According to informant B this element can help classify and group the data as below:

'Okay, for classification dan indexing yang saya nampak adalah you mudah untuk refer kemudianlah. You tahu dekat mana, mungkin you classkan ikut taxonomy yang you pakai dan bersesuaian. So, dalam itu senang kita tengok kalau dah classified kan. Data ini dekat mana datangnya, its about admin ke, its finance ke, asset ke, human resource ke. Jadi kita tahu data tadi nak groupkan dekat mana, index dekat mana, taxonomy mana yang digunakan sebab selepas ini data akan di dispose kemudian. So, if you rightly put together, kita akan senang nak dispose.'

(Okay, what I can see classification indexing will help data to be referred to in the future. You also can know where is the document by classification based on suitable taxonomy. So, we can see if the data is classified. Where the data sources such as admin data, finance data, or human resources data. Therefore, we can know how to group the data, index, and what taxonomy to use because after this the data will be disposed of. So, if we put everything in right, it will be easy to dispose of the data rightly.)

Based on the above, informant B believes classification and indexing elements are suitable in managing data by grouping a variety of data that will help the data to be referred in the future and ease the process of disposal. This showed that, this element is suitable in managing big data v's which is 'variety'.

Same goes with informant C that believe the classification and indexing element is important. The informant C also direct stated it suitable in managing variety of data after been asked on this element:

'Yes, dia boleh handle variety of data. Sebab secara keseluruhannya yang awak tunjuk tadi kita nampak, kepentingannya.'

(Yes, it can handle a variety of data because as overall what you showed earlier we see, the importance).

Through explanation from each informant, all informants agreed that the classification and indexing element is suitable in managing big data V's which is **'variety'**. This finding supports the issue discussed in Section 4.2.2, where unstructured data and data variety were identified as major challenges in big data environments.

4.5.4 Access Control Element

In this research, all informants also were asked on their view regarding **'access control'** element. Based on interview, all informants believe this element suitable in managing big data V's which is **'value'**.

'Yes okay. Let's said I have valuable information but only one person have access then it is less reliable to the company because, the people that can use the data don't have access to it and I guess on others way, if I have the value data and everybody have access then the information can lead uncontrol I believe. Maybe. So, it is like, business critical information and everybody have access to that, then maybe there are risks we will lost some competitive edge. So yes, I see that there are value on access control.'

Based on the above, we can see that the access control element is suitable for managing the **'value'** of data by having access control over the value of data. This is also supported by Informant B as per the below statement:

'So, Access control come to that basic so bila kita classified and index, kita letak sekali security measure dia. Siapa yang boleh access, siapa yang boleh tengok, and dia classified as public ke, confidential ke, kita classified masa itu. Siapa boleh tengok dan tak boleh tengok dan dia bukan based on value tapi based on sensitivity of the data itu sendiri.'

(So, Access control comes to that basic when we classify and index, we put a security measure on it. Who can access it, who can see it, and whether it was

‘classified as public or confidential, we classified at that time. Who can see and who cannot see, and it is not on value but based on the sensitivity of the data itself’

As per a statement from Informant B, access control elements need to have security measures and only certain people can access it based on the sensitivity of the data which can protect the value of the data itself.

Same goes with Informant C, that also think access control is important in managing big data:

‘Dan ya ini yang paling penting yang saya pun selalu tekankan kepada staff saya is access control. From my understanding access control is very crucial lah. Sebab tak semua orang boleh tengok data ni. Macam contoh dekat site saya, bila saya buat project dengan client saya, ada certain data yang kita tak boleh tengok. Maknanya access control tu kena ada. Sangat penting bila kita berurusan dengan big data ni lah.’

(And yes, this is the most important thing that I always emphasize to my staff is access control. From my understanding access control is very crucial. Because not everyone can see the data. As an example during at site, when I do a project with my client, there is certain data that we cannot see. It means that access control must be there. It is very important when we deal with big data.)

Based on above statement from Informant C and others informant we can conclude that access control is suitable in managing big data. This also aligns with findings in Section 4.2.3, particularly concerns related to data security, control, and trust in IoT-driven environments.

4.5.5 Storing Records Element

‘**Storing records**’ is also one of the elements of records management that this research wants to see whether it is suitable or not in managing big data. Therefore, all informants were asked about their views regarding the ‘storing records’ element. Here below is a statement from Informant A:

‘Well, if you not storing records, I guess you might have trouble affecting the value.’

Based on the above, informant A believes that storing records is important to manage the value of data. This is also supported by Informant B who also thinks storing records is important in managing big data V’s which is the value of data:

‘Storing of data itu memang pentinglah. Kita memang kena store data tersebut sebab later kita nak refer pada data tersebut. Sebab itu kita simpan and it depends on Value and others V dan dia relate semua tu. Dia akan store based on that value. Melalui value ianya dapat kenal pasti berapa tahun kita dapat simpan, berapa tahun nak capture.’

(The storing of data is indeed important. We need to store the data to refer to the data in the future. That's why we keep the data and it depends on Value and others V. The data will be stored based on that value. Through value, we can know for sure how many years we can save and capture it.)

As stated by Informant B, the storing records element is important in managing big data V’s by keeping data that have value only. This is also supported by Informant C that storing records is important in managing value of data as per below:

‘Storing record yes sure very important in managing value of data’

Based on statements from each informant, this research can conclude that storing records element is very important and suitable in managing big data V’s especially related to ‘**value**’. Vasilopoulou et al (2023), also believe that storage is an important element where data needs to be stored securely and ethically to avoid

serious consequences such as losing customer trust, the negative effect on a company's reputation, and legal liability.

4.5.6 Use and Re-Use Element

Each informant in this research also was asked regarding 'use and re-use' element to see either this element suitable or not in managing big data. In this analysis, there are no clear answer from informants on use and re-use element that can conclude this element is not suitable in managing big data.

4.5.7 Migration / Conversion Element

In this study, each informant also has been asked whether the 'migration/conversion' element is suitable or not in managing big data. Here below response from informant A:

'Yes. Maybe variety. Because I guess it also determine like if I want to create data, and migrated, I probably choose not to migrate all data, maybe I just want to create and migrate the name, the rest maybe nothing or me maybe I want to migrate all the data sets. So, that want I can understand. I guess yes that's important and suitable.'

Based on the above, Informant A believes that migration/conversion is suitable for managing big data by choosing which data needs to migrate instead of migrating all the data sets. The same goes with Informant B who also has the same opinion about the importance of this element:

'Okay untuk migrate, for sure we need to migrate as much as possible record to electronic untuk memudahkan kita refer kemudian. So, dia kena banyak migration to that level lah. Kita, in the institution kena ada objective berapa percent record kena ada dalam electronic format. Yang itu kena adalah dan also ianya akan help untuk kita dispose kemudianlah. So, bila record dalam keadaan digital atau electronic kita senang nak setkan berapa tahun dia nak simpan.'

(Okay for migration, of course, we need to migrate as many as possible records to make it easier for us to refer later. The institution must have an objective of

how many percent to keep records in electronic format. It is needed and it will us to disposed of later. So when the records are in digital or electronic format, it will be easy to assign how many years we want to keep it.)

According to informant B, the migrate/conversion element is needed to allow records or information to be transferred in electronic format. This will help to identify how many years the variety of information needs to be kept until the organization decides to dispose of or keep it.

Next, move to the Informant C, that also believe migration/conversion element is important in managing big data especially the variety of data as per below:

'Did you believed that the migration/conversion element is important and suitable in managing big data V's which is variety and why? Yes. Migration /conversion. Bila you convert of course la daripada data yang banyak , jenis variety you kena convert untuk fit dia. Dia memang sangat penting dan sesuai untuk managing big data. Sebab kalau tak ada conversion might be certain conversion tak boleh run la. Sebab solution berbeza-beza dekat luar. So kalau you tak ada ability untuk convert the data itself, so pada saya benda tu tak akan berjalan lah'.

(Did you believe that the migration/conversion element is important and suitable in managing V's big data which is variety and why? Yes. Migration/conversion. When you convert a lot of data, you need to know the variety of data types that need to fit in. This element is very important and suitable for managing big data. Because if there is no conversion, there might be certain conversions that cannot be run. Because there are various solutions and if you cannot convert the data itself, it will not work.)

'Migration and conversion sangat penting sebab sometime the compatibility of system dia perlukan conversion of data.'

(Migration and conversion are very important because sometimes the compatibility of the system needs conversion of data.)

Based on the statement from Informant C, the informant believes that the migration/conversion element is important in managing a variety of data by

having proper conversion that is suitable for various data and fits in the compatibility system in the future.

Through this element and the view from each informant, this study believes that the migration/conversion element is important and suitable in managing big data V's especially the '**variety**' of data.

4.5.8 Disposition Element

In this study, the final element in records management that need to know is suitable for managing big data is the '**disposition**'. With the same process, each informant was asked about their view regarding this element and its suitability in managing big data. Based on the below, informant A believes this element is suitable for managing big data:

'Yes, I think yes. It is suitable. Because, if I kept the data forever, I won't have any more space because the volume will be too great. So, just I can't keep paper records forever because my flat will fill up with papers. I need to eventually have a certain times interval that make sense to the organization in order to dispose of that records. So, that is clear to me'

Based on Informant A, the disposition is suitable for managing the '**volume**' of data. This also can be seen from the view of Informant B who also has the same opinion as per below:

'So, disposition punya exercise dia tak akan berhenti, dia akan ada sepanjang dalam simpanan kitalah. Until at last, kita rasa kita tak perlu simpan lagi, value dia dah berkurang, tak ada historical value, legal value, tak ada value lain yang kritikal, kita mungkin boleh decide untuk destroylah. Kurangkan physical document dalam kita punya storage and kita mungkin electronickan dia, simpan dalam bentuk electronic lah'.

(So, the disposition has exercise, it will not stop and will be there as long we keep information. Until at last, we do not want to save it anymore, the value also decreases which is no more historical value, legal value, and there is no other critical value. Therefore, we may decide to destroy it. Disposition can reduce the physical document stored in storage and also can keep it in electronic form.)

Based on above, informant B believes the disposition element is important in managing big data in term of **‘value’**. Informant C also believe the disposition element is also suitable in managing big data as per below:

‘Saya rasa disposition ni benda yang penting dan perlu hati-hati untuk diuruskan. Then i believed the standard must indicate apa yang perlu dibuat untuk dispose activity’.

(I think this disposition is an important thing and needs to be carefully managed. Then I believed the standard must indicate what needs to be done in terms of disposition activity.)

‘so bila data dah terlampau banyak, of course numbers, space, akan start spike so memang kena ada lah. In term of volume lah memang dia suitable lah’.

(so when there is too much data, of course, numbers, and space, will start to spike so it has to be there (disposition). In terms of volume, indeed it is suitable.)

Through explanation from each informant, this study can conclude that the disposition element is important and suitable for managing big data V’s especially **‘volume’** and **‘value’**. This also reflects earlier findings in Section 4.2, where excessive data volume and redundancy were identified as key challenges which needs records management as a tools to control it.

4.6 The Important Elements in Records Management that Suitable in Managing Big Data

Through this study, each informant was asked which element in records management needs to be seen first and important among others element in records management. Here below is an explanation from each informant:

‘I think, access control, creation. Okay yes maybe access control and creation. I think it is around the security and misused of data will be mild’.

Based on the above, informant A believes that access control and creation are the most important elements in managing big data. Informant A also further explains on creation element below:

'I think, in term of volume and velocity. So, don't create data for absolutely everything'.

Informant A believes that access control can help in managing big data by having security or access level to the use of data and the creation element can manage the volume and velocity of big data by not creating all data.

Next is informant B, that also believe creation element is the one that need to be see first and important in managing big data as below:

'I think, kalau tengok cycle yang ada, I think 'creation' is very important lah. Creation punya area ya, belum lagi tengok V semua. Creation itu penting sebab akan determine semua apa yang you nak buat.'

(I think, if you look at the existing cycle, I think 'creation' is very important. Creation area and not others V yet that we can see. Creation is important because it will determine everything that you want to do.)

Lastly is informant C believe that access control that should be in first place and suitable in managing big data same as Informant A that also have the same view. Here below statement from informant C:

'Saya pilih access control dulu. Saya nak ada kebenaran utk create record sebab bukan semua orang boleh create record ni. Jadi saya pilih yang paling penting teratas adalah access control. Bukan creation'.

(I choose access control first. I want permission to create a record because not everyone can create a record. So I chose the most important top is access control. Not creation)

Following up questions the reasons of choose this element as the first element, here below the response:

'sebab bila saya tengok access control and, even access untuk create record itu sendiri pun kena ada kebenaran. Begitu boleh tak? Sebab ini level of access

control yang saya faham. Sebab tu saya letak access control di atas. Siapa dulu yang boleh create record.'

(because when I look at access control and, even access to create the record itself must have permission. Is that possible? Because this is the level of access control that I understand. That's why I put access control on top. Who was the first to create a record.')

Based on explanation from each informants, 'creation' and 'access control' is the most important element in records management that is suitable in managing big data and need to be in top.

4.7 Integrated Discussion of Findings

This study demonstrates a clear integration between informants' perspectives and the applicability of records management elements in managing big data.

Findings in Section 4.2 revealed that key challenges of big data are associated with volume, variety, velocity, and veracity. These challenges are further addressed through specific records management elements discussed in Section 4.5.

For instance, the creation and disposition elements contribute significantly to managing data volume, while classification and indexing address issues related to data variety. Similarly, access control supports data value and security, aligning with concerns related to trust and data protection highlighted by informants.

However, not all elements demonstrate equal relevance. Elements such as capture and use/re-use were perceived as less applicable, suggesting potential gaps in practical implementation or understanding within organisational contexts.

These findings indicate that while ISO 15489 provides a strong foundational framework, its application in big data environments requires adaptation and integration with broader data governance and technological systems.

Overall, records management functions as a governance mechanism that supports data control, structure, and reliability within complex big data ecosystems.

4.8 Chapter Summary

Overall, the findings indicate that the elements of ISO 15489 provide a structured approach that supports the management of key big data characteristics, particularly in relation to data organisation, control, and governance. While these elements do not directly address all technical aspects of big data, they contribute significantly to managing dimensions such as volume, variety, and veracity through systematic records management practices.

This demonstrates that records management standards can be aligned with broader data handling processes, supporting organisations in managing data throughout its lifecycle in a controlled and structured manner.

CHAPTER 5

DISCUSSION OF EMERGENT ELEMENT IN MANAGING BIG DATA

5.1 Introduction

While conducting the interviews, several new aspects were discovered which could be of critical importance in the handling of big data. These aspects were not included in the conventional Records Management policies and practices but were suggested by the informants due to their competence and experience in dealing with big data issues. Every single one of such emergent elements has been acknowledged to possess great importance in the resolution of the peculiarities involved in the domain of big data management.

These emerging elements also fit the purpose of this research because they provide additional principles and techniques for the handling of big data in the scope of records management. The data collected from the informants argue that some forms of practices or factors even when they do not fall under the conventional records management standards are important in addressing the issues that come with big data.

The invention of these triggering components will greatly affect the formulation of the final framework of this study. These new elements, as the study matures, will be integrated into the conceptual framework which will further facilitate the research to solve the vast needs of big data management. They will refine the scope of records management practice in meeting the specific needs of big data and hence ensuring that the final framework is sufficiently broad and practical in addressing the future needs of evolving technology.

The research tackles therefore more relevant issues by introducing these triggering elements, and seeks to provide better and more flexible management of big data that offers a recommendation framework and guidelines for use across multiple sectors and contexts.

5.2 Emergent Element in Managing Big Data

In Chapter Five, a comprehensive discussion is provided on all elements of records management, with a focus on assessing their suitability for managing big data. Each element was carefully evaluated to determine its effectiveness in addressing the unique challenges posed by big data. The elements found to be suitable for managing big data will form the final results of this research and will contribute significantly to the proposed guidelines for managing big data in the context of records management.

In addition to the elements outlined in the ISO 15489-1:2016(E) standard, several emergent elements were identified during the interviews with the informants. These new elements were not initially considered part of the standard records management framework but were suggested by the informants based on their experiences with big data management challenges. These emergent elements include:

1. **Procedure:** Clear and standardized procedures for handling big data, ensuring consistency and efficiency across different stages of data management.
2. **Objective:** A defined and strategic approach to managing big data, focusing on specific goals such as data accessibility, security, and retention.
3. **Knowledge:** The need for specialized knowledge in managing big data, including technical expertise and an understanding of data governance principles.
4. **Administrative Value:** The importance of recognizing the administrative significance of big data, ensuring that data serves its intended organizational purposes while adhering to regulations.
5. **Historical Value:** Understanding the long-term importance of preserving big data for future reference, including its potential use for historical research or analysis.
6. **Financial Value:** Acknowledging the financial implications of managing big data, such as costs associated with storage, processing, and compliance.
7. **Legal Value:** The need for strong legal frameworks to ensure that big data is managed in compliance with relevant laws and regulations, particularly regarding data privacy and security.
8. **Roles of Records Professionals:** The evolving role of records management professionals in the big data landscape, highlighting their responsibility in ensuring data is managed effectively throughout its lifecycle.

These newly identified elements can be categorized as general factors that will enhance and support the established records management guidelines for managing big data. By integrating these emergent elements into the final framework, this research aims to provide a more comprehensive and holistic approach to records management in the context of big data. These elements will serve as critical considerations in the development of practical guidelines that can be applied in various organizational settings to improve big data management practices.

5.2.1 Procedure Element

The ‘**procedure**’ element was found in this study during an interview with informant A who believes procedure is an important thing and suggests each organization to focus on having procedure first before enhancing the practices in managing and controlling big data. The records management procedure is one example that needs to be focused on first. The procedure needs to be setup properly in the organization before each team in the organization can follow and practice it. Here below statement from informant A regarding the ‘procedure’.

‘I can conclude a conclusion on records management professional, focusing around procedure rather than hands-on and analyses every pieces of data. That will definitely huge organization.’

Based on above the informant A suggests the records management professional focus first on developing proper procedures before the hands-on on managing big data. Informant A also emphasized that, once the procedure was set properly, each team in the organization could know how to manage the data and also have good personal distributed practices on big data:

‘So, I guess it is probably distributed practices when individual people managing data that comes to their project. So, if I handle the project and lets said I need some data from customers, maybe that data is huge it can be called as big data. I might bring the customers data to the organization and I will not hands over it to someone to manage it for me. It’s my project, so I will manage the big data or data.’

Through the explanation above from informant A, we can see that the ‘procedure’ element plays an important role that will help in educating each team in the organization in terms of properly managing data.

5.2.2 Objective Element

In this study, the informant B also emphasize that each organization need to have an ‘**objective**’ as element that will help in managing big data. Here below statement from informant B:

‘But, you must have your own objective. Kalau tak ada objective, you tak tahu apa you nak create. Sebab elemen of objective you tak letak dalam structure ni lah. Sebab dengan objective, you tahu apa nak buat. Jadi, if education punya based, so kita tahu semua ni lah. If you letak objective, you tahu apa yang perlu dan tak perlu. Data mana perlu dan tak perlu. Lepas itu analysis berapa ketara yang kita kena buat based on objective yang kita ada lah. And it is start with creation . Dia start dengan creation dan yang lain akan ikutlah.’

(But, you must have your objective. You will not know what to create if you do not have an objective. Because the element of objective is not placed in this structure and with objective, you know what to do. On an educational basis, it will have all this. If you put objective, you know what is necessary and not necessary. After that, to know how significant is the analysis we must do based on the objective. Then, it will start with creation. Starting with creation and the other elements will follow.)

Based on the above, informant B suggests having an objective in creating data. If the person or organization does not have an objective, they will not know the reasons for creating the data, where is the location of data that needs to be kept, and how much data needs to be created. Therefore, having an objective is an important thing before every organization decides to create any data.

5.2.3 Knowledge Element

Another emergent element in this research based on interview with informants is the ‘knowledge’. In this research, the informant B emphasize and believe knowledge or education is needed to manage the big data. Here below statement from informant B:

‘But, this one different sebab education penting untuk kita faham semua, but untuk kita make decisions, sometimes kita kena buat sekali terus, kita combine ke atau kita adjust dia punya process ke. Mana boleh buat dulu dan ke depan, so this one based on experience and based on “theme” yang ada dalam itu] but macam saya cakap earlier tadi, education punya you mesti tahu, dia kena this element, discipline, dia akan help you on those project nantilah.’

(But, this one is different because education is important for us all to understand, but for us to make decisions, sometimes we have to do it either once or we combine or adjust it, and it has a process. Anything that can be done we do it first. So this one is based on experience and based on the "theme" or element that have. But, like I said earlier, you must know which element, and discipline needed that help you on the project later)

Based on the above, we can see that ‘knowledge’ is important to understand the element of managing big data and the function that will help in this project. Following up on the question to the informant on how knowledge can work in managing big data, here is the answer:

‘So, kalau you nak validate data itu macam mana. So, process tersebut you kena “master” dulu. You must able know the process macam mana, how to validate those information and data, lepas itu baru kita rasa data itu bersesuaian untuk kita analyse, untuk kita dapatkan information.’

(So, how you want to validate the data, you need to master the process first. You must able to know the process in validating those information and data. After that we can know the either the data is suitable or not to be analyze and obtain the information).

5.2.4 Value Element (Administrative, Historical, Financial and Legal)

In this research, the informant B also emphasize each data should have four (4) element value which are administrative, historical, financial and legal value. This is because the informant B believes, that the data will be more important and need to be keep if it has those value is exist in each data. The informant also believe it can give an impact and contribute in managing big data. Here below statement from informant B.

‘The data that we take should have administrative value, historical value, financial value, legal which is based on the importance of the data itself. I will stick to the NAM (National Archive Malaysia) definition of value covering the data. For us, if people ask us to keep data, we will ask whether your data has historical value or not. Data that have historical value, or legal value, for example, you cannot easily destroy or share. So, those values will make the data become important or not and how long we can keep it.’

‘I mean you mesti simpan based on value yang atas tadi, historical, administrative, legal. So it based on that one. So, that one yang identified berapa lama you nak simpan and if it become record, you need to simpanlah. Ianya tertakluk bawah akta.’

(You must keep it based on the above values mentioned, which are historical, administrative, and legal. The data should based on that one. So, that one will help to identify how long you want to keep the data, and if it becomes a record, you need to keep it. It is subject to the act.)

Based on above explanation and statement we can see that the data that have those values which are the administrative, historical, financial and legal value will give impact to the action or management data by deciding the data needs to be kept or destroy. Only data that have a function or those value need to be keep depends on the act or needs each organization. In summary, those values are important for each organization to evaluate the data where the end can give impact to the big data itself.

5.2.5 Roles of Records Professional Element

In this research, the researcher found out that the roles of records professional is important as general requirement in managing big data. Based on interview with each informants, all of them believe each organization needs to have someone or professional in organization that able in manage the big data.

This can be see under chapter **4.2.7 Perspective Informants towards Records Professional** where we can see statements from all informants that believe each organization need to have records professional or people that dealing with data in managing big data. That persons also need to plays a good roles and understand wells their scope in helping organization in managing the big data.

Based on that, this research believe, roles of records professional or people who dealing with data can be one of general emergent element that will contribute in managing big data.

5.3 Chapter Summary

This chapter has discussed the emergent elements identified from the findings, which extend beyond the existing records management elements outlined in ISO 15489. These elements, including procedure, objective, knowledge, value, and the roles of records professionals, reflect additional organisational and practical considerations required in managing big data environments.

The findings indicate that while ISO 15489 provides a structured foundation for records management, it does not fully address the broader organisational and contextual requirements associated with big data. The emergent elements identified in this study highlight the importance of having clear procedures, defined objectives, appropriate knowledge, and an understanding of data value in supporting effective data management practices. In addition, the role of records professionals remains critical in guiding and ensuring the proper management of data within organisations.

These elements complement the existing records management framework by addressing practical challenges encountered in real-world environments, particularly in dealing with large volumes and diverse types of data. This suggests that managing big data requires not only adherence to established standards, but also the integration of additional organisational and human factors.

In addition, while not explicitly identified as a primary element in this study, interoperability is increasingly relevant in big data environments, particularly with the growing use of artificial intelligence (AI) systems. The ability of systems to exchange and integrate data supports more effective data processing and analysis. This highlights the need for records management practices to also consider system compatibility in ensuring that data remains usable across different platforms.

Overall, the emergent elements identified in this chapter provide important insights that contribute to the development of a more comprehensive framework for managing big data. These findings will be further integrated in the subsequent chapter to support the formulation of practical guidelines for organisations.

CHAPTER 6

DEVELOPING FINAL FRAMEWORK OF SUITABILITY RECORDS MANAGEMENT IN MANAGING BIG DATA

6.1 Introduction

The final framework of the research, which is showcased in this chapter, directly concerns the key aiming of the research which is to establishing applicable guidelines for handling big data through the introduction of pertinent elements into the records management. In the course of the inquiry, it appeared that not all elements of the records management standards are suitable or applicable when it comes to the provision of big data services. Rather, only a limited set of elements are needed for the novel characteristics of big data such as volume, velocity, variety and veracity.

The final framework defined in this study provides a fusion of these crucial elements alongside the new emergent elements that were discovered during the in-depth interviews with the informants. These emergent elements were based on the deep interviews which are the informants testified on big data management practices which were then combined into more traditional ways of doing records management. All these aspects: procedural, administrative, historical, financial, legal etc which were some of the new elements discovered during these interviews continues to be of paramount importance in the management of big data as it continues to evolve.

All of these new aspects, together with the previously discussed elements of ISO 15489-1:2016 (E), create a more adaptable approach to records management of Big Data, which is the primary goal of the study, as it adds more avenues on how to efficiently control big data.

Echoing the details of the previous sections, the combination of emergent and traditional elements in the last framework shows that the management of big data is indeed multifaceted and incorporates both well known standards and something new. It enhances existing best practices for big data management while also being applicable in different settings to enhance organizational and industrial records management practices.

6.2 Early Stage of Research Framework

The process of constructing the framework for assessing the suitability of records management standards in managing big data in multiple case studies within Malaysian organizations follows a structured approach using matrix analysis. This matrix analysis maps out the relationship between the elements of records management standards and the key challenges posed by big data, as identified in the data collected throughout this research.

The initial phase of developing the research framework was presented and explained in Chapter 3, specifically under **Section 3.9** on Matrix Analysis. In this section, the researcher employed critical thinking and conducted surveys, alongside a comprehensive review of the literature, to identify which elements within the records management standards should be explored to determine their applicability in addressing the complexities of big data, specifically the 10 V's. The matrix analysis served as a foundational tool at this stage to create a conceptual framework for the study.

This research focused on eight (8) key elements from the Records Management Standard ISO 15489-1:2016(E) to evaluate their suitability for managing the 10 V's of big data. These eight elements were:

1. **Creation:** The process of generating records that may include new types of data generated in the big data context.
2. **Capture:** The act of acquiring and documenting data for long-term management, which is crucial in capturing diverse big data formats.
3. **Classification and Indexing:** The systematization of records and their metadata, facilitating easy retrieval and organization, which is particularly important for managing the volume and variety of big data.
4. **Access Control:** The implementation of security measures to protect sensitive records, ensuring that only authorized users can access the data, a critical consideration for the veracity and validity of big data.
5. **Storing Records:** Safeguarding records in suitable storage environments to maintain accessibility and integrity, which addresses issues related to the volume and velocity of big data.
6. **Use and Reuse:** Managing how records are accessed and reused, ensuring that valuable big data can be used effectively over time without compromising its quality.

7. **Migration/Conversion:** The process of transferring or converting records to ensure their continued usability and accessibility, especially in the face of rapidly changing technologies, which is necessary for handling the variability and volatility of big data.
8. **Disposition:** The removal or destruction of records that are no longer required, ensuring that irrelevant or outdated big data is managed effectively to reduce risks.

The 10 V's of Big Data, which represent the various challenges associated with big data, are:

1. **Volume:** The large amount of data generated.
2. **Value:** The importance and potential usefulness of data.
3. **Velocity:** The speed at which data is generated and needs to be processed.
4. **Veracity:** The trustworthiness or accuracy of data.
5. **Viscosity:** The complexity and difficulty of extracting value from big data.
6. **Variability:** The inconsistency or unpredictability in data.
7. **Volatility:** The rate at which data loses value or relevance over time.
8. **Viability:** The ability of data to remain relevant and useful over time.
9. **Validity:** The degree to which data is accurate and suitable for its intended purpose.
10. **Variety:** The different formats and types of data.

The matrix analysis, as shown in Chapter 3, visually represents how these records management elements align with and address the challenges posed by the 10 V's of Big Data. This matrix provides a clear framework for assessing which records management practices are most effective in managing big data within the context of Malaysian organizations.

SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: A MULTIPLE CASES STUDIES OF MALAYSIAN ORGANIZATIONS

MATRIX ANALYSIS : THE 10V's OF BIG DATA AND RECORDS MANAGEMENT STANDARD : ISO 15489:2016 (E) (FOR CONCEPTUAL FRAMEWORK PURPOSES)

Date:
7/13/2020

No	THE 10V'S OF BIG DATA	ELEMENTS IN RECORDS MANAGEMENT STANDARD : ISO 15489-1:2016(E) THAT SUITABLE IN MANAGING THE 10V's OF BIG DATA								REMARKS
		CREATION	CAPTURE	CLASSIFICATION AND INDEXING	ACCESS CONTROL	STORING RECORDS	USE AND REUSE	MIGRATION / CONVERSION	DISPOSITION	
1	VOLUME	☒	☐	☐	☐	☐	☐	☐	☒	1. Creation 2. Disposition
2	VALUE	☐	☒	☒	☒	☒	☒	☐	☐	1. Capture 2. Classification and Indexing 3. Access Control 4. Storing Records 5. Use and Reuse
3	VELOCITY	☒	☒	☐	☐	☐	☐	☐	☐	1. Creation 2. Capture
4	VERACITY	☐	☒	☐	☐	☐	☒	☐	☐	1. Capture 2. Use and Reuse
5	VISCOSITY	☐	☒	☒	☐	☐	☐	☐	☐	1. Capture 2. Classification and Indexing
6	VARIABILITY	☐	☒	☒	☐	☐	☐	☐	☐	1. Capture 2. Classification and Indexing
7	VOLATILITY	☐	☒	☐	☐	☐	☐	☐	☒	1. Capture 2. Disposition
8	VIABILITY	☐	☒	☐	☐	☒	☒	☐	☐	1. Capture 2. Storing Records 3. Use and Reuse
9	VALIDITY	☐	☒	☐	☐	☐	☐	☐	☐	1. Capture
10	VARIETY	☐	☒	☒	☐	☐	☐	☒	☐	1. Capture 2. Classification and Indexing 3. Migration or Conversion

Figure 6. 1 Matrix Analysis of This Study Constructed in Chapter 3

Figure 6.1 presents the initial matrix analysis developed in this study, illustrating the alignment between the elements of ISO 15489-1:2016(E) and the 10 V's of big data. The matrix serves as a preliminary conceptual representation of how specific records management elements may contribute to addressing different characteristics of big data within organisational contexts.

The rows of the matrix represent the 10 V's of big data (e.g., volume, velocity, variety, and veracity), while the columns represent the key elements of records management derived from ISO 15489, including creation, capture, classification and indexing, access control, storage, use and reuse, migration/conversion, and disposition.

The check marks (✓) indicate the initial assumptions regarding the relevance or suitability of specific records management elements in addressing particular big data characteristics. The remarks column further highlights the key elements identified as applicable at this conceptual stage.

It is important to note that this matrix represents the preliminary conceptual framework constructed in **Chapter 3**, which guided the data collection and analysis process. Following the empirical findings presented in Chapters 4 to 6, the relationships between elements were further refined and validated. As a result, the final research framework is presented in Figure 7.8, which reflects the updated and empirically supported structure of records management elements in managing big data.

Therefore, **Figure 6.1** serves as a foundational analytical tool that informed the development of the study, while the final framework represents the validated outcome of the research.

The figure below illustrates the conceptual framework (also constructed in chapter 3) that has been adapted for this research, it depicts the interrelationship between records management processes and the relevant aspects interesting for investigation out of the 10 V's of Big Data:

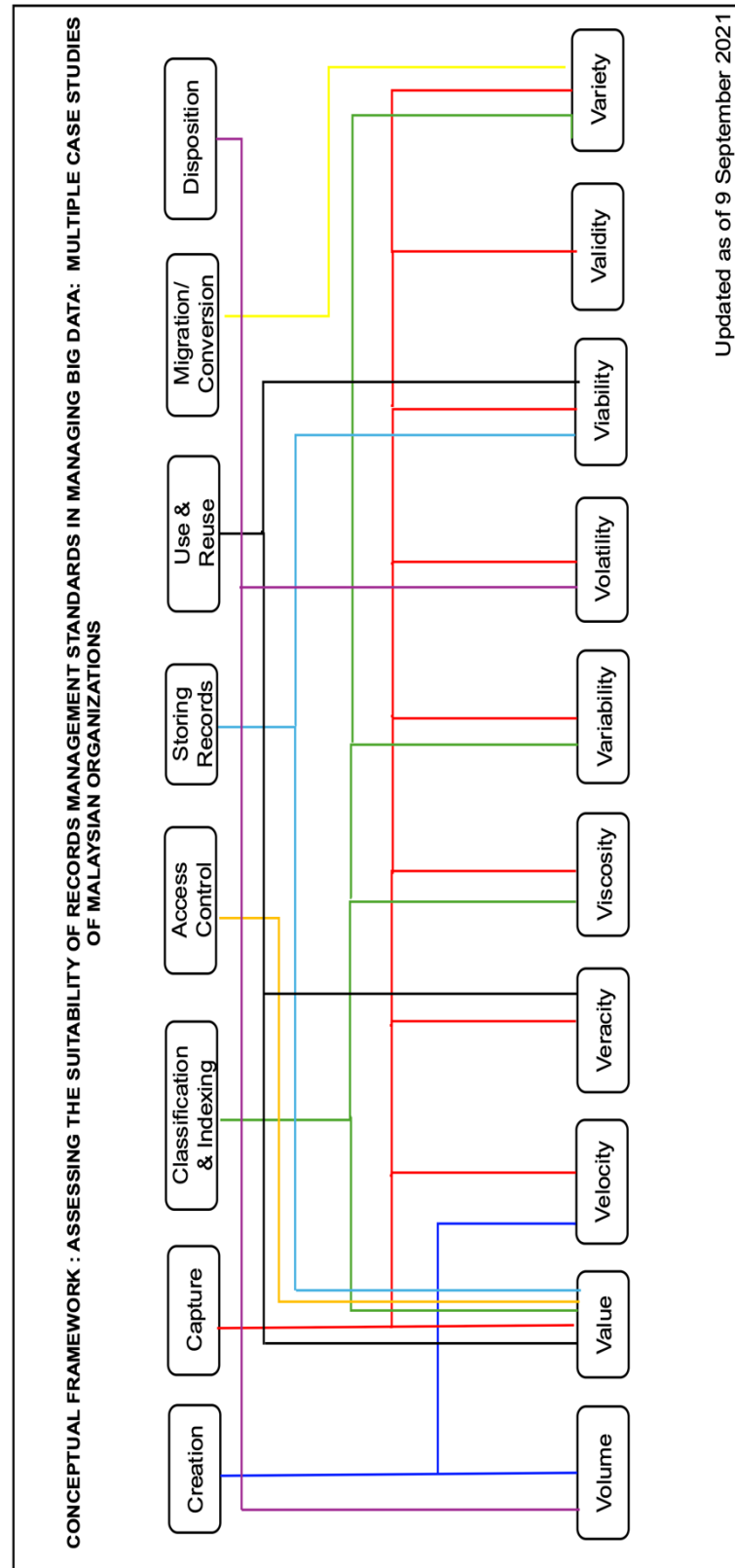


Figure 6. 2 The Conceptual Framework of this Study Constructed in Chapter 3

This conceptual framework was constructed using matrix analysis along with an overall literature review as a basis. Each of the components of the Records Management Standard ISO 15489-1:2016(E) were related to the issues defined by the 10 V's of Big Data. These connections were discussed in more detail in Chapter 3. In that chapter, the researcher reduced each aspect of records management to its basic components and described the purpose for which it was used in relation to the various big data V's.

However, in the framework of this study, changes were made after the data were collected in which deep interviews were conducted with three (3) informants of various organizations. The interviews demonstrated that only certain elements of the records management standard were appropriate for big data management, as the answers of the informants illustrated practical issues and needs to manage big data in the real context of organizations.

As such, in the light of the interview data, changes to the conceptual framework have been made in respect to factors that were determined to be more appropriate to assist in managing the different facets of big data. Hence, such revisions provide a better approach in ensuring that the final framework is more applicable to big data management rather than being solely based on the theoretical literature and on the data collected through the study

6.3 Final Matrix Analysis (Based on Data Analysis)

In this study, three (3) informants from different organizations were interviewed using the conceptual framework described earlier. Based on the data collected from these interviews, the researcher developed a matrix analysis for each informant. This analysis ultimately contributed to the final matrix analysis and the development of a framework for evaluating the suitability of records management standards in managing big data.

Each element of the records management standard, as outlined in Chapter 4, was carefully examined to determine its relevance and effectiveness in the context of big data. The insights gained from the informants played a crucial role in constructing the final framework. The revised framework, which incorporates both theoretical and empirical findings, provides a comprehensive guideline for organizations in Malaysia on how to manage big data using the most suitable elements from records management standards.

This chapter presents the data analysis, which has been transformed into matrix analysis for each informant. These individual matrix analyses form the basis of the final framework. The following sections will explain how each element of the records management standard contributes to the overall framework, providing a detailed guide for organizations to effectively manage big data in line with best practices in records management.

6.3.1 Matrix Analysis of Informant A, B And C

Based on the interviews with Informants A, B, and C, the research found that the elements discussed in Chapter 4 were revised and transferred into matrix analysis. Upon reviewing the responses from the informants, it was determined that, out of the eight (8) elements in the records management standard, only six (6) elements are suitable for managing big data. The following matrix analysis presents the suitability of each element, as evaluated by the informants:

SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: A MULTIPLE CASES STUDIES OF MALAYSIAN ORGANIZATIONS

MATRIX ANALYSIS OF INFORMANT A (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 10V'S OF BIG DATA									
		VOLUME	VALUE	VELOCITY	VERACITY	VISCOSITY	VARIABILITY	VOLATILITY	VIABILITY	VALIDITY	VARIETY
1	CREATION	✓	✓	✓	×	×	×	×	×	×	×
2	CAPTURE	×	×	×	×	×	×	×	×	×	×
3	CLASSIFICATION AND INDEXING	×	×	×	×	×	×	×	×	×	✓
4	ACCESS CONTROL	×	✓	×	×	×	×	×	×	×	×
5	STORING RECORDS	×	✓	×	×	×	×	×	×	×	×
6	USE AND REUSE	×	×	×	×	×	×	×	×	×	×
7	MIGRATION / CONVERSION	×	×	×	×	×	×	×	×	×	✓
8	DISPOSITION	✓	×	×	×	×	×	×	×	×	×

Figure 6. 2 Matrix Analysis of Informant A

MATRIX ANALYSIS OF INFORMANT B (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 10V'S OF BIG DATA									
		VOLUME	VALUE	VELOCITY	VERACITY	VISCOSITY	VARIABILITY	VOLATILITY	VIABILITY	VALIDITY	VARIETY
1	CREATION	✓	×	✓	×	×	×	×	×	×	×
2	CAPTURE	×	×	×	×	×	×	×	×	×	×
3	CLASSIFICATION AND INDEXING	×	×	×	×	×	×	×	×	×	✓
4	ACCESS CONTROL	×	✓	×	×	×	×	×	×	×	×
5	STORING RECORDS	×	✓	×	×	×	×	×	×	×	×
6	USE AND REUSE	×	×	×	×	×	×	×	×	×	×
7	MIGRATION / CONVERSION	×	×	×	×	×	×	×	×	×	✓
8	DISPOSITION	×	✓	×	×	×	×	×	×	×	×

Figure 6. 3 Matrix Analysis of Informant B

MATRIX ANALYSIS OF INFORMANT C (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 10V'S OF BIG DATA									
		VOLUME	VALUE	VELOCITY	VERACITY	VISCOSITY	VARIABILITY	VOLATILITY	VIABILITY	VALIDITY	VARIETY
1	CREATION	✓	✓	✓	X	X	X	X	X	X	X
2	CAPTURE	X	X	X	X	X	X	X	X	X	X
3	CLASSIFICATION AND INDEXING	X	X	X	X	X	X	X	X	X	✓
4	ACCESS CONTROL	X	✓	X	X	X	X	X	X	X	X
5	STORING RECORDS	X	✓	X	X	X	X	X	X	X	X
6	USE AND REUSE	X	X	X	X	X	X	X	X	X	X
7	MIGRATION / CONVERSION	X	X	X	X	X	X	X	X	X	✓
8	DISPOSITION	✓	X	X	X	X	X	X	X	X	X

Figure 6. 4 Matrix Analysis of Informant C

FINAL MATRIX ANALYSIS OF ALL INFORMANTS (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 10V'S OF BIG DATA										REMARKS
		VOLUME	VALUE	VELOCITY	VERACITY	VISCOSITY	VARIABILITY	VOLATILITY	VIABILITY	VALIDITY	VARIETY	
1	CREATION	✓	✓	✓	X	X	X	X	X	X	X	INFORMANT A & C : Volume, Value & Velocity (3 V's) INFORMANT B : Volume, Velocity (2 V's)
2	CAPTURE	X	X	X	X	X	X	X	X	X	X	Not Suitable to use in managing big data
3	CLASSIFICATION AND INDEXING	X	X	X	X	X	X	X	X	X	✓	INFORMANT A, B & C : Variety (1 V only)
4	ACCESS CONTROL	X	✓	X	X	X	X	X	X	X	X	INFORMANT A, B & C : Value
5	STORING RECORDS	X	✓	X	X	X	X	X	X	X	X	INFORMANT A, B & C : Value
6	USE AND REUSE	X	X	X	X	X	X	X	X	X	X	Not Suitable to use in managing big data
7	MIGRATION / CONVERSION	X	X	X	X	X	X	X	X	X	✓	INFORMANT A, B & C : Variety (1 V only)
8	DISPOSITION	✓	✓	X	X	X	X	X	X	X	X	INFORMANT A & C : Volume INFORMANT B : Value (previous not been narrow in conceptual framework)

Figure 6. 5 Matrix Analysis of All Informants (Informant A, B and C)

These matrix analysis provides a clear overview of which elements from the ISO 15489-1:2016(E) standard are applicable to managing the challenges posed by big data. The insights from the interviews were crucial in refining the conceptual framework and identifying the most relevant elements for big data management.

Based on the matrix analysis in Figures 6.3 and 6.5, it is clear that Informants A and C share the same opinion regarding the suitability of certain elements in records management for managing big data. Both informants believe that six (6) elements from the records management standard are suitable for managing the challenges posed by big data V's, as detailed in Chapter 4. These elements include:

- **Creation**
- **Classification and Indexing**
- **Access Control**
- **Storing Records**
- **Migration/Conversion**
- **Disposition**

Informants A and C both agree that the **Creation** element in records management is suitable for managing three (3) big data V's: **volume**, **value**, and **velocity**. They believe that identifying which data or documents need to be created is crucial in managing the volume and velocity of big data. Only data that holds value for the organization should be created, thus helping to manage the **value** of data.

In terms of **Classification and Indexing**, both informants agree that this element is suitable for managing the **variety** of big data. It aids in classifying data that comes from various formats or sources, enabling better organization and retrieval.

The **Access Control** element is seen as suitable for managing the **value** of data. Informants A and C argue that restricting access to certain data helps protect its value, ensuring that only authorized personnel can interact with critical information.

Similarly, the **Storing Records** element is useful for managing the **value** of big data, as it ensures that only valuable data required for the business operations of an organization is retained and properly stored.

The **Migration/Conversion** element is also suitable for managing the **variety** of big data, as it helps determine which data needs to be migrated to newer systems or formats, without migrating all of the data indiscriminately.

Finally, the **Disposition** element is crucial for managing the **volume** of big data. By disposing of data that is no longer necessary, organizations can reduce the volume of data and keep only the information that is valuable for future use.

On the other hand, Informant B, as shown in Figure 6.4, believes that the **Creation** element is suitable only for managing **volume** and **velocity**, prioritizing these two V's. Informant B also views the **Disposition** element as key for managing the **value** of data, as it allows organizations to retain only the data that contributes to their business activities, while discarding irrelevant data.

Figure 6.6, which consolidates the input from all three informants (A, B, and C), shows that while there are minor differences in the suitability of elements for managing big data, the overall conclusion is that six (6) elements from the records management standard are indeed suitable for managing big data. These elements are **Creation, Classification and Indexing, Access Control, Storing Records, Migration/Conversion, and Disposition**.

The final matrix analysis for all informants, shown in Figure 7.6, concludes that:

- The **Creation** element is suitable for managing **volume, value, and velocity** of big data.
- **Classification and Indexing** and **Migration/Conversion** are suitable for managing the **variety** of big data.
- **Access Control** and **Storing Records** are suitable for managing the **value** of big data.
- **Disposition** is suitable for managing both the **volume** and **value** of big data.

From this analysis, it is evident that two elements in records management—**Capture** and **Use and Reuse**—are not suitable for managing big data.

As a result, the eight (8) elements in the records management standard were reduced to six (6) elements that are relevant for managing big data V's. Furthermore, only four (4) of the 10 V's of big data are manageable through records management practices: **volume, value, velocity, and variety**. The remaining six (6) V's—**veracity, viscosity, variability, volatility, viability, and validity**—are not suitable for management through records management elements.

The clear final results of this study, based on the matrix analysis, are presented in Figure 6.7. This provides a definitive guide on how records management practices can be applied to manage the complexities of big data.

FINAL RESULT OF MATRIX ANALYSIS (BASED ON DATA ANALYSIS)					
Date: 3/18/2024					
No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 4 V'S OF BIG DATA			
		VOLUME	VALUE	VELOCITY	VARIETY
1	CREATION	☒	☒	☒	☐
2	CLASSIFICATION AND INDEXING	☐	☐	☐	☒
3	ACCESS CONTROL	☐	☒	☐	☐
4	STORING RECORDS	☐	☒	☐	☐
5	MIGRATION / CONVERSION	☐	☐	☐	☒
6	DISPOSITION	☒	☒	☐	☐

Figure 6. 6 Result of Matrix Analysis

6.4 Suitability of Records Management Standard in Managing Big Data Through Face to Face Interviews Results.

Table 6. 1

Results of Suitability RM Standard in Managing big Data through Face-to-Face Interview

No	Elements in Records Management	The Malaysian Cases (Managing Big Data)		
		Informant A	Informant B	Informant C
		Volume, Value & Velocity	Volume and Velocity	Volume, Value & Velocity
1	Creation	The creation element plays a crucial role in managing big data by identifying which data needs to be generated. This proactive approach significantly reduces the volume and velocity of big data, ensuring that only essential data is created and stored. By carefully evaluating the necessity and value of data before its creation, the creation element helps manage and maintain the overall value of the data. This process involves determining whether documents possess intrinsic value , thereby preventing	Creation elements can significantly help in controlling the volume and velocity of data by setting clear objectives for data creation. Establishing a well-defined objective for creating data or information determines the necessity of generating any data. By having a specific purpose and criteria for data creation, organizations can avoid the unnecessary accumulation of data, which in turn reduces the overall	Creation is the initial factor that can significantly increase the volume and velocity of big data if not properly controlled. To manage the emergence of big data effectively, it is crucial to ensure that only data with inherent value is created. By implementing stringent criteria for data creation, organizations can prevent the unnecessary generation of data, thereby maintaining a manageable volume and reducing the velocity at

No	Elements in Records Management	The Malaysian Cases (Managing Big Data)		
		Informant A	Informant B	Informant C
		the unnecessary generation of data that does not contribute meaningful insights or benefits.	volume of data being handled. Additionally, this approach ensures that only valuable and relevant data is created, contributing to more efficient data management and streamlined processes.	which data accumulates. This strategic approach not only optimizes data storage and processing but also enhances the overall quality and usefulness of the data collected. Additionally, this approach ensures that only valuable and relevant data is created, contributing to more efficient data management and streamlined processes.
2	Capture	All informants unanimously believe that this element is not suitable for managing big data		
		Variety	Variety	Variety
3	Classification and Indexing	Classification and indexing are critical methods for organizing data, designed to systematically categorize and group various types and variations of data. These	Classification and indexing are valuable techniques for organizing data, facilitating its future reference by systematically grouping various types	Classification and indexing are crucial elements, particularly when managing a diverse range or variety of data.

Elements in		The Malaysian Cases (Managing Big Data)		
No	Records Management	Informant A	Informant B	Informant C
		techniques enable the effective organization of information by sorting it into distinct categories, making it easier to manage, retrieve, and analyze. By applying classification and indexing, organizations can enhance data retrieval efficiency and ensure that data is structured in a way that supports more accurate and insightful analysis.	and categories of information. By categorizing data into distinct groups, organizations can ensure that information is organized logically, making it easier to access and manage in the future.	By applying classification and indexing, organizations can handle various types of data more efficiently, making it easier to access, analyze, and utilize the information as needed.
		Value	Value	Value
4	Access Control	Access Control element can help in controlling the value of data by providing access to certain users only, depending on the value of the data. If there is no access control, it can lead to the value of the data being exposed, and the company will be at risk of losing some competitive edge.	Access control provides effective security measures by ensuring that only certain individuals can access data based on its sensitivity. This, in turn, helps to protect the value of the data itself.	Access Control is one of the most important and crucial elements, as it ensures that not everyone can view the data. This element helps in managing the value of big data by controlling access based on the sensitivity of the data.

Elements in		The Malaysian Cases (Managing Big Data)		
No	Records Management	Informant A	Informant B	Informant C
		Value	Value	Value
5	Storing Records	Properly storing records and data is essential for protecting their value . Without adequate storage, issues can arise that negatively affect the value of the data.	Storing records is indeed important. Data needs to be stored so that it can be referenced in the future. The data should be stored based on its value , which determines how many years it should be kept. This approach ensures that the value of the data is preserved and can be accessed when needed in the future.	The informant C believe that storing records is very important in managing the value of data by retaining only data that has value.
6	Use and Reuse	All informants unanimously believe that this element is not suitable for managing big data		
		Variety	Variety	Variety
7	Migration / Conversion	Migration or conversion is an important element in managing a variety of data by selecting specific data to migrate, rather than migrating all data sets.	The migration/conversion element helps in managing a variety of data by establishing an objective for how much data will be kept in electronic or digital	Migration and conversion are crucial because system compatibility often requires data conversion.

Elements in		The Malaysian Cases (Managing Big Data)		
No	Records Management	Informant A	Informant B	Informant C
			format. Data stored in digital or electronic formats makes it easier for the company to determine how many years the data should be retained.	Managing data migration and conversion is essential for handling a variety of data types effectively. Each company needs to understand and account for the different types of data that need to be accommodated during migration. Furthermore, if the variety of data is not properly managed during conversion, there is a risk that some conversions may fail.
		Volume	Value	Volume
8	Disposition	Disposition is a very important element in managing the volume of big data. This is because not all data can be kept forever, and as the volume increases, the company may run out of storage space. Therefore, every	The disposition element is suitable for managing the " Value " aspect of big data. The company needs to determine whether the data still holds value for the organization. Data that no longer	The disposition element is crucial in managing big data in terms of " Valume. " The organization needs to carefully manage disposition by establishing proper standards that

Elements in		The Malaysian Cases (Managing Big Data)		
No	Records Management	Informant A	Informant B	Informant C
		organization needs to have a clear strategy and specific time intervals for arranging the disposal process.	has value, such as historical value, legal value, or any other critical value, should be destroyed. Disposition can help reduce the physical documents in the organization by deciding whether to keep only the electronic format, based on the need and value of the data, or to destroy both physical and electronic copies.	specify what actions should be taken regarding disposition activities.

Notes: Results of Suitability RM Standard in Managing big Data through Face-to-Face Interview

6.5 Developing Framework: Assessing the Suitability of Records Management Standards in Managing Big Data.

In order to develop a framework that can effectively assess the suitability of records management standards within the context of big data, this research seeks to identify and explore the foundational elements of records management that could prove to be valuable and applicable to the management of big data. The study specifically focuses on eight critical elements that are part of established records management standards. These elements were carefully evaluated and scrutinized by three subject matter experts, referred to as Informant A, Informant B, and Informant C. Each informant contributed their professional insights and detailed opinions regarding which aspects of records management they believe are most appropriate and effective in addressing the unique challenges and complexities associated with big data. The opinions and analyses provided by these informants are central to understanding how records management standards can be adapted or refined to better support the management of large and complex datasets in contemporary environments.

6.5.1 Early Elements in Records Management Standard Potentially Suitable for Managing Big Data

Through a thorough and in-depth analysis of the collected data, it became evident that not all of the elements initially identified at the beginning of this study are directly applicable or suitable for the effective management of big data. The research findings suggest that only certain elements of the records management framework align well with the unique and diverse characteristics that define big data, which are commonly described using the "V's" of big data. These "V's" typically include **volume**, **value**, **velocity**, and **variety** each representing a different challenge or feature associated with big data. Based on the analysis, the study highlights which elements of records management are appropriately suited for managing these characteristics, and conversely, which elements are less relevant or ineffective in the context of big data management. A summary of these findings, including a detailed breakdown of the elements deemed suitable and those found to be unsuitable, is presented in the table below for clearer visualization and understanding.

Table 6. 2
Early Elements of RM Listed in this Research

No	Early Elements of Records Management Listed in This Research (Potentially Suitable for Managing Big Data)	Informant A	Informant B	Informant C
1	Creation	Volume, Value & Velocity	Volume and Velocity	Volume, Value & Velocity
2	Capture	X	X	X
3	Classification and Indexing	Variety	Variety	Variety
4	Access Control	Value	Value	Value
5	Storing Records	Value	Value	Value
6	Use and Reuse	X	X	X
7	Migration / Conversion	Variety	Variety	Variety
8	Disposition	Volume	Value	Volume

Notes: Early elements listed in this study showed potential suitability of RM in managing big data

6.5.2 Final Elements in Records Management Standard That is Suitable in Managing Big Data

Based on a comprehensive and rigorous analysis of the collected data, it was determined that only six out of the original eight elements identified at the outset of this research were found to be truly suitable for effectively managing big data. Through this thorough examination, the study concluded that these six elements are the most applicable and optimal for addressing the complex challenges that arise in the context of big data management. The analysis revealed that these selected elements align well with the unique characteristics of big data, offering solutions that can facilitate more efficient and organized management. A detailed and systematic explanation of each of the final six elements of records management that are considered most suitable for the management of big data is provided in the table below, offering further clarity and insight into their relevance and application.

Table 6. 3
 Final Elements of RM (Suitable for Managing Big Data)

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
1	Creation	1. Volume, 2. Velocity, and 3. Value.	Based on the comprehensive analysis, it has been determined that the creation element plays a vital role in identifying which data should be created and how this process can be strategically managed to help reduce both the volume and velocity of big data. The careful management of the creation process is crucial in determining the inherent value of data before it is generated. This involves assessing whether documents or datasets have intrinsic value and relevance, ensuring that unnecessary or redundant data is not produced in the first place. For instance, by thoroughly evaluating the potential usefulness and relevance of data before its creation, organizations can avoid generating surplus or irrelevant data, ultimately leading to a more optimized use of storage and processing resources. By focusing on creating only valuable and necessary data, organizations are better equipped to maintain an efficient and manageable data environment, minimizing unnecessary complexity and inefficiency. This perspective is also supported by O’Neil and Schutt (2013), who emphasize the importance of streamlining the data creation process within organizations. By

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
			applying robust data governance principles, organizations can ensure that only valuable and essential data is generated. This method effectively prevents data bloat, a common issue in big data management, and helps optimize storage capacities as well as processing resources. The result is a more efficient, organized, and manageable data environment, allowing organizations to better control and utilize their data assets.
2	Classification and Indexing	1. Variety	Based on the in-depth analysis, all three informants unanimously agreed that the classification and indexing elements play a significant role in managing the variety and complexity of big data. In the course of this research, it became evident that all three informants shared a common viewpoint: these elements are essential for addressing the diverse nature of big data. By effectively classifying each type of data into distinct categories or groups, organizations can more easily navigate the complexity and vastness of big data sets. With the implementation of proper classification and indexing systems, organizations can streamline the process of sorting both newly generated and existing data, ensuring that data is systematically organized according to its characteristics and relevance. This structured approach not only enhances the accuracy of data storage but also facilitates faster and more efficient retrieval of data when needed. As a result, organizations are better

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
			equipped to manage the broad spectrum of data types that make up big data, allowing for more effective and timely decision-making processes.
3	Access Control	1. Value	In this research, all three informants reached a unanimous agreement that the access control element within records management standards plays a pivotal and essential role in managing the value of big data. The implementation of effective access control mechanisms is fundamental to enhancing the overall security framework surrounding big data. By ensuring that only individuals with the proper authorization are allowed to access specific datasets, these mechanisms help to maintain strict control over who can view, modify, or share sensitive information. This process is critical in safeguarding the value and confidentiality of the data, as well as protecting it from potential misuse or unauthorized access. By restricting access to only those who have a legitimate need for the data, organizations can significantly reduce the risk of data breaches, theft, or accidental exposure, which are common threats in the realm of big data management. Moreover, this careful regulation of access not only helps secure sensitive data but also supports the broader goal of maintaining data integrity and ensuring that the data remains reliable and trustworthy for authorized users.

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
4	Storing Records	1. Value	All three participants were in consensus regarding the records management standards and the custodian of of the records storage element being the most important aspect. As per the data analysis, the informants observed that proper records storage practices such be implemented to assist in the management of the value of big data. Efficient storage practices guarantee not only the preservation, but the ideal amounts of optimal conditions are conducive to the data's future repair to its usability. Adherence to these storage guidelines prevents the circumstance of losing or damaging data which allows the continuous access and preservation of reliability, accuracy and truthfulness of data. Alongside the aforementioned techniques, appropriate retrieval strategies assist in improving the quality of data allowing the data sets to endure a long period of retention. This slows down the degrading process of the data, ensuring its validity by allowing organizations to improve accurate record keeping for more pertinent information. It also assists in strategically preserving data by cutting excess out, therefore more relevant information can be kept while the unnecessary data is wiped out, allowing the organization to maximize efficiency.

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
5	Migration / Conversion	1. Variety	The three informants agreed during the analysis that the element migration or conversion process is extremely useful in solving the problem of managing a lot of data in a big data environment. With the incorporation of migration or conversion processes, the data can be stored and accessed in multiple OR variety formats such as electronic, digital or even old legacy formats which all ensure that the data is interoperable in many systems and platforms. This array of data formats enables organizations to expand the boundaries for the use of different data in diverse platforms. In addition to this, these processes give the organizations the ability to check the quality of various data formats before starting any type of migration or conversion processes which means that potential complaints and issues over data quality or consistency are resolved before any of the processes take place. This careful strategy permits some organizations to move only those datasets which are of utmost importance to the company leaving behind all other data. By being that selective with the data set migration, companies only migrate the data which is most relevant to the users. As a result of this optimization in resources, data redundancy is reduced to the bare minimum and the transferred data become intact

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
			and useful. This approach helps maintain the efficiency of data management and the quality of data strands is maintained throughout the entire data life cycle.
6	Disposition	1. Volume, and 2. Value	Finally, disposition is recognized as one of the most important elements in records management standards, especially in the context of managing big data. Throughout this research, the three informants consistently emphasized the pivotal role that the disposition element plays in effectively managing both the volume and inherent value of big data. Implementing robust and efficient disposition practices enables organizations to significantly reduce the ever-growing volume of data that is generated on a daily basis. By disposing of unnecessary, redundant, or obsolete data that is no longer needed or relevant, organizations can streamline their data management processes and prevent data overload. This disposition process is essential for optimizing storage resources by ensuring that only data that holds significant value—such as information with historical, legal, or business importance—is retained. By actively curating the data that remains in the system, organizations can maintain a leaner, more organized database that is both manageable and scalable. Furthermore, this approach helps to eliminate the risk of data bloat, which can hinder the efficiency of data retrieval and processing systems.

No	Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Descriptions (Based on Data Analysis Results)
			By focusing on preserving and maintaining only valuable records, organizations can foster a more efficient, sustainable, and future-proof data management system, one that not only supports their immediate needs but also ensures long-term viability and compliance with regulatory requirements.

Notes: Results of final elements in RM that suitable in managing big data was discussed and explained

6.5.3 Emergent Elements in Records Management in Managing Big Data

In addition to the six elements that were identified as suitable for managing big data based on the extensive and detailed data analysis, this research also uncovered a range of emergent data elements through comprehensive, in-depth interviews conducted with the informants. These interviews, which provided rich and valuable insights, revealed several new considerations and perspectives that were not initially evident in the earlier stages of the study. As a result, these emergent elements offer a deeper understanding of the evolving challenges associated with big data and suggest additional factors that need to be taken into account in order to manage big data in a more effective and efficient manner.

The findings of the study indicate that, in total, five new or emergent elements have been identified as crucial for the comprehensive and successful management of big data. These elements address critical issues that have not been fully captured by the initial six elements, providing practical solutions and innovative approaches that complement and strengthen the existing records management framework. By integrating these emergent elements into the management process, organizations can better navigate the complexities of big data and overcome the specific challenges it presents. A detailed summary and in-depth description of these newly identified elements, which are considered essential for managing big data effectively, are provided below for further examination and analysis.

Table 6. 4
Emergent Elements in RM in Managing Big Data

No	Emergent Elements in Records Management in Managing Big Data	Descriptions (based on data analysis results)
1	Value: (Administrative Value; Historical Value; Financial Value; and Legal Value)	In the early stages of this research, the "value" element was initially identified as a critical component of records management for effectively managing big data. However, during the data collection phase, one of the informants highlighted a more refined perspective on the importance of retaining data based on specific, clearly defined values. According to this informant's viewpoint, data should only be retained if it possesses one or more types of intrinsic value, such as administrative, historical, financial, or legal significance. This nuanced approach to data retention ensures that only data with a direct and meaningful impact on the organization's operations, compliance, and long-term objectives is preserved. Data that does not meet these criteria, lacking any of these four types of value, should not be retained or stored. By applying this selective retention principle, organizations can significantly optimize their storage practices, ensuring that valuable resources are dedicated to maintaining only the most relevant and essential data. This approach not only helps to minimize unnecessary data accumulation but also supports better resource utilization, as it eliminates redundant or non-essential data that would otherwise occupy valuable storage space. Ultimately, this focused approach to data retention enhances overall data management efficiency, ensuring that

organizations maintain a streamlined and cost-effective system while preserving the data that truly contributes to their goals.

Within this piece of work one more new and emergent element has been identified in this research as '**procedure**'. One of the informants in the course of informed interview stressed on the use of procedures owed to the need of organizing the collected big data; this implies that procedures need to be very clear and well-structured. In that context, 'procedures' can be interpreted as a blend of formulated policies, rules, and specific record management strategies that are aimed to be an effective way of managing data and information in a methodological way. Such procedures usually form a scheme that guarantees any form of data is processed, stored, and retrieved in a neat and orderly manner for enhancement of operations and integrity of data.

2 Procedure

The informant highlights the importance of the first step to have well written policies and procedures, and considers this as the strategizing step for employees to take control of information management systems to facilitate efficient data management. Well defined policy framework gives the employees the opportunity to take action to implement steps which are in conjunction with the objectives of the organization as well as the best practices in data management. This clarity not only allows for operations to be executed with insight and smoothness but also cultivates a great understanding among employees regarding processes expected of them. As well, the informant stressed that clearly formulated procedures are proved

to better internal consistency in data management practices, which moreover improved the level of errors and discrepancies. By normalization of data management methods relating to big data, organizations improve the quality and effectiveness of their data management and thereby the workflow of its operations at all levels.

3 Objective

The next key issue of concern is the **objective**, which comes out as a new dimension in the management of big data. While collecting the data, one of the informants insisted that it is important to bear in mind one's goal in every activity performed in the coursework management of data. What was stressed is that such goal has to be set for each business process of data creation with the point that all data created has some rational or meaningful reason for being created. If there is no good or reasonable justification for some data to be created, the said data creation is a waste of time and effort, hence, it should not take place. Thus organizations are in a position to set appropriate limitations to the unauthorized increase in big data which if unchecked could lead to an exponential increase.

The objective gives a principled approach at any given time during any stage of the data management process cycle thus guaranteeing that only relevant, needed and useful data is created and stored. Such an approach is helpful in minimizing the unnecessary or redundant data that may otherwise be available and which are unneeded in the management of big data as they add to the complexity and cost. By making it such that every such action that involves data

creation is relevant and meets the needs of the organization on set goals & objectives, the organization is able to undertake effective processes in data management. To this particular aspect of the organization, the focus on creation of data is managed in such a way that there is a maximum utilization of data resources available especially in storage, that the data which is not of any value is never retained or controlled, thus leading to the success in time and sustainable maintenance of the related organizational data systems.

4 Knowledge

In the course of this investigation, it was established that ‘**knowledge**’ is a core and fundamental component that is arguably possessive of a critical role needed in the efficient management of big data. During the extensive interviews with the informants, one of them in particular was vivid about knowledge and education being the building blocks for success when dealing with big data. It is not sufficient for people who directly handle the data to have technical know-how of the processes alone; they also ought to have great insight into the data as well as its context. When the employees have a vast knowledge base, they are able to make wise choices concerning how the data will be processed, stored and used ensuring the data fulfills its purpose and adds value to the company.

For instance, understanding the data validation methods is crucial to engaging in the needs of the data which facilitates the data managers to ensure that only pertinent, precise and quality data is used. This knowledge is particularly important in the era of big data in which data volume,

its types and the nature of the data makes separation between useable and unusable information a tedious task. By training employees, companies are able to verify that proper evaluation, validation and practices are followed, for management of the data. In this way, knowledge is one of the tools that aid to maintain the relevance and integrity of the big data which helps the organizations in the understanding and aiming at the best use of the data in their decision making with ease.

5 Roles of records Professional

Notably, one more newly emerged factor that has been mentioned in this research is the ‘**role of records professionals**’ in the management of big data. For instance, when analyzing the data collected from the informants, it became clear that all the informants were in unison and stressed on the significance of the role of records professionals in the preservation and effective management of the big data that was in place. A competent and well-informed records professional, for instance, who shouldered the well-defined duties in the company is a key figure in ensuring that the records management practices are put in place and make sense.

As such, these professionals are in a position to formulate and ensure compliance with policies, procedures and plans for the management, storage and retrieval of data in ways that are acceptable and legal. Their being well versed with the concept of the life span of records, from the time of creation to their time of disposal, assists organizations in managing big data and its inherent issues, such as regulatory compliance, data preservation, and efficient storage.

Also, data managers teach and promote among employees of all ranks and workplaces the building blocks of data stewardship which are the data protocols set by the organization. In the end, they are relevant to the organization's ability to handle big data in an efficient manner through enhanced adoption of records management practices for better data access, security, and usage.

Notes: Emergent elements in RM that suitable to managing big data gained through data collection

6.6 Final Research Framework

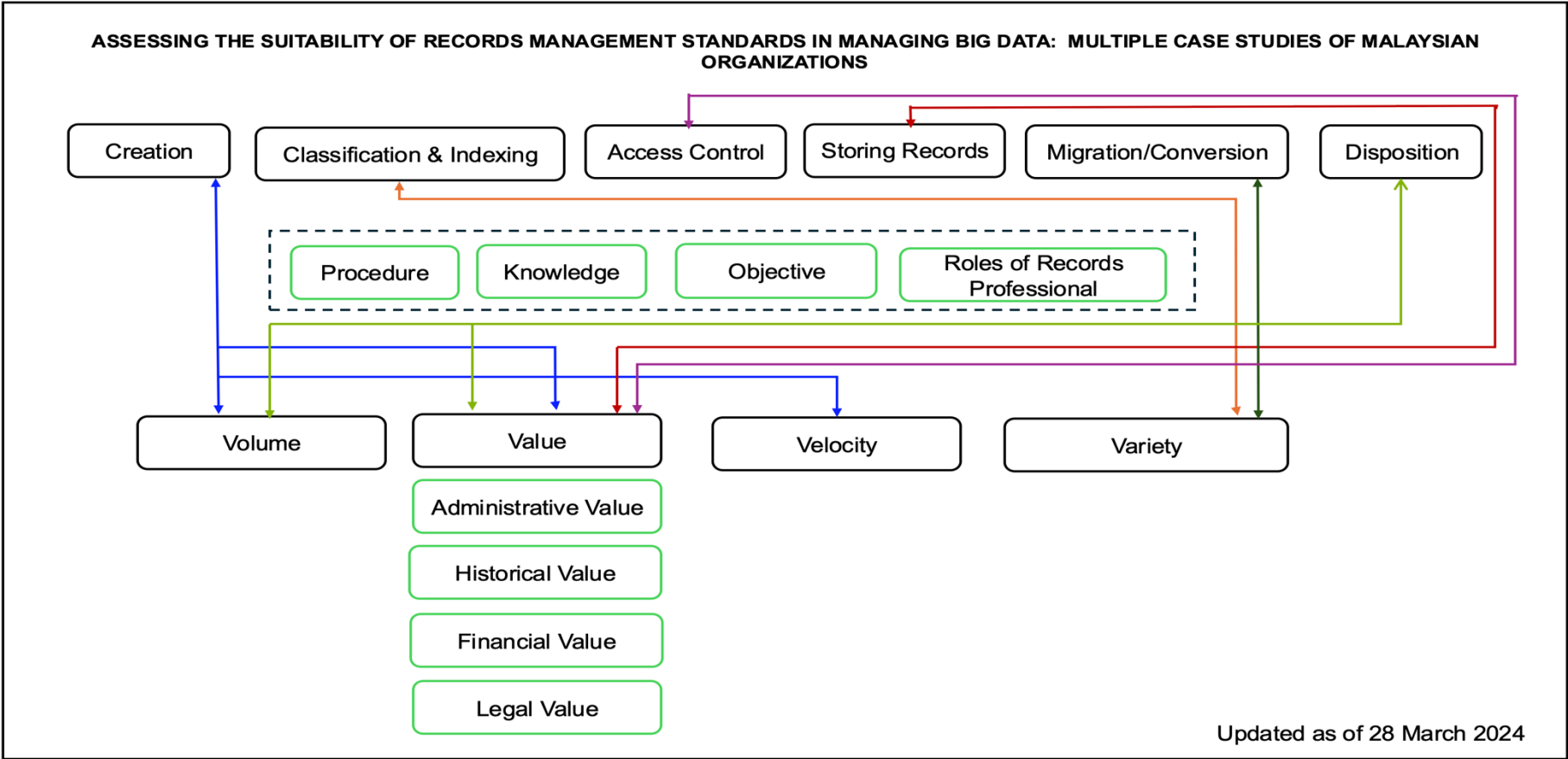


Figure 6. 7: Final Research Framework

In this framework, the overall structure and the conclusions are stemming from the detailed data analysis which was carried out by all the informants. As already stated, not all components in records management or standards are appropriate for big data management. From the results of this study, the author determined only six (6) elements that he considers relevant to be integrated into the framework as shown in Figure 6.8. These six are **'creation'**, **'classification and indexing'**, **'security/ access control'**, **'storing records'**, **'migration/conversion'**, and **'disposition'**.

Big data management, supported by the existing record management systems, hinges on four core constructs: these being **'volume'**, **'value'**, **'velocity'**, and **'variety'**. So alongside “the V’s” which encapsulate the most important attributes of capturing big data, these four were singled out as fundamental in simplifying the intricacy that revolves around big data.

Approaching the concept of big data from the perspective of records management enables one to develop a precise understanding of what this big data contains and even how best to leverage these elements simultaneously. Being able to define means by which elements can be used in coherently interacting with each other was possible through a necessity to manage each element in the records management system. For instance, ‘creation’ was associated with the ‘volume’, ‘value’ and the ‘variety’ of the data. This supposed interaction was validated through a qualitative inquiry which triangulated the data gathered from important informants, as explained earlier in the study.

Apart from the six components that in particular are linked to the practical aspects of records management, this study has also identified a few additional components that are important for the final framework. These elements are marked green in the framework and are discussed more thoroughly in chapter 6 of this study. In accordance with the final framework, it can also be observed that the ‘value’ element under big data has been further classified into four distinct types, which are **administrative value, historical value, financial value, and legal value**. During the conversations it was Informant B who recommended that the ‘value’ might be subdivided in the manner suggested herein. These four values also make it simpler to make the choice regarding if certain information ought to be kept or discarded. For example, if a certain data is useful in terms of business strategies, or comprehensive, or meets legal obligations, or has historical significance, then it must be kept by the organization.

In addition, this study found four other emergent elements that are necessary for effective management of big data through records management practices. What these **‘procedure’, ‘objective’, ‘knowledge’, and ‘roles of records professional’**, were this time restaged in all the informants and what is considered are such elements that are important for ensuring the effective management of big data and are not however, part of the conventional norms of record management about.

The need to have a clearer understanding of the term **‘procedure’** was pointed out by Informant A who cautioned that the making of procedures must come as the first step in big data management. For focused activities in record management practice, it was Informant A who argued that such aims culminate in creating appropriate structured procedures for an organization to follow in terms of managing significant big data. This primary step could contribute towards indication of the expectations from the various team members in the data management endeavour.

In a similar fashion, Informant B also pointed out the importance of defining a clear **‘goal’** before creating data. In this instance, having specific goals from the start allows for businesses to define what data has to be created and for what reason in order to ensure that data is created for a reason. This objective-oriented strategy probably eliminates unnecessary data duplication due to the fact that all data created has a purpose, this kind of strategy improves management of data by all organizations.

The **‘knowledge’** element also emerged as a significant consideration in this study. According to informant B, knowledge and education are important to people who deal with big data. Absolutely some knowledge is necessary in order to validate data. Correctly in that sense only people responsible for data are somebody who knows very well what to do with the data. Knowledge enables records professionals and the rest to determine or assess the real purpose of any data, which guides them whether the data in question is useful and accurate enough to be retained (and retained for how long). Also knowledge in data analytics is crucial in that it enables professionals to appreciate the big picture regarding data and to ensure thorough processing and analysis of the data.

Finally, the significance of **records professionals** emerges as an important factor concerning this research. The informants combined made a compelling case that the records professionals perform a critical function in the management of big data through records management processes. It is very important for such specialists to clearly understand the boundaries of their work and powers in the organization. Their proficiency in records management techniques and their understanding of the models

of big data management are vital for the effectiveness of the operations with the large and complex data sets. Since they understand both the data itself and the organizational aspects quite well, records professionals play an important role in the organization by preventing unnecessary data-related decisions and ensuring that the organization follows correct data governance policies.

6.7 Member Checking: Validation of Final Framework

Following the completion of data analysis and the development of the final framework, a member validation process was undertaken to confirm the credibility, accuracy, and relevance of the research findings. The final framework, which was grounded in the thematic analysis of interview data from three selected organizations, was sent to the same informants who had participated in the initial data collection phase. Each informant received a validation test form along with a summary of the final framework for their review and feedback (see Appendix 7).

The validation test form requested that informants assess the framework in terms of the following criteria:

- The accuracy in representing their organizational context and experiences;
- The relevance of the components included in the framework;
- The applicability and practicality of the framework for real-world implementation.

All informants responded positively, confirming that the final framework accurately captured the key elements, strategies, and challenges discussed during the interviews. They agreed that the framework was reflective of their organizational practices and feasible for implementation within the context of records management and big data integration. No contradictions, disagreements, or suggestions for major revisions were raised during the member validation process.

All three informants expressed their agreement with the framework. The feedback demonstrated a strong consensus that the final framework was both an accurate and valid representation of their input, in terms of both content and practical relevance. Their responses further supported the credibility, transferability, and confirmability of the research findings.

Summary of Informant Feedback

Informant A commented: *"Excellent work. This brings me to think more clearly about data and records management."*

This feedback indicated that the framework not only reflected the organisation's current practices but also encouraged reflective thinking and professional insight.

Informant B remarked: *"Overall, areas and elements covered met the set standard."*

This affirmed that the framework aligned well with established industry standards and was considered both methodologically robust and practically sound.

Informant C stated: *"Accepted and accurate."*

This succinct endorsement reinforced the validity and clarity of the final framework from their organisational perspective. The high level of acceptance and alignment among all informants indicated that the framework was both grounded in real-world practices and theoretically coherent. As such, the member checking process not only verified the accuracy of the researcher's interpretations but also enhanced the trustworthiness and practical significance of the research.

This strong consensus among the informants further strengthened the credibility and confirmability of the study's findings. The consistency between the developed framework and participant feedback demonstrated a high level of trust in the interpretation of the qualitative data. Furthermore, the validation process confirmed that the framework was not only theoretically sound but also practically relevant-an essential attribute for the development of applied models or tools in organisational research.

In conclusion, the member validation process served as both a quality assurance mechanism and as evidence that the final output of the study was accepted and endorsed by actual practitioners in the field.

6.7.1 Detailed Validation Feedback Informant A

As part of the validation process, all three informants were invited to complete a structured assessment form, in which they reviewed the appropriateness of each element within the proposed framework for managing big data through records management functions. Their feedback was recorded using a four-point rating scale: (1) Not Suitable, (2) Suitable, (3) Very Suitable, and (4) Strongly Suitable. This approach enabled the incorporation of a quantitative layer into the overall validation effort, offering insight into the degree of alignment between the proposed framework and the informants' practical experiences

6.7.1.1 Informant A

As part of the member validation process, **Informant A** examined the final framework and completed the assessment form by rating the appropriateness of each proposed component in addressing big data challenges within the domain of records management. The response was overwhelmingly positive, with the majority of elements rated as “**Strongly Suitable**” across key dimensions of big data, namely volume, variety, velocity, and value. For instance, the “Creation” function received the highest rating for its effectiveness in managing volume, velocity, and value, emphasizing its foundational role in facilitating structured and purposeful data capture. Similarly, the “Classification” component was highly rated, especially in relation to handling data variety, which reflected its significance in organizing heterogeneous datasets. Additional elements such as “Access Control” and “Migration/Conversion” were rated as “**Very Suitable**,” suggesting a strong practical relevance, albeit with possible implementation constraints. The “Storing Records” and “Disposition” components also received strong ratings, particularly for their contribution to managing data value and volume, reinforcing their essential role in long-term preservation and compliant disposal practices.

Regarding the emergent elements introduced in the framework, Informant A offered several noteworthy observations. The “Value” component—which encompasses administrative, financial, legal, and historical considerations—was rated as “**Strongly Suitable**,” underscoring its strategic importance in governing organizational data. Both the “Procedure” and “Objective” elements received similarly high ratings. However, with respect to the “Objective” component, the informant

highlighted a potential organizational challenge, noting that while the concept was theoretically sound, practical alignment between data creators and those with insight into the data's value might be difficult to achieve. The "Knowledge" element was marked as **"Suitable,"** accompanied by a remark that organizational priorities and employee motivations may occasionally hinder effective, value-based data decisions.

Finally, the importance of professional roles in records management was strongly emphasized. The informant remarked, "Absolutely agree! Organizations don't pay enough attention to this field," pointing to the underappreciation of records management expertise in current data environments. The overall evaluation concluded with a positive reflection: **"Excellent work, and this brings me to think more clearly about data and records management,"** suggesting that the framework not only aligned with real-world practices but also prompted deeper contemplation on effective information governance.

6.7.1.2 Informant B

Informant B offered detailed and strongly supportive feedback on the proposed framework as part of the member validation phase. All six core elements of records management were assessed as **"Strongly Suitable"** in relation to the corresponding dimensions of big data, thereby reinforcing the framework's practical utility and conceptual integrity. The "Creation" component was especially commended for its role in managing volume, velocity, and value, reflecting its central importance in the initial stages of data lifecycle management. The "Classification" function similarly received high ratings, particularly for addressing data variety, signifying its effectiveness in structuring diverse data types. In addition, both "Access Control" and "Storing Records" were rated at the highest suitability level, especially with regard to maintaining data value—highlighting their significance in preserving integrity and supporting long-term usability. The components of "Migration/Conversion" and "Disposition" were also evaluated as strongly suitable, demonstrating the informant's confidence in the framework's ability to support comprehensive lifecycle management while efficiently handling high-volume and heterogeneous data environments.

Regarding the newly introduced elements within the framework, Informant B rated all aspects—namely, the composite value dimension (encompassing administrative, legal, financial, and historical elements), procedures, objectives,

knowledge, and the professional roles in records management—as **“Strongly Suitable.”** These consistent high ratings signified the perceived importance and practical alignment of these components with the evolving demands of big data governance. Although the informant did not provide extended qualitative commentary on specific items, a general statement was included: **“Overall... areas and elements covered met the set standard.”** This concise remark represented a broad affirmation of the framework’s comprehensiveness and methodological soundness, indicating a high level of acceptance and recognition of its relevance to current organizational practices.

6.7.1.3 Informant C

Informant C expressed a strong level of endorsement for the proposed framework, particularly regarding its appropriateness for managing big data within the scope of records management practices. In evaluating the core elements, the informant rated the “Creation” component as **“Very Suitable”** for handling volume and **“Strongly Suitable”** for addressing both velocity and value. This response reflected a clear recognition of the framework’s alignment with the fast-paced and high-volume demands characteristic of big data environments. Additionally, the elements of “Classification,” “Access Control,” and “Storing Records” were each assessed as **“Strongly Suitable,”** particularly in terms of managing variety and preserving value. These assessments reinforced their perceived importance in maintaining data coherence, integrity, and accessibility. The “Migration/Conversion” function received a **“Very Suitable”** rating for managing variety, while the “Disposition” element was marked as **“Strongly Suitable”** for addressing both volume and value. This confirmed the informant’s support for a systematic and accountable approach to data lifecycle completion within large-scale data infrastructures.

In relation to the emergent elements incorporated into the framework, Informant C assigned **“Strongly Suitable”** ratings across all components and offered detailed qualitative reflections. For the value dimension—which encompassed administrative, legal, financial, and historical considerations—the informant emphasized the necessity of contextual evaluation, advocating for value to be measured in terms of analytic utility, operational relevance, and cost-efficiency. The “Procedures” element was acknowledged for its importance in maintaining a structured yet flexible approach, particularly under rapidly evolving data conditions, to ensure both consistency and

adaptability. The “Objective” element was praised for its ability to reduce duplication and enhance the focus of data for effective decision-making. With regard to “Knowledge,” the informant highlighted the critical role of continuous staff development and governance, supported by technologies such as cloud platforms, structured databases, and artificial intelligence tools, in achieving optimal big data practices. Lastly, the role of records professionals was strongly affirmed. The informant underscored their essential functions in metadata management, classification, archiving, and data analytics - areas crucial to long-term preservation and strategic insight.

The informant’s concluding remark “**Accepted and accurate**” offered a clear and concise validation of the framework. This statement confirmed the model’s relevance and credibility from a practitioner’s perspective, particularly within contexts where the integration of big data and records management is central to organizational effectiveness.

6.7.2 Summary of Member Validation Results

The findings from the member validation process indicated a unanimous consensus among the three informants regarding the appropriateness and relevance of the proposed framework for managing big data through established records management practices. All informants consistently assessed the core elements namely creation, classification, access control, storing records, migration/conversion, and disposition as either “**Very Suitable**” or “**Strongly Suitable**” in relation to the principal characteristics of big data, such as volume, velocity, variety, and value. These evaluations underscored the perceived alignment between conventional records management functions and the evolving requirements of big data environments.

Furthermore, the emergent elements embedded within the framework—including value dimensions (administrative, historical, financial, and legal), procedure, objective, knowledge, and the roles of records professionals—also received “**Strongly Suitable**” ratings from all participants. The qualitative feedback provided further emphasized the importance of establishing clear procedures, fostering strong governance mechanisms, enhancing employee competence, and securing organizational commitment in supporting effective big data management.

Notably, **Informant A** acknowledged the framework’s capacity to encourage deeper reflection on data and records management, remarking, “Excellent works and this brings me to think more clearly about data and records management.” **Informant**

B offered a succinct endorsement, affirming that all areas and elements met the expected standards. **Informant C** described the framework as “Accepted and accurate,” while elaborating on the need for flexibility, cost-efficiency, and continuous staff development to support big data initiatives.

Taken together, the feedback from all informants indicated a high degree of credibility and acceptance of the proposed framework. These outcomes support its practical value and potential applicability in organizational settings. (Refer to **Appendix 7** for the complete validation forms and detailed feedback.)

6.8 Concluding Remarks

This chapter presents the findings derived from the data collected from each informant, culminating in the development of a final framework for records management practices that are deemed suitable for managing big data. The framework outlined herein identifies the most appropriate records management practices for big data management, particularly within the context of Malaysia. The data collected through the informants, together with insights from the literature review, indicate that only a selected number of records management elements are directly applicable and effective for managing big data. In addition, several emergent elements were identified, which further enhance and complement the overall framework.

The development of this framework reflects a progression from the initial conceptual structure to an empirically informed model, integrating both established standards and practical insights derived from the findings. While all identified elements were generally supported by the informants, representing diverse organisational contexts in Malaysia, the framework is positioned as a set of guiding principles rather than a rigid model. It is therefore expected to be adaptable and applicable to organisations beyond the Malaysian context, particularly those facing similar challenges in managing big data.

This research contributes to the understanding of how records management practices can be aligned with the complexities of big data environments, particularly through the integration of standard elements and emergent organisational considerations. As the importance of big data continues to grow across sectors, the proposed framework provides a practical reference for organisations seeking to improve data governance, ensure compliance, and enhance the effective use of data resources.

While the framework has been developed based on empirical findings and supported by relevant literature, further validation through expert-based approaches such as workshops or Delphi studies could enhance its robustness. Future research may consider engaging practitioners and subject matter experts to evaluate and refine the framework in practical settings.

CHAPTER 7

DISCUSSION OF RESULTS AND RECOMMENDATION

7.1 Introduction

This research was carried out to provide the best guidelines for managing big data through records management standards. The research methodology involved a thorough literature review, initial surveys, and direct engagement with informants. This process included an early-stage approach to identify relevant informants, followed by in-depth interview sessions and subsequent discussions. The culmination of this process is the presentation of results that indicate which elements of records management are most effective in managing big data. These findings are intended to serve as practical guidelines for organizations seeking to improve their big data management practices in the future. This was finally brought to the final results of suitability elements in records management in managing big data that will be a guideline in the future to every organization.

7.2 Research Objectives Revisited

Table 7. 1
Objectives Revisited

Objectives
RO 1.0: To evaluate current records management practices used that are suitable in dealing with big data V's.
RO 2.0: To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.
RO 3.0: To assess the suitable elements for developing a records management framework for managing big data.

Notes: The research objectives are revisited in this final chapter to ensure clear alignment between the study's findings and its original aims.

In order to fulfil the objectives, the analysis focused and exploring the relationship and understanding between records management practices and big data with the aim to provide suitable guideline in records management in managing big data. The above objectives have been successfully achieved through the following research questions:

Table 7. 2
Research Questions Revisited

Objectives	Research Questions
RO 1.0: To evaluate current records management practices used that are suitable in dealing with big data V's.	RQ 1.0: Which current records practices that suitable in dealing with big data V's?
RO 2.0: To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.	RQ 2.0: What are the perspectives of records professionals on managing big data using a records management approach within organizations?
RO 3.0: To design and validate a records management framework for managing big data by integrating suitable elements from established records management standards.	RQ 3.1 : What elements of records management standards are suitable for developing a framework to manage big data?

Notes: The research questions are revisited in this final chapter to ensure alignment between the findings and the study's objectives.

In conclusion, this study successfully achieved all the stated research objectives by examining the suitability of records management practices in managing big data within organisational contexts.

RO1, which aimed to examine the applicability of ISO 15489-1:2016(E) in managing big data, was achieved by identifying both its strengths and limitations in addressing data complexity, volume, and diversity. The findings indicate that not all elements of ISO 15489 are equally applicable in managing big data. Selected elements, particularly those related to data organisation, control, and governance, were found to be more relevant in addressing key big data characteristics such as volume, variety, and veracity.

RO2, which sought to evaluate the effectiveness of existing records management standards within organisational settings, was addressed through empirical investigation across multiple case studies. The findings reveal that organisations encounter challenges when applying traditional records management standards to big data environments, particularly in handling unstructured and high-velocity data. In addition, several emergent elements, including procedure, objective, knowledge, value, and the roles of records professionals, were identified as important factors that complement existing practices and support more effective data management.

RO3 focused on developing a suitable framework for managing big data through records management principles. This objective was fulfilled through the development of a practical framework informed by both theoretical insights and professional practices. The framework reflects the integration of structured records management elements and emergent organisational considerations. Its relevance and applicability were further supported through a member-checking process involving key informants.

Overall, the study demonstrates that effective big data management requires not only the application of established records management standards, but also the integration of additional organisational capabilities. The research therefore contributes meaningful insights to the field of records management in the context of big data. These findings provide a foundation for both theoretical advancement and practical application in managing big data through records management practices.

7.3 Discussion on How Has the Methodology Employed Fulfilled the Aim and Objectives of the Study

7.3.1 Research Strategy

To generate a robust and reliable analysis, this study employs a well-defined and strategic approach to data collection. The research adopts a qualitative methodology, emphasizing rigorous criteria in the selection of informants. The initial stage of the informant selection process involved identifying the research site by adopting a broad organizational perspective. This began with a systematic filtering process, focusing on organizations from fields that significantly contribute to the generation of large volumes of big data.

Several organizational sectors were identified as key contributors to substantial data generation. These sectors, which are discussed comprehensively in Chapter Three, include technology and commerce enterprises, healthcare institutions, educational organizations, production and miscellaneous industries, oil and gas (O&G) firms, financial institutions, renewable energy companies, and construction and engineering fields. These sectors were selected due to their demonstrated capacity to produce and manage extensive amounts of data, which aligns closely with the objectives of this study.

Following the identification of relevant organizational sectors, the research employed purposive sampling to further refine the focus of the study. This sampling technique facilitated the targeted selection of organizations actively contributing to the emergence and management of big data. From the eight identified organizational sectors, three were selected for in-depth analysis, based on their relevance to the research objectives and their potential to provide rich and meaningful data.

Within these selected sectors, the study identified informants, specifically records professionals, who are directly involved in the generation or management of big data. The selection of informants was informed by the criteria outlined in ISO 15489-1:2016(E), as elaborated in Chapter Three. According to this standard, records professionals are not confined to individuals with formal qualifications in records management or archival studies. Instead, the definition encompasses individuals engaged in the daily management and processing of data within their organizations. This inclusive approach ensures the incorporation of diverse expertise and perspectives,

thereby enriching the data collected.

The careful selection of informants from organizations that engage with big data on a daily basis ensures the collection of high-quality data that is both relevant and comprehensive. This rigorous approach not only strengthens the validity of the data collection process but also facilitates an in-depth analysis that aligns with the research objectives and adequately addresses the research questions.

7.3.2 Face to Face Interview and Discussion

This study selected three (3) informants, each representing one of three (3) organizational fields that significantly contribute to the emergence of big data: renewable energy companies and construction engineering firms, financial institutions, and technology or commerce enterprises. The selection process involved first identifying the roles of potential informants within their respective organizations, with particular attention given to their direct engagement with big data. Each informant was subsequently approached to participate in the study, and face-to-face interview sessions were conducted with them in February 2022.

The interviews were designed to gather insights into the informants' perspectives on managing big data within their organizational contexts. Through these discussions, this research aimed to develop a practical and effective guideline for managing big data, informed by established records management standards. Each informant contributed unique opinions regarding the applicability of records management principles to the complexities of big data management, highlighting both opportunities and limitations.

As discussed in Chapter Six (6), the findings from the interviews revealed that not all traditional elements of records management are fully suitable for addressing the challenges associated with managing the five V's of big data: volume, velocity, variety, veracity, and value. Additionally, the informants identified emergent elements and practices that could complement existing records management frameworks to better address the demands of big data management. These emergent elements represent innovative approaches that organizations could adopt as part of an enhanced records management strategy.

The face-to-face interviews conducted with the informants were instrumental in achieving the objectives of this research. The insights derived from these interviews provided a robust foundation for formulating a guideline tailored to the management of

big data. By integrating the informants' perspectives with existing records management standards, this research contributes a comprehensive approach to addressing the challenges of managing big data effectively within diverse organizational contexts.

7.3.3 Overview of Findings from Interview with Informants

The rapid and continuous growth of big data presents both opportunities and challenges for organizations. When effectively organized, big data can yield positive impacts, such as enhanced decision-making and improved operational efficiency. However, if mismanaged, it can become a significant challenge, particularly due to its scale and complexity. This research identifies the Records Management Standard as a viable and practical solution for managing big data within organizational contexts.

During the data collection process, Informant A was specifically asked about the relationship between the characteristics of big data, commonly referred to as the five V's (volume, velocity, variety, veracity, and value), and the current operations of their organization. Informant A recognized the potential of big data to create valuable datasets that could provide critical information for organizational decision-making. At the same time, they acknowledged the challenges associated with the volume of big data. Informant A emphasized that organizations must adopt targeted approaches to data creation, ensuring that data is generated and managed based on specific organizational needs and priorities.

Informant A further stated that this research could offer effective solutions by demonstrating how records management practices are suitable for addressing the challenges of big data. They concluded that without proper controls or standardized frameworks, managing big data would become increasingly difficult, not only within individual organizations but also across countries and industries. According to Informant A, the implementation of records management standards could enhance the value of big data, fostering trust among consumers and enabling its use as a reliable source of information in the future.

Similarly, Informant C shared a positive perspective on the role of records management in managing big data. When asked about the suitability of records management practices, Informant C strongly agreed that these practices could address various challenges faced by organizations in managing big data. Drawing from their own experience in managing both records and big data, Informant C highlighted that poorly organized big data often becomes a significant obstacle. They expressed

confidence that the records management approach proposed in this research would provide an effective framework for organizing and managing big data efficiently.

Informant B, however, offered a slightly different perspective. While acknowledging the potential of records management practices in managing big data, Informant B argued that not all elements of traditional records management are equally applicable to big data. They noted that some elements of records management are well-suited to addressing the complexities of big data, while others may not be directly applicable. Despite this nuance, Informant B concurred that this research provides valuable insights and guidelines by identifying the specific elements of records management that are most effective for managing big data.

In summary, the findings from the informants collectively underscore the potential of records management practices to serve as a critical framework for managing big data. As elaborated in Chapter Six, this research identifies and refines the elements of records management that are most relevant to addressing the challenges of big data, offering organizations a practical and effective framework for implementation.

7.4 The Importance of Developing Framework Managing Big Data Through Suitable Records Management Standard.

The aim of this study is to develop a systematic approach by developing research framework for managing big data based on accepted records management standards. In particular, this study intends to consider the possible contribution of records management standards to the problem of big data given the steady and rapid growth of big data. R. Subash (2022), for instance, explains that big data is now omnipresent, largely because of the rapid development of real-time applications which have fueled the growth of data in the last ten years. As per Subash (2022), big data is variously expected in the coming decades; more so, in engineering fields where the use of data is growing rapidly for decision-making purposes. A vivid example is data collected during the COVID-19 pandemic, which were helpful for assessing, handling, and storing information on patients for accessibility after the pandemic period.

This example highlights how the volume of big data can be useful in the form of patient data, which can then be used for references or research in the field of medicine. Even though this seems useful, the increase in the volume of big data poses a significant number of problems and challenges alongside it. According to Nazarevich

(2024), Big data and data production have reached concerning figures, Statista reported that 328.77 million terabytes, or 0.33 zettabytes of data is produced each day alone. This means that the production rate can be cumulative of around 120 zettabytes each year and over 2.31 zettabytes a week. While all this seems impressive, it has its own challenges especially in the operational industry, much of the data that is produced has to be processed in real time, which can enable fast response to fluid situations (R. Subash, 2022).

This study aims to provide a more cost-effective means to be utilized by institutions, enabling them to manage and process large datasets without relying on the assistance of AI or big data analytics. It instead underscores the importance of practicing good records management as well as providing a large data management guideline. This paper takes an alternative approach which focuses on solving the inherent issues that arise in the increasing volume and complexity of big data without investing in high end software or sophisticated analytics. Instead, it assists in effectively and practically managing, evaluating and archiving data.

The justification of the guideline stems from the great need of the organizations to have a reliable way of handling big data in a more inexpensive and streamlined manner as opposed to waiting on data analysis that comes off as costly and complicated. Even though this analysis acknowledges that the big data analytics process is an important component in turning raw data into meaningful business information, it also argues that good records management practices can improve the management of big data, especially when it comes to evaluating, analysing or archiving information in a more efficient way. Within the confines of this research, this research seeks to play an important role in formulating policies that can enable organizations to handle big data in a more effective manner while at the same time not resorting to costly, complex and intricate analytics tools thus providing feasible solutions for organizations facing obstacles of big data.

7.5 Discussion and Implications

This study highlights the growing importance of records management in addressing the challenges associated with big data. As the volume and complexity of data continue to increase, organisations are required to adopt more structured and effective approaches to managing information. The findings of this study demonstrate that records management practices remain relevant, particularly in supporting data

organisation, control, and governance within complex data environments.

From a practical perspective, the study provides insights for stakeholders, including records professionals, researchers, and organisations, on how records management principles can be applied to improve big data management. While many organisations rely on advanced analytics and technological solutions, this study emphasises that fundamental records management practices continue to play a critical role in ensuring data reliability, accessibility, and usability.

From a theoretical perspective, the study contributes to the evolving understanding of records management by positioning it within the context of big data. It suggests that traditional records management approaches require adaptation to remain effective, particularly in addressing challenges related to data volume, variety, and velocity. The identification of suitable elements, together with emergent organisational factors, reflects the need for a more flexible and context-driven approach.

Besides, the findings of this study also have important implications for policy development in the context of records management and big data. As organisations increasingly operate in data-intensive environments, there is a need for policies that integrate records management principles with broader data governance frameworks.

In the Malaysian context, this includes aligning organisational practices with national digital transformation initiatives and strengthening policies related to electronic records management, data security, and information governance. The study suggests that policymakers should consider incorporating elements of records management standards, such as ISO 15489, into guidelines that address the management of large and complex datasets.

More broadly, the findings highlight the importance of developing flexible and adaptive policy frameworks that can accommodate emerging data challenges. This includes recognising the role of records management in ensuring data reliability, accountability, and long-term accessibility within evolving technological environments.

Overall, the findings imply that records management should not be viewed as a standalone function, but as an integral component of broader data governance strategies. By aligning records management practices with the demands of big data, organisations can enhance their ability to manage information more effectively and support informed decision-making.

7.6 Limitation of The Study

This study acknowledges several limitations, which should be considered within the context and scope of the research design. First, the findings are based on a selected number of informants drawn from relevant organisational sectors. The informants were purposively chosen for their experience and direct involvement in managing data, ensuring that the insights obtained are both informed and contextually grounded. While the perspectives may not represent all industries, they provide meaningful and in-depth understanding of current practices within organisations that actively engage with big data.

Second, the study focuses primarily on the Malaysian context. This focus was intentional to provide context-specific insights aligned with local organisational practices and regulatory environments. While the findings may differ in other settings, they offer a useful reference point for organisations operating in similar contexts or facing comparable challenges.

In addition, this study adopts a qualitative research approach, which enables a detailed exploration of organisational practices and professional perspectives. Although the findings are not intended for statistical generalisation, the approach allows for rich, interpretive insights that contribute to a deeper understanding of how records management practices are applied in managing big data.

Finally, the proposed framework has been developed through empirical findings and conceptual analysis, reflecting both theoretical and practical considerations. While it has not been extensively tested across large-scale organisational settings, the framework provides a structured foundation that can be further examined and refined through future implementation and validation studies.

7.7 Suggestions for Further Research

This study establishes a foundation for future research in examining the role of records management practices in managing big data. As data environments continue to evolve, there is significant potential to further explore how records management standards can be adapted to address increasingly complex data challenges.

Future research may extend this study by **investigating the integration of emerging technologies**, such as artificial intelligence (AI), blockchain, and cloud-based systems, within records management practices. These technologies offer

opportunities to enhance data classification, integrity, traceability, and scalability, and their alignment with records management principles remains an important area for further exploration.

The insights gained from interviewing representatives of organisations managing large volumes of data have provided an initial understanding of how records management elements can be applied in big data environments. However, further research may **examine specific components of records management in greater detail** to determine their effectiveness in addressing different characteristics of big data. This includes identifying which elements are most suitable for managing aspects such as data volume, value, and validity.

In addition, future studies may **explore the impact of records management practices on big data outcomes within organisations**. This may involve evaluating how structured records management approaches influence data quality, accessibility, and decision-making processes.

Another important direction for future research is the **implementation and evaluation of the framework** developed in this study. Testing the framework in different organisational settings and industries would provide further insight into its applicability, adaptability, and effectiveness in managing big data.

Furthermore, future research may also focus on **enhancing awareness of the role of records management in big data environments**. This includes examining organisational readiness, professional competencies, and policy development to support more effective data governance practices.

Overall, this study serves as a starting point for continued exploration at the intersection of records management and big data. It is hoped that future research will build upon these findings to further refine and strengthen the application of records management practices in increasingly data-driven environments.

7.8 Conclusion

This study set out to examine how records management practices can be applied in managing big data within organisational contexts. Through a combination of literature review and empirical investigation, the study has shown that while existing records management standards provide a useful foundation, they are not entirely sufficient on their own to address the growing complexity of big data environments.

One of the key insights from this research is that only selected elements of ISO 15489 are directly applicable in managing big data, particularly those related to organisation, control, and governance. At the same time, the study highlights the importance of additional factors, such as clear procedures, defined objectives, organisational knowledge, and the role of records professionals, which emerged from real-world practices. These elements reflect the need for a more flexible and context-driven approach to records management.

The findings also suggest that managing big data is not purely a technical challenge, but one that requires strong organisational coordination and governance. By integrating both standardised records management principles and practical insights from industry, this study offers a more balanced and applicable framework for organisations dealing with large and complex data environments.

From a broader perspective, this research contributes to bridging the gap between traditional records management and modern data challenges. It demonstrates that records management remains relevant but must evolve to remain effective in a data-intensive environment. The framework developed in this study provides a practical starting point for organisations, particularly within the Malaysian context, while also offering insights that may be applicable in similar settings.

In addition, this study contributes to the broader development of records management standards by extending the application of ISO 15489 into the context of big data. The integration of traditional records management principles with contemporary data challenges provides insights that may inform future adaptations of records management frameworks at a global level. This highlights the relevance of records management beyond conventional practices, positioning it as a key component in modern data governance.

Overall, this study reinforces the importance of adapting existing standards to meet current data realities. It is hoped that the findings will support organisations in strengthening their data governance practices and encourage further research at the intersection of records management and big data.

7.9 Declaration of Artificial Intelligent (AI)

In preparing this research, the author(s) utilized OpenAI's ChatGPT and Microsoft Copilot to enhance readability, grammar, and language after substantial revisions had been made. Following the use of this tool, the author(s) thoroughly reviewed and adjusted the content as needed, taking full responsibility for the final publication. All material in the paper is original and created by the author(s). The tool was used exclusively during the major revision phase to assess readability and language and was not involved in generating any content.

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APPENDICES

APPENDIX A

ATLAS.ti Results (Networking)

The screenshot displays the ATLAS.ti project overview. The main title is 'SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIPLE CASE STUDIES OF MALAYSIAN ORGANIZATIONS'. Below the title, there is a 'Project Overview' section with a table of project statistics:

Category	Count
Documents	3
Codes	147
Quotations	149
Memos	1
Networks	7

Additional information includes: Created by NOR SA...WI on 23 Dec 2024, Last edited on 28 Dec 2024, Current user: NOR SAKILA ASNAWI, and Version: 25.0.1 (32922). The right sidebar shows a list of project elements and a comment section.

This screenshot shows a detailed view of the project's content structure. It lists the following categories and their associated counts:

- Documents (3)**
 - 1 Informant A: 54
 - 2 Informant B: 51
 - 3 Informant C: 44
- Codes (49)**
 - 1. The important of Records Management Practices: 5
 - 2. View of Big Data: 17
 - 3. Relationship of Records Management & Big Data: 8
 - 4. Suitable Elements of Records Management in Managing Big Data: 34
 - 5. Emergent Elements: 21
 - 6. Most Important Element in Managing Big Data: 9
 - 7. Believe RM Standard Suitable in Managing Big Data: 7
 - 8. Impact of this Research: 4

Network Manager

SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIP...

+

▼

New

🗑

Delete

No Grouping

↕

Grouping

📄

▼

Export

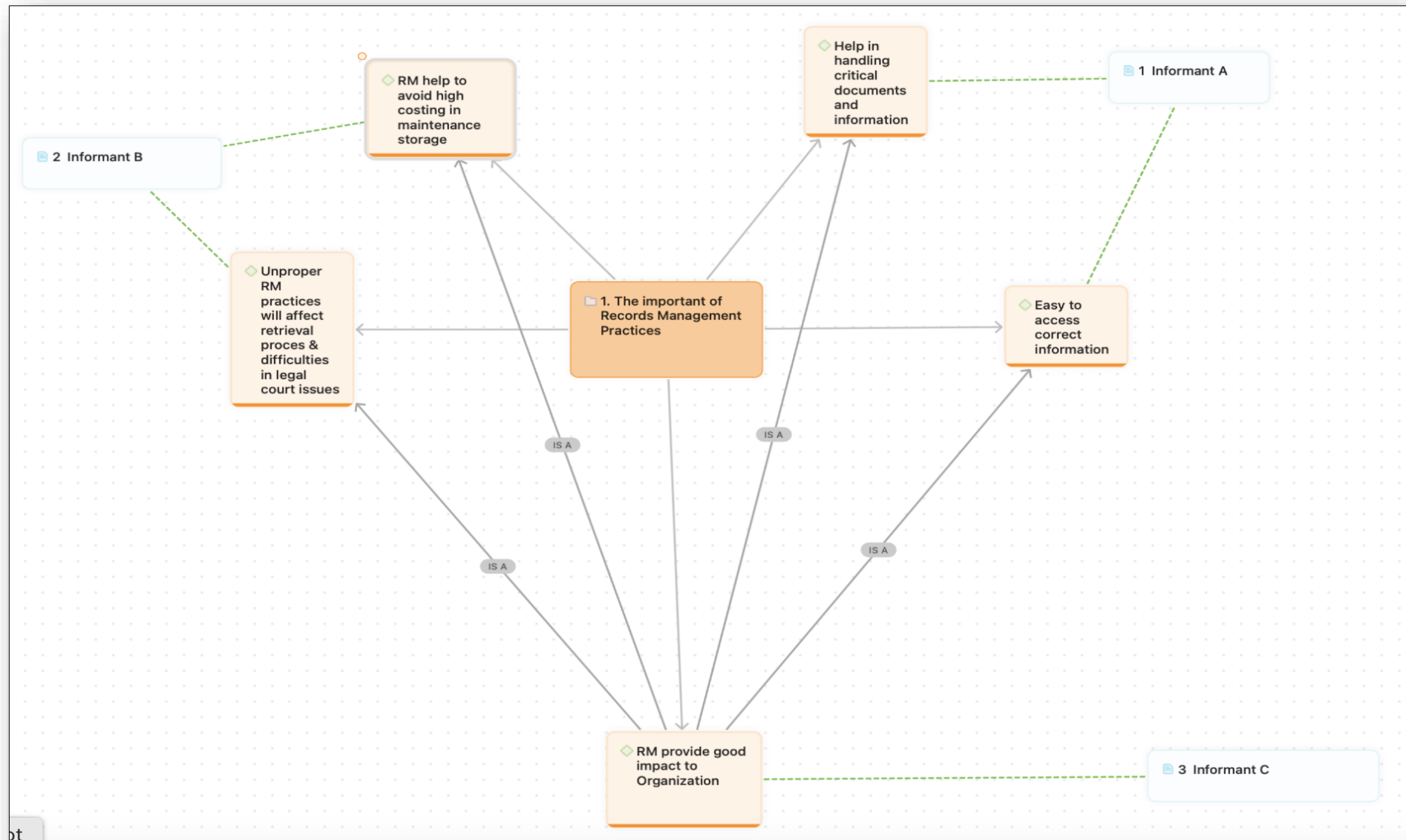
🔍

Filter

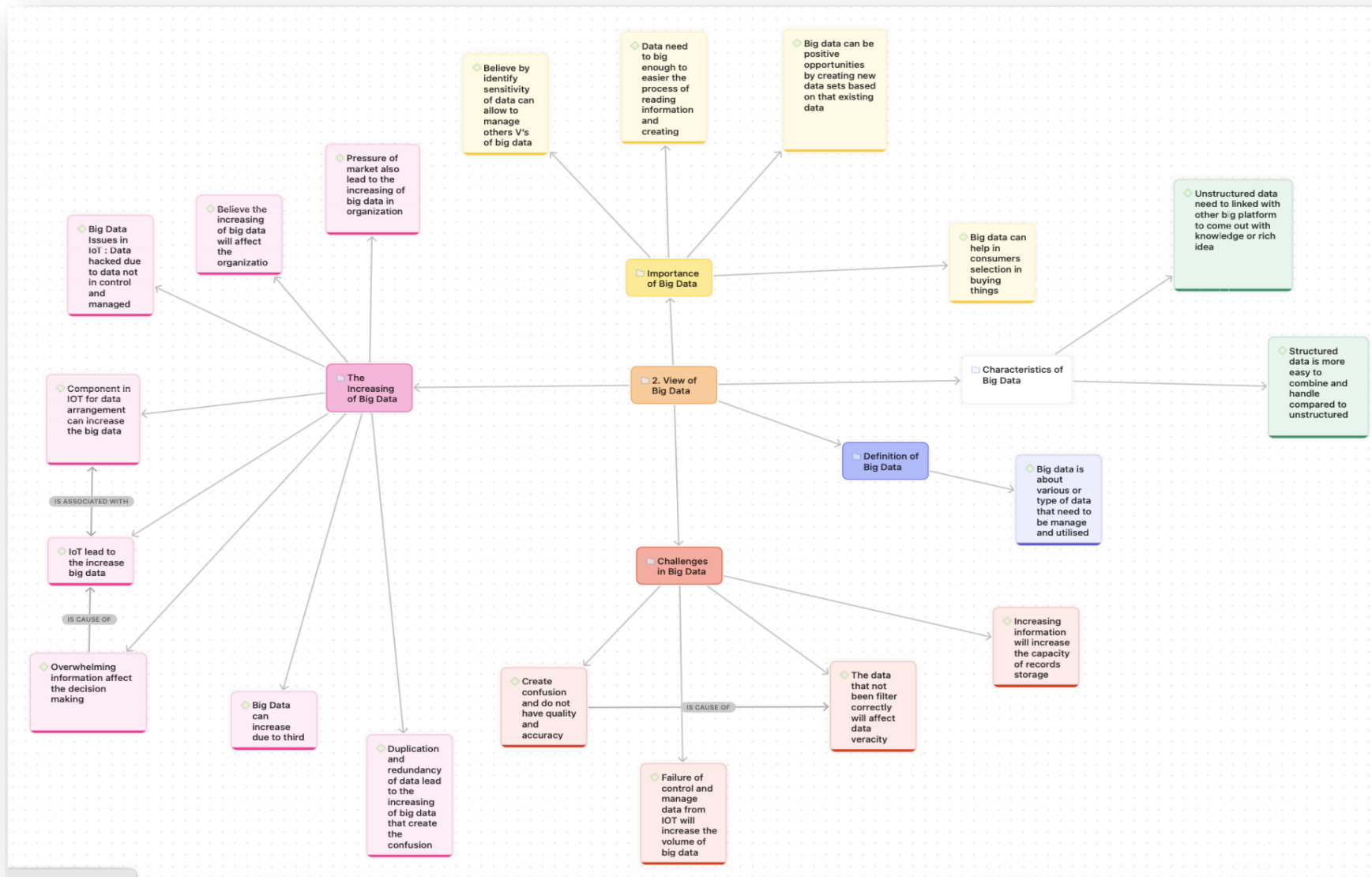
Name	Groups	Comment
🔗 1. The important of Records Management Practices		
🔗 2. View of Big Data		
🔗 3. Relationship of RM and Big Data		
🔗 4. Suitable Elements of RM in Managing Big Data		
🔗 5. Emergent Elements		
🔗 6. Most Important Element		
🔗 8. Impact of this research		

Result: 7 of 7 Network(s)

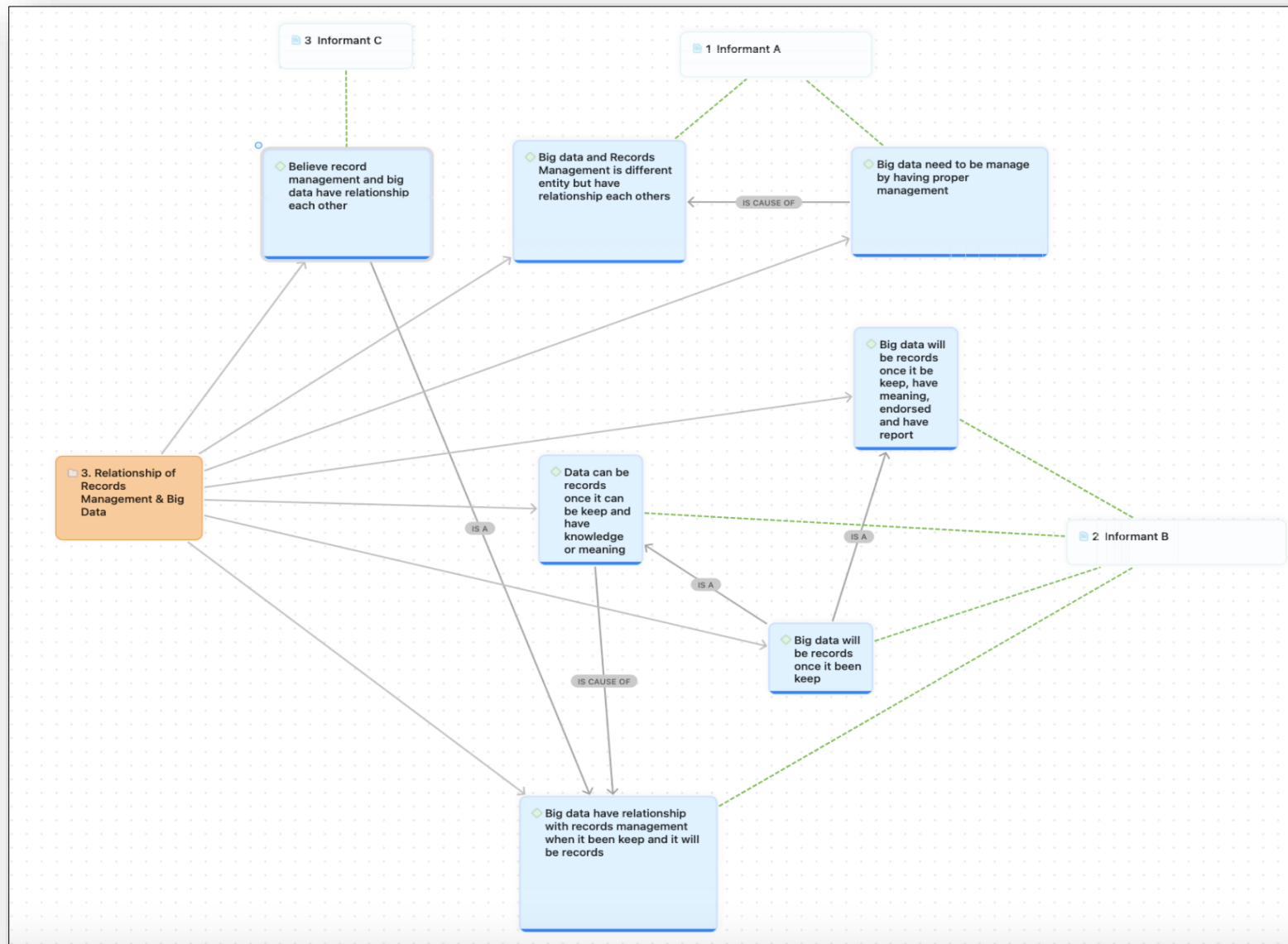
Networking ATLAS.ti – 1. The Important of Records Management Practices



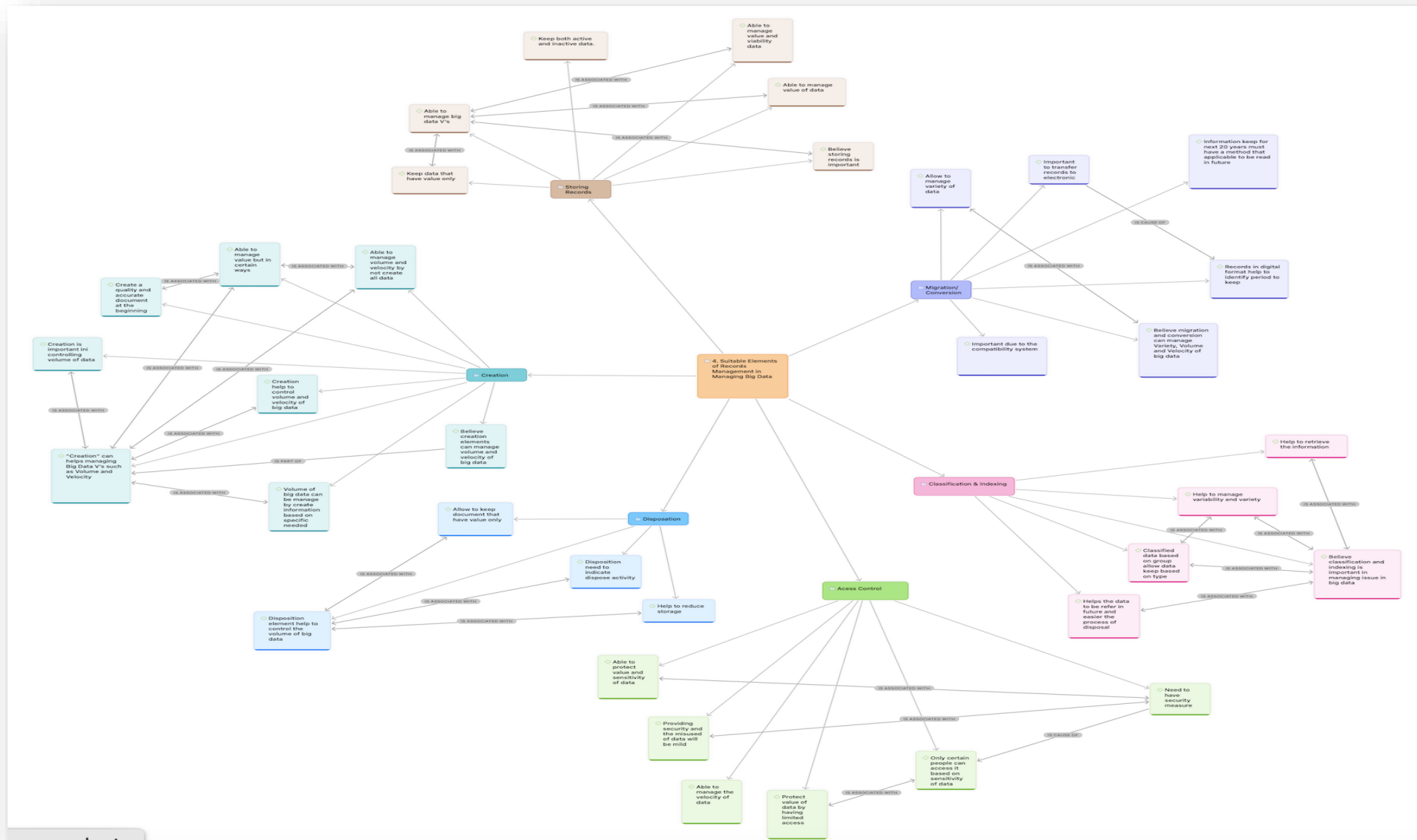
Networking ATLAS.ti – 2. View of Big Data



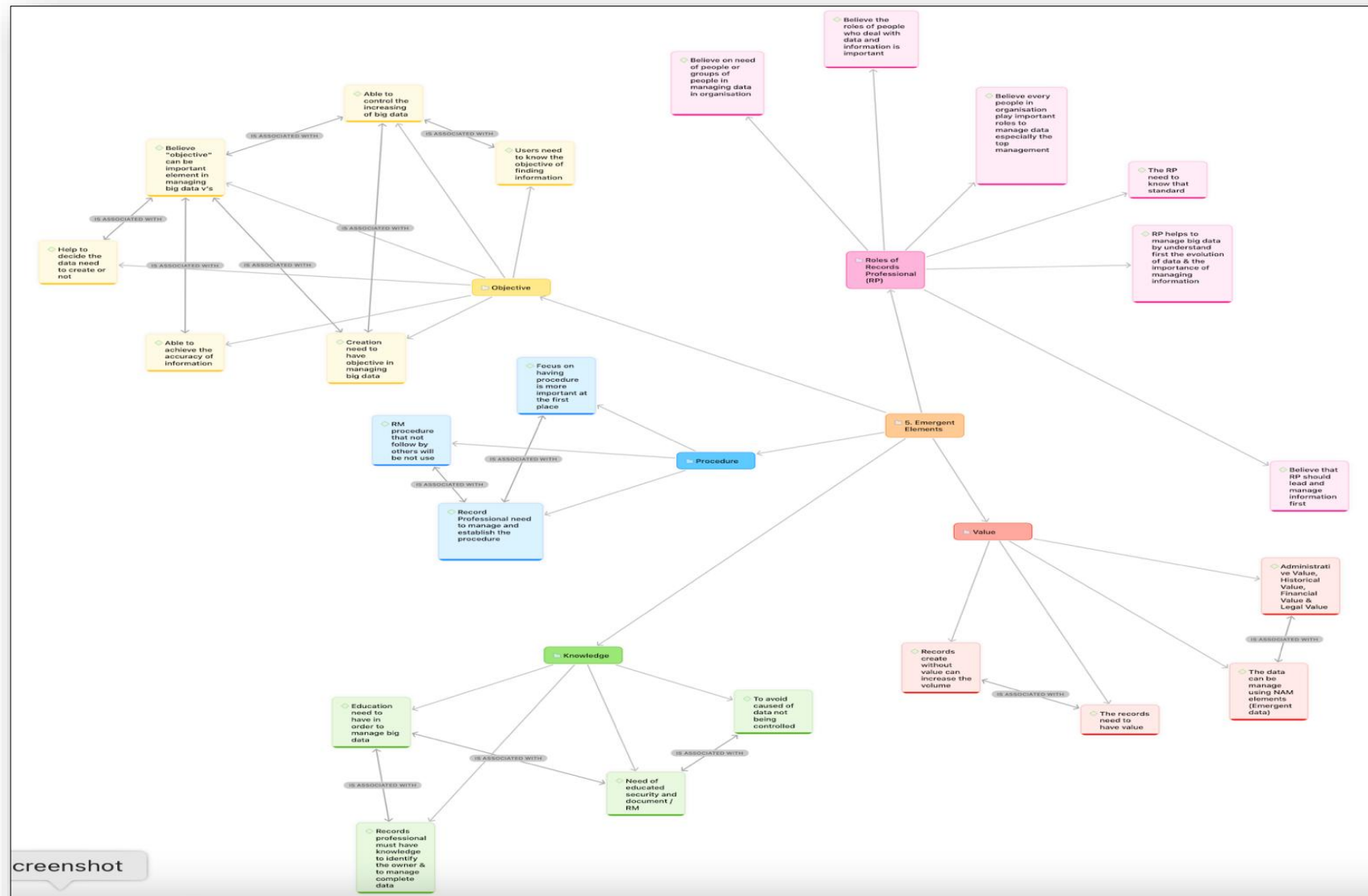
Networking ATLAS.ti – 3. Relationship of Records Management and Big Data



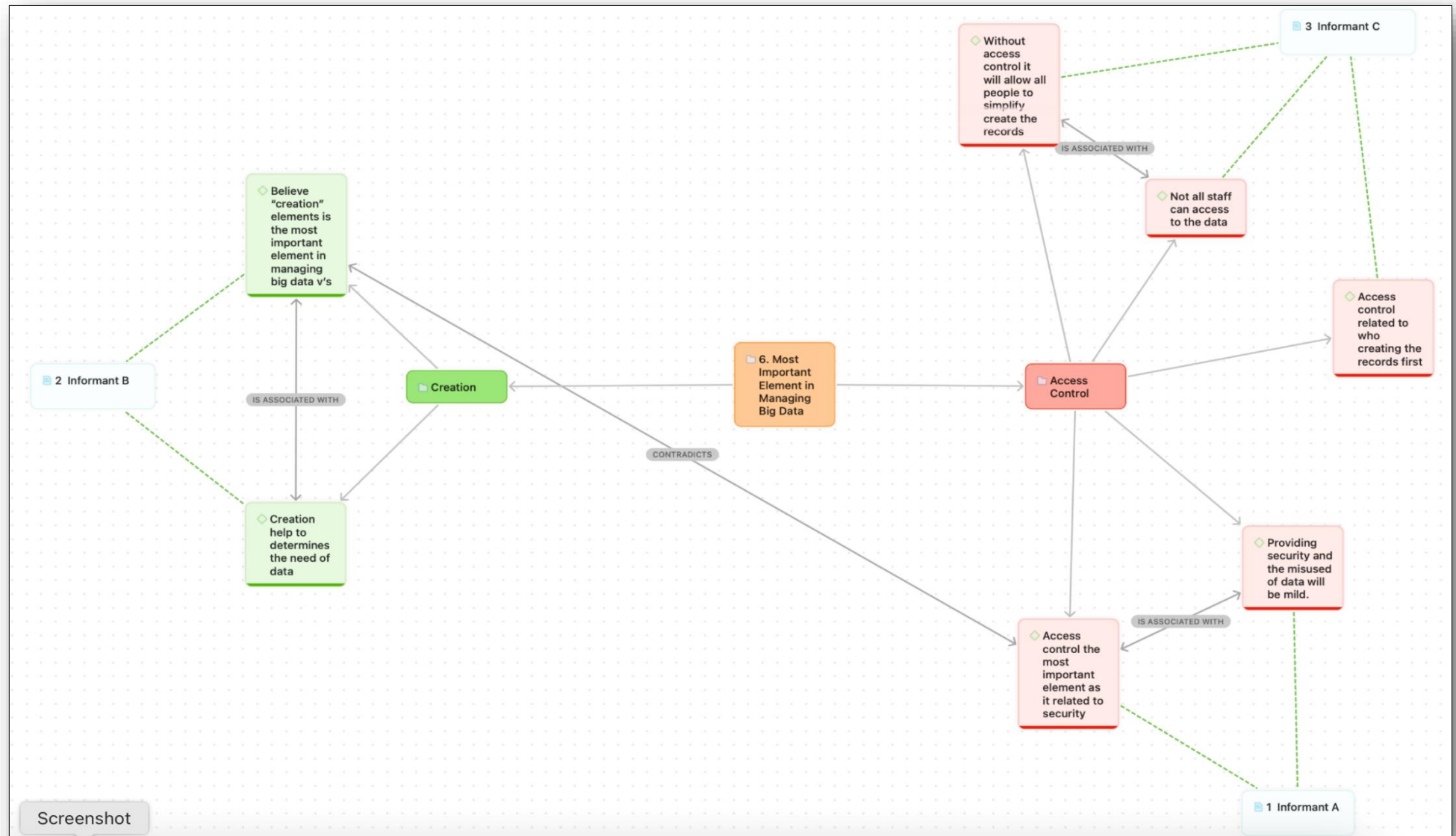
Networking ATLAS.ti – 4. Suitable Elements of Records Management in Managing Big Data



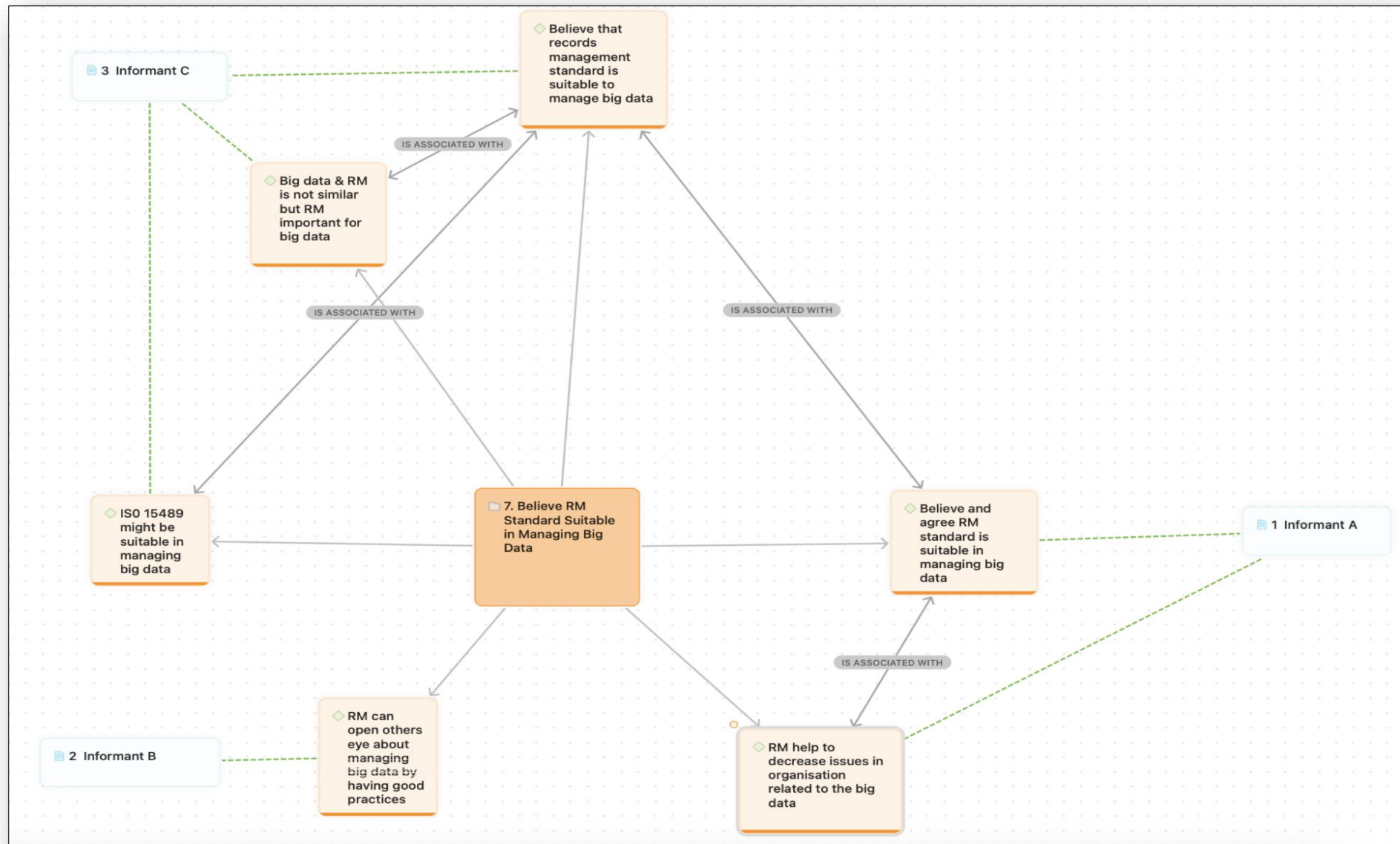
Networking ATLAS.ti – 5. Emergent Elements



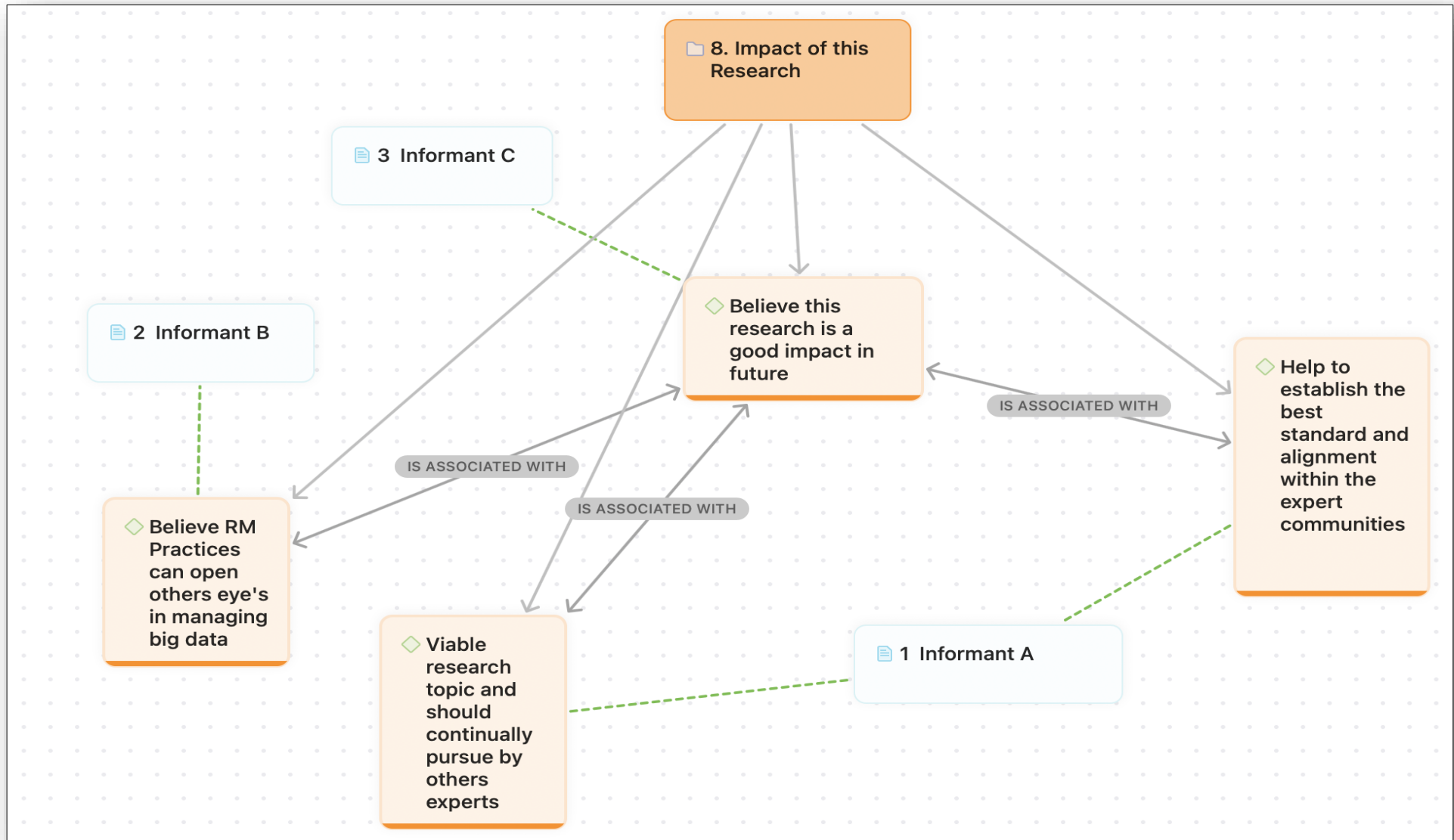
Networking ATLAS.ti – 6. Most Important Element in Managing Big Data



Networking ATLAS.ti – 7. Believes Records Management Standard Suitable in Managing Big Data



Networking ATLAS.ti – 8. Impact of this Research



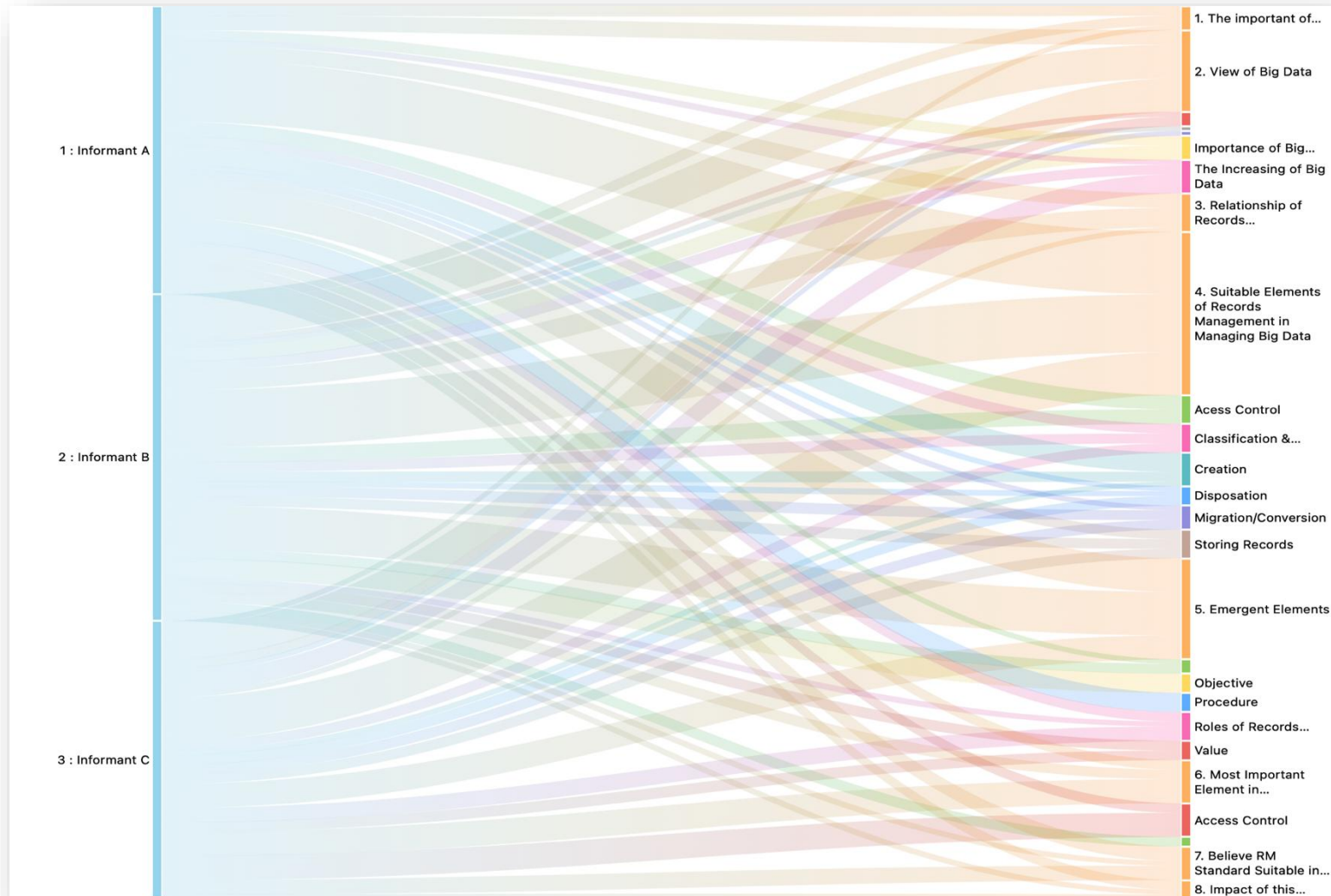
APPENDIX B

ATLAS.ti Results (Table)

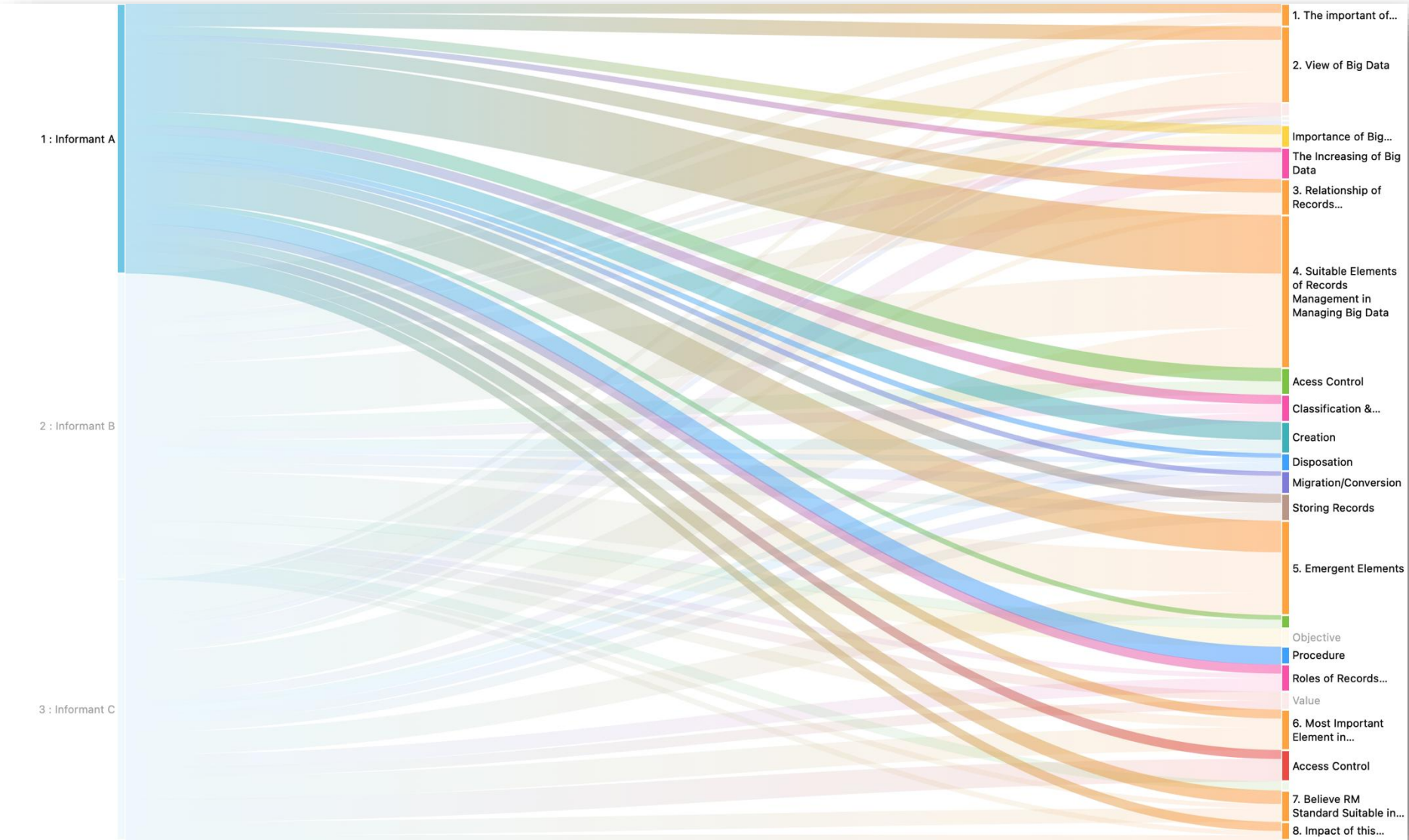
		1 Informant A 54	2 Informant B 51	3 Informant C 44	Totals
1. The important of Records Management Practices	5 5	2	2	1	5
2. View of Big Data	19 17	3	7	7	17
Challenges in Big Data	4 3		1	2	3
Characteristics of Big Data	2 1		1		1
Definition of Big Data	1 1			1	1
Importance of Big Data	4 5	2	3		5
The Increasing of Big Data	8 7	1	2	4	7
3. Relationship of Records Management & Big Data	7 8	3	4	1	8
4. Suitable Elements of Records Management in Managin...	34 34	13	12	9	34
Access Control	6 6	3	3		6
Classification & Indexing	5 6	2	2	2	6
Creation	7 7	4	2	1	7
Disposition	4 4	1	1	2	4
Migration/Conversion	6 5	1	2	2	5
Storing Records	6 6	2	2	2	6
5. Emergent Elements	23 21	7	9	5	21
Knowledge	4 3	1	2		3
Objective	6 4		4		4
Procedure	3 4	4			4
Roles of Records Professional (RP)	6 6	2	1	3	6
Value	4 4		2	2	4
6. Most Important Element in Managing Big Data	7 9	2	2	5	9
Access Control	5 7	2		5	7
Creation	2 2		2		2
7. Believe RM Standard Suitable in Managing Big Data	6 7	3	1	3	7
8. Impact of this Research	4 4	2	1	1	4
Totals		60	68	58	186

APPENDIX C

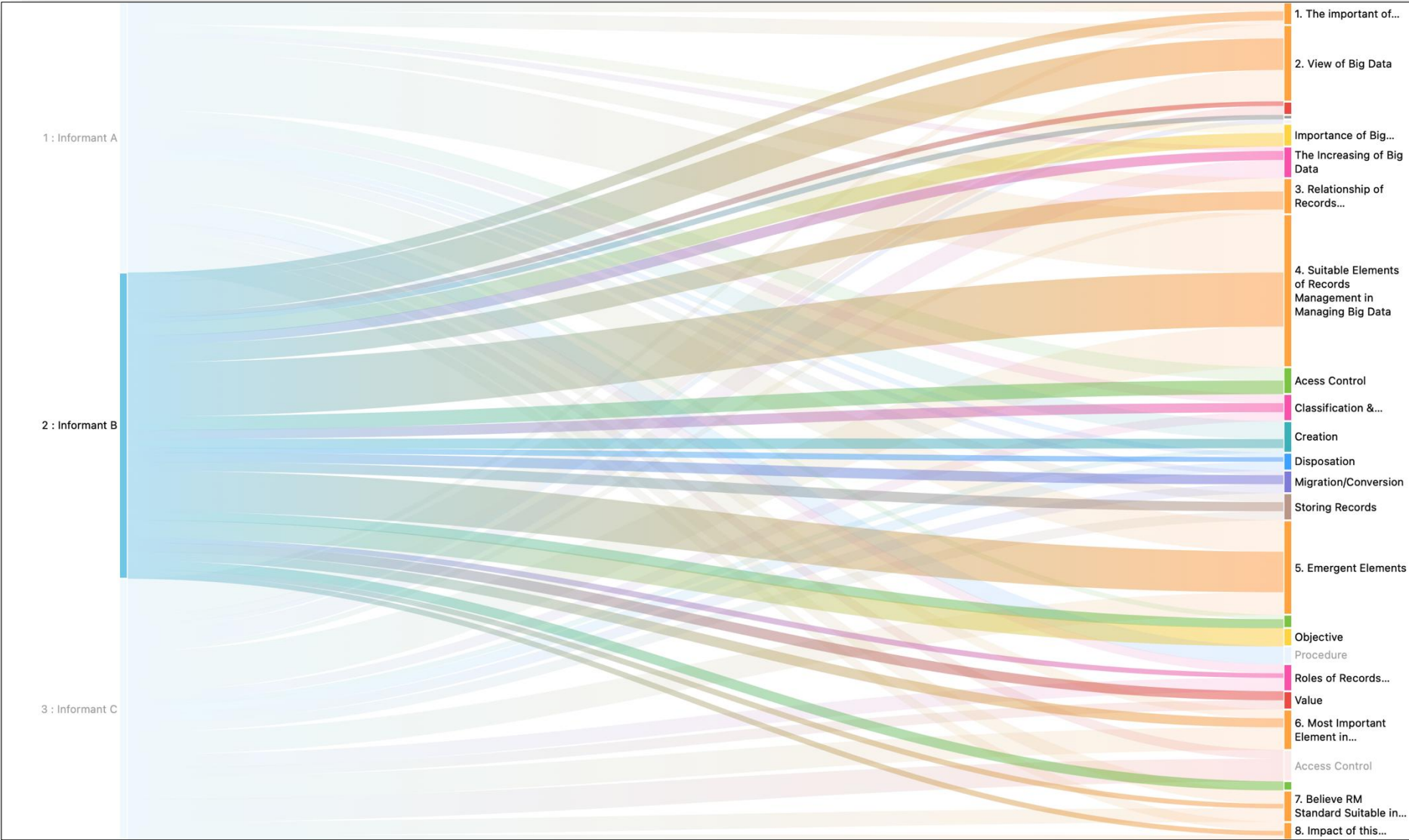
ATLAS.ti Results (Sankey Diagram)



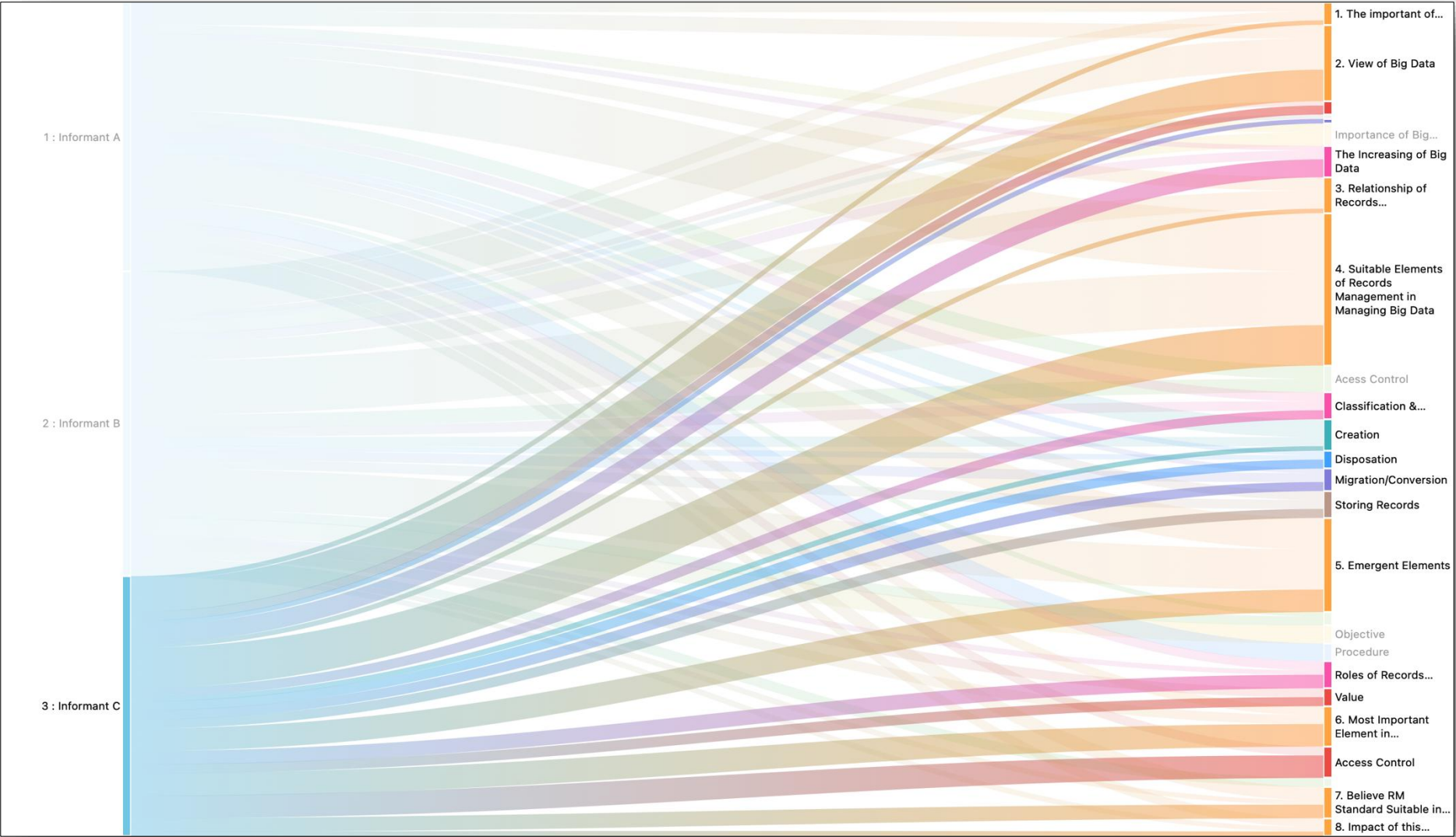
Sankey Diagram ATLAS.ti – Informant A



Sankey Diagram ATLAS.ti – Informant B



Sankey Diagram ATLAS.ti – Informant



APPENDIX D

ATLAS.ti Report

ACCESSING THE SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIPLE CASE STUDIES OF MALAYSIAN ORGANIZATIONS

Documents grouped by Codes

Report created by NOR SAKILA ASNAWI on 28 Dec 2024

● "Creation" can helps managing Big Data V's such as Volume and Velocity

1 Documents:

1 Informant A

Text Document

Created: 23/12/2024 by NOR SAKILA ASNAWI, **Modified:** 25/12/2024 by NOR SAKILA ASNAWI

Quotations:

1:1 ¶ 8, Documents Management for example contracts need to be backup digitally and in Informant A 1:2 ¶ 10, if you looking at a scraping data or putting together others to abstract them, much easier to do in... in Informant A 1:3 ¶ 28, .. you know kind of volume of data and if you are in a very big organizations like Google and you ha... in Informant A 1:4 ¶ 36, I mean even IoT or something of that only vaguely familiar with but, just using example in our home,... in Informant A 1:5 ¶ 38, we have ten thousands customers were data have been hacked, we working very hard to make the situati... in Informant A 1:7 ¶ 40, . So, if you are no standard like there are known standard, then so that's this data could be manage... in Informant A 1:8 ¶ 48, Let's say when you sign a contract that digital versions of contract, you cannot just store in empl... in Informant A 1:9 ¶ 58, EVN: Yes, absolutely. I really could appreciate good records management. I mean, if you do not have... in Informant A 1:10 ¶ 60, , you can probably have great records management on paper, like process flow and procedure but if th... in Informant A 1:11 ¶ 66, But, its seems to me the records management is around what you do with that data. Do you do nothing... in Informant A 1:12 ¶ 70, there are not really similar, there are two different items to me that records management has relati... in Informant A 1:13 ¶ 77 – 78, NSA: Okay, in your opinion, did you believe that records management standards is suitable in managin... in Informant A 1:14 ¶ 78, But, there are also possibility big data can make the world worst. So, proper management of big data... in Informant A 1:15 ¶ 78, Security link, people or company using that data for purposes with not interested owner the data or... in Informant A 1:16 ¶ 78, . So, proper control in this instant lets said this recording might be manage and stored probably no... in Informant A 1:18 ¶ 92, So I think yes, should be some people or group of people that help the organizations and manage all... in Informant A 1:19 ¶ 94, Okay, one thing is that, I would be possible control the data directly because there are too much da... in Informant A 1:20 ¶ 94, Not necessary hands on, analyse the data themselves. I think that will not be responsibility records... in Informant A 1:21 ¶ 96, . The records professional probably need to know that standard very well. Make sure the organization... in Informant A 1:22 ¶ 98, I can conclude a conclusion on records management professional, focusing around procedure rather the... in Informant A 1:23 ¶ 102, So, I guess it is probably distributed practices when individual people managing data that comes to... in Informant A 1:24 ¶ 106, Let's said the customers sent me the

excel spreadsheet of power plant data. So, those can be differe... in Informant A 1:25 ¶ 110, , lets said it comes in email then we will put in on our centralized server so others engineer can... in Informant A 1:26 ¶ 110, So, we must make sure the employee do that for business critical and like I mention put in server, l... in Informant A 1:27 ¶ 110, So a long those line, you need a proper backup. So, in case somebody accidently delete something, th... in Informant A 1:28 ¶ 131, , it is not clear to me how much efforts required to manage all this elements. Maybe the organizatio... in Informant A 1:29 ¶ 140, I think, it is about describe what data should be created or not created. Maybe, there are certain r... in Informant A 1:30 ¶ 141 – 142, . So, in that case, did you believe that the creation element can helps managing Big Data V's such a... in Informant A 1:31 ¶ 146, "Value" is bit difficult, but I guess could be a roles there. Maybe whether it can be create or not,... in Informant A 1:32 ¶ 154, Probably nothing. Because "capture" sounds like "creation" to me. So, I must not be understand on so... in Informant A 1:33 ¶ 166, Classification I think is like tagging the data with some kind method data to said that.. maybe if y... in Informant A 1:34 ¶ 167 – 168, You can classified and index it. At the end people can know where to retrieve that one document. So,... in Informant A 1:35 ¶ 176, Wait, back to the question, can classification handle the big data v's. I guess so, maybe variabilit... in Informant A 1:36 ¶ 180, I am trying to thinking in term of if there are big data sets and I need to tag then I will be able,... in Informant A 1:37 ¶ 184, Yes okay. Let's said I have valuable information but only one person have access then it is less rel... in Informant A 1:38 ¶ 186 – 188, EVN: Yes, I think so. NSA: How about others V's ? EVN: Maybe the "Velocity" but I am not really sure... in Informant A 1:39 ¶ 189 – 192, "storing records" element is important in managing Big Data V's especially related to Value and Viab... in Informant A 1:40 ¶ 194, I can see the Value is yes but Viability is hard to see so. I hesitate to say yes or know actually. in Informant A 1:41 ¶ 208, EVN: Yes. Maybe variety. Because I guess it also determine like if I want to create data, and migrat... in Informant A 1:42 ¶ 214, Because, if I kept the data forever, I won't have anymore space because the volume will be to great.... in Informant A 1:43 ¶ 224, EVN: I think, access control, creation. Okay yes maybe access control and creation. I think it is ar... in Informant A 1:44 ¶ 224 – 226, think it is around the security and misused of data will be mild. NSA: So, the access control is mo... in Informant A 1:45 ¶ 229 – 230, NSA: Then it is okay, we almost go to the conclusion. But, before that, are you think that, can the... in Informant A 1:46 ¶ 232, what can I see is more on opportunity rather than problem. I mean problem also can be positive but,... in Informant A 1:47 ¶ 232, You are asking about the Big Data V's, but the volume could be extreme if you try to create them. Ma... in Informant A 1:48 ¶ 234, Yes, because without control and standard, managing big data will become very difficult across many... in Informant A 1:49 ¶ 236, I guess, my point of view its same like the value of contributing to standardization. Standardizatio... in Informant A 1:50 ¶ 242, : Yes, absolutely. For people that have some knowledge of data, I am sure this would be much easier... in Informant A 1:51 ¶ 244, So, I will conclude, there are lots of settle differences and how records management gets standardiz... in Informant A 1:52 ¶ 78, . So, proper control in this instant lets said this recording might be manage and stored probably no... in Informant A 1:53 ¶ 106, Let's said the customers sent me the excel spreadsheet of power plant data. So, those can be differe... in Informant A 1:54 ¶ 167 – 168, You can classified and index it. At the end people can know where to retrieve that one document. So,... in Informant A 1:55 ¶ 38, What is the caused not being control ? I guess, I maybe I would be not educated security or not educ... in Informant A 1:56 ¶ 224, VN: I think, access control, creation. Okay yes maybe access control and creation. I think it is aro... in Informant A

Codes:

- "Creation" can helps managing Big Data V's such as Volume and Velocity
- Able to manage big data V's
- Able to manage the velocity of data
- Able to manage value but in certain ways
- Able to manage value of data
- Able to manage volume and velocity by not create all data
- Access control the most important element as it related to security
- Backup data is needed in managing data
- Believe and agree RM standard is suitable in managing big data
- Believe migration and conversion

can manage Variety, Volume and Velocity of big data • Believe on need of people or groups of people in managing data in organisation • Believe that Records Management is suitable in Managing Big Data • Big data and Records Management is different entity but have relationship each others • Big data can be positive opportunities by creating new data sets based on that existing data • Big data can help in consumers selection in buying things • Big Data Issues in IoT : Data hacked due to data not in control and managed • Big data need to be manage by having proper management ○ Centralises system can help manage big data but not for small adhoc works ○ Centralized server will help in managing data ○ Centralized server will help in managing data and easy to access information • Easy to access correct information • Focus on having procedure is more important at the first place • Help in handling critical documents and information • Help to establish the best standard and alignment within the expert communities • Help to manage variability and variety • Help to open others eyes on the important of RM especially in managing the Big Data • Help to reduce storage • Help to retrieve the information • How to handle structured and unstructured data • IoT lead to the increasing of big data • New Emerge Solution: Backup Digitally ○ Not really sure on meaning of capture ○ Organization need to do costs benefit analysis to manage all elements • People will lost trust on information if data not be controlled ○ Personal distributed practices can be alternative in managing and control big data or information ○ Perspective on creation element • Protect value of data by having limited access • Providing security and the misused of data will be mild • Providing security and the misused of data will be mild. ○ Reasons of classification elements need in variety • Record Professional need to manage and establish the procedure • RM help to decrease issues in organisation related to the big data • RM procedure that not follow by others will be not use • RM standard need to improve the quality • The RP need to know that standard very well • To avoid caused of data not being controlled ○ Understanding of classification meaning • Viable research topic and should continually pursue by others experts • Volume of big data can be manage by create information based on specific needed

● Able to achieve the accuracy of information

1 Documents:

2 Informant B

Text Document

Created: 23/12/2024 by NOR SAKILA ASNAWI, **Modified:** 25/12/2024 by NOR SAKILA ASNAWI

Quotations:

☺ 2:1 ¶ 9, Normally, bank manage structured data sahaja yang ada numbers, figures, value because that one can r... in Informant B ☺ 2:2 ¶ 9, I think, kalau to make jadi big data biasanya, from my understanding will be another third party yan... in Informant B ☺ 2:3 ¶ 13, Big data kalau unstructured I tak tahu berapa besar data yang dia nak buat but, kalau structured kit... in Informant B ☺ 2:4 ¶ 17, Orang kata, knowledge yang kita tak tahu pun dia akan keluarkan. So, dia akan memudahkan kita untuk... in Informant B ☺ 2:5 ¶ 21, So, that is my understanding big data itu macam mana kalau unstructured macam tu, I mean you kena li... in Informant B ☺ 2:6 ¶ 25, . Kalau dia nak become "big" sepatutnya dia taka da restriction sangat lah. Cuma, dia kena ada direc... in Informant B ☺ 2:7 ¶ 49, f you have records management section to manage, kita akan tahu macam mana nak simpan those data, be... in Informant B ☺ 2:8 ¶ 49, If you tidak manage better it will affect the costs, mungkin simpan tidak proper, you susah nak cari... in Informant B ☺ 2:9 ¶ 61, Capacity makin lama makin tidak cukup bila kita simpan electronic dan digital banyak. So, our IT uni... in Informant B ☺ 2:10 ¶ 61, Rupanya, bila kita nak upgrade the system, to make it more intelligent, rupanya banyak data yang dia... in Informant B ☺ 2:11 ¶ 61, So, those study kena selalu di buat, those analysis mesti selalu dibuat to make sure the rekod yang... in Informant B ☺ 2:12 ¶ 69, Okay, dia ada relate bila kita simpan. Kalau tidak simpan, tidak jadi. Bila kita simpan, simpan ke r...

in Informant B ☺ 2:13 ¶ 69, Maknanya, rekod yang tadi I mean big data kena ada nama data tersebut, for example data in what, dat... in Informant B ☺ 2:14 ¶ 73, Big data baca macam itu. Itulah objektif yang kita nak. So, bila data tu besar, dia boleh baca trend... in Informant B ☺ 2:15 ¶ 73, Maknanya, kalau kita nak simpan big data as a rekod, dia mesti dah siap all those analysis. Sekurang... in Informant B ☺ 2:16 ¶ 84, In a simple words, what I can say big data itu macam saya cakap kita tahu data apa and bila nak simp... in Informant B ☺ 2:17 ¶ 88, Yes betul, dia mesti kena ada hubungkait. Ianya akan jadi rekod yang kita boleh baca. Big data kita... in Informant B ☺ 2:18 ¶ 96, Its depends, you tengok records management atau guideline, policies its about record or its about da... in Informant B ☺ 2:19 ¶ 99, Yes depends, macam mana institution itu manage record dia. Siapa yang manage records and siapa yang... in Informant B ☺ 2:20 ¶ 118, Ya seperti yang saya cakap tadi, apabila data tersebut menjadi information and knowledge, dan kita d... in Informant B ☺ 2:21 ¶ 130, The data that we take should have administrative value, historical value, financial value, legal whi... in Informant B ☺ 2:22 ¶ 141, So, in bank, the statistic department and also others department is handle the big data. Some depart... in Informant B ☺ 2:23 ¶ 145, : Like I said, once the statistic department done analyse the data, they will pass to us. The data s... in Informant B ☺ 2:24 ¶ 149, Its very important. But the, we need to understand the evolution of data to become records or knowle... in Informant B ☺ 2:25 ¶ 157, I think, you must have knowledge and not manage. Sebabnya, apabila orang nak berurusan dengan kita,... in Informant B ☺ 2:26 ¶ 201, Okay, kalau dari creation kita kena ada objektif lah, contohnya kita kena decide nak buat apa dengan... in Informant B ☺ 2:27 ¶ 205, Yes, dia kena tahu objective apa yang dia nak cari dulu. So, from that objective mungkin ada team di... in Informant B ☺ 2:28 ¶ 207 – 209, : Jadi, boleh saya conclude kan actually “creation” ini penting dari segi nak kawal the volume of da... in Informant B ☺ 2:29 ¶ 219 – 225, NSA: Okay, so far based on my reading, creation ini penting on volume and velocity. SHAH: Yes betul... in Informant B ☺ 2:30 ¶ 229, I think based on apa yang you dah listkan in term of discipline, semuanya perlulah, and probably in... in Informant B ☺ 2:31 ¶ 233, So, kalau you nak validate data itu macam mana. So, process tersebut you kena “master” dulu. You mus... in Informant B ☺ 2:32 ¶ 233, But, this one different sebab education penting untuk kita faham semua, but untuk kita make decision... in Informant B ☺ 2:33 ¶ 245, Okay, for classification dan indexing yang saya Nampak adalah you mudah untuk refer kemudianlah. You... in Informant B ☺ 2:34 ¶ 247 – 249, Okay, baik faham, kalau elemen-elemen dalam big data v’s, adakah En. Shahrin rasa membantu atau tida... in Informant B ☺ 2:35 ¶ 254, So, Access control come to that basic so bila kita classified and index, kita letak sekali security... in Informant B ☺ 2:36 ¶ 258, Sensitivity itu termasuk jugak value. Kadang-kadang depends on situation, kalau value lebih 1 juta a... in Informant B ☺ 2:37 ¶ 258 – 266, Sensitivity akan cover semua V yang you ada. NSA: Okay faham. SHAH: Kita tak tahu mana satu (sensit... in Informant B ☺ 2:38 ¶ 270, Storing of data itu memang pentinglah. Kita memang kena store data tersebut sebab later kita nak ref... in Informant B ☺ 2:39 ¶ 272 – 278, NSA: Kalau dari segi viability – data activeness, adakah kita hanya simpan data yang active sahaja a... in Informant B ☺ 2:40 ¶ 283 – 285, Okay baik, kalau dari segi elemen V yang lain kena check balik. Okay untuk elemen “use and re-use” s... in Informant B ☺ 2:41 ¶ 287 – 289, NSA: Okay, kalau dari segi V tadi ? SHAH: Value ada. Dia bukan value nombor ya, dia value nilai. Val... in Informant B ☺ 2:42 ¶ 293, Okay untuk migrate, for sure we need to migrate as much as possible record to electronic untuk memud... in Informant B ☺ 2:43 ¶ 293, So, disposition punya exercise dia tak akan berhenti, dia akan ada sepanjang dalam simpanan kital... in Informant B ☺ 2:44 ¶ 305, I think, kalau tengok cycle yang ada, I think “creation” is very important lah. Creation punya area... in Informant B ☺ 2:45 ¶ 305, But, you must have your own objective. Kalau tak ada objective, you tak tahu apa you nak create. Seb... in Informant B ☺ 2:46 ¶ 332, Macam mana nak cakap ya, you cuba tengok the relationship between records management and managing da... in Informant B ☺ 2:47 ¶ 336, I think yes bila keluar some reports, something macam ini, records management akan become important... in Informant B ☺ 2:48 ¶ 130, The data that we take should have administrative value, historical value, financial value, legal whi... in Informant B ☺ 2:49 ¶ 254, So, Access control come to that basic so bila kita classified and index,

kita letak sekali security... in Informant B ☹ 2:50 ¶ 305, Creation itu penting sebab akan determine semua apa yang you nak buat. in Informant B ☹ 2:51 ¶ 336, I think yes bila keluar some reports, something macam ini, records management akan become important... in Informant B

Codes:

- Able to achieve the accuracy of information ● Able to control the increasing of big data ● Able to protect value and sensitivity of data ● Administrative Value, Historical Value, Financial Value & Legal Value ● Allow to keep document that have value only ● Believe "objective" can be important element in managing big data v's ● Believe by identify sensitivity of data can allow to manage others V's of big data ● Believe creation elements can manage volume and velocity of big data ○ Believe not all elements records management practices can manage big data, maybe have but not many ● Believe RM Practices can open others eye's in managing big data ● Believe "creation" elements is the most important element in managing big data v's ● Big Data can increase due to third party ● Big data have relationship with records management when it been keep and it will be records ● Big data will be records once it be keep, have meaning, endorsed and have report ● Big data will be records once it been keep ● Classified data based on group allow data keep based on type ● Creation help to determines the need of data ● Creation is important in controlling volume of data ● Creation need to have objective in managing big data ● Data can be records once it can be keep and have knowledge or meaning ○ Data from statistic department need to analyse first and endorse by authorise person before transfer to Records department ● Data need to big enough to easier the process of reading information and creating report ● Education need to have in order to manage big data ● Help to decide the data need to create or not ● Helps the data to be refer in future and easier the process of disposal ● How to handle structured and unstructured data ● Important to transfer records to electronic ● Increasing information will increase the capacity of records storage ● Information keep for next 20 years must have a method that applicable to be read in future ○ Information upgrade need to be read for next future ● IoT lead to the increase big data ● Keep both active and inactive data. ● Keep data that have value only ● Need to have security measure ○ Objective is important to manage big data ● Only certain people can access it based on sensitivity of data ● Overwhelming information affect the decision making ● Records in digital format help to identify period to keep ○ Records Management standard maybe suitable or not in manage big data depends on situation ● Records professional must have knowledge to identify the owner & to manage complete data ● RM can open others eye about managing big data by having good practices ● RM help to avoid high costing in maintenance storage ● RP helps to manage big data by understand first the evolution of data & the importance of managing information ○ Statistic department responsible in managing big data before transfer to records department ● Structured data is more easy to combine and handle compared to unstructured ● The data can be manage using NAM elements (Emergent data) ● The relationship between big data and records when the big data have meaning and can be keep then it is can consider as records ○ Understand the process is important to manage big data ● Unproper RM practices will affect retrieval proses & difficulties in legal court issues ● Unstructured data need to linked with other big platform to come out with knowledge or rich idea ○ Use and re-use elements important by use the records and creating knowledge that at the end can be call as corporate memory ○ Use and re-use elements important in managing elements Value data especially historical value ● Users need to know the objective of finding information

● Able to control the increasing of big data

1 Documents:

2 Informant B

Text Document

Quotations:

☺ 2:1 ¶ 9, Normally, bank manage structured data sahaja yang ada numbers, figures, value because that one can r... in Informant B ☺ 2:2 ¶ 9, I think, kalau to make jadi big data biasanya, from my understanding will be another third party yan... in Informant B ☺ 2:3 ¶ 13, Big data kalau unstructured I tak tahu berapa besar data yang dia nak buat but, kalau structured kit... in Informant B ☺ 2:4 ¶ 17, Orang kata, knowledge yang kita tak tahu pun dia akan keluarkan. So, dia akan memudahkan kita untuk... in Informant B ☺ 2:5 ¶ 21, So, that is my understanding big data itu macam mana kalau unstructured macam tu, I mean you kena li... in Informant B ☺ 2:6 ¶ 25, . Kalau dia nak become “big” sepatutnya dia taka da restriction sangat lah. Cuma, dia kena ada direc... in Informant B ☺ 2:7 ¶ 49, f you have records management section to manage, kita akan tahu macam mana nak simpan those data, be... in Informant B ☺ 2:8 ¶ 49, If you tidak manage better it will affect the costs, mungkin simpan tidak proper, you susah nak cari... in Informant B ☺ 2:9 ¶ 61, Capacity makin lama makin tidak cukup bila kita simpan electronic dan digital banyak. So, our IT uni... in Informant B ☺ 2:10 ¶ 61, Rupanya, bila kita nak upgrade the system, to make it more intelligent, rupanya banyak data yang dia... in Informant B ☺ 2:11 ¶ 61, So, those study kena selalu di buat, those analysis mesti selalu dibuat to make sure the rekod yang... in Informant B ☺ 2:12 ¶ 69, Okay, dia ada relate bila kita simpan. Kalau tidak simpan, tidak jadi. Bila kita simpan, simpan ke r... in Informant B ☺ 2:13 ¶ 69, Maknanya, rekod yang tadi I mean big data kena ada nama data tersebut, for example data in what, dat... in Informant B ☺ 2:14 ¶ 73, Big data baca macam itu. Itulah objektif yang kita nak. So, bila data tu besar, dia boleh baca trend... in Informant B ☺ 2:15 ¶ 73, Maknanya, kalau kita nak simpan big data as a rekod, dia mesti dah siap all those analysis. Sekurang... in Informant B ☺ 2:16 ¶ 84, In a simple words, what I can say big data itu macam saya cakap kita tahu data apa and bila nak simp... in Informant B ☺ 2:17 ¶ 88, Yes betul, dia mesti kena ada hubungkait. Ianya akan jadi rekod yang kita boleh baca. Big data kita... in Informant B ☺ 2:18 ¶ 96, Its depends, you tengok records management atau guideline, policies its about record or its about da... in Informant B ☺ 2:19 ¶ 99, Yes depends, macam mana institution itu manage record dia. Siapa yang manage records and siapa yang... in Informant B ☺ 2:20 ¶ 118, Ya seperti yang saya cakap tadi, apabila data tersebut menjadi information and knowledge, dan kita d... in Informant B ☺ 2:21 ¶ 130, The data that we take should have administrative value, historical value, financial value, legal whi... in Informant B ☺ 2:22 ¶ 141, So, in bank, the statistic department and also others department is handle the big data. Some depart... in Informant B ☺ 2:23 ¶ 145, : Like I said, once the statistic department done analyse the data, they will pass to us. The data s... in Informant B ☺ 2:24 ¶ 149, Its very important. But the, we need to understand the evolution of data to become records or knowle... in Informant B ☺ 2:25 ¶ 157, I think, you must have knowledge and not manage. Sebabnya, apabila orang nak berurusan dengan kita,... in Informant B ☺ 2:26 ¶ 201, Okay, kalau dari creation kita kena ada objektif lah, contohnya kita kena decide nak buat apa dengan... in Informant B ☺ 2:27 ¶ 205, Yes, dia kena tahu objective apa yang dia nak cari dulu. So, from that objective mungkin ada team di... in Informant B ☺ 2:28 ¶ 207 – 209, : Jadi, boleh saya conclude kan actually “creation” ini penting dari segi nak kawal the volume of da... in Informant B ☺ 2:29 ¶ 219 – 225, NSA: Okay, so far based on my reading, creation ini penting on volume and velocity. SHAH: Yes betul... in Informant B ☺ 2:30 ¶ 229, I think based on apa yang you dah listkan in term of discipline, semuanya perlulah, and probably in... in Informant B ☺ 2:31 ¶ 233, So, kalau you nak validate data itu macam mana. So, process tersebut you kena “master” dulu. You mus... in Informant B ☺ 2:32 ¶ 233, But, this one different sebab education penting untuk kita faham semua, but untuk kita make decision... in Informant B ☺ 2:33 ¶ 245, Okay, for classification dan indexing yang saya Nampak adalah you mudah untuk refer kemudianlah. You... in Informant B ☺ 2:34 ¶ 247 – 249, Okay, baik faham, kalau elemen-elemen dalam big data v’s, adakah En. Shahrin rasa membantu atau tida... in Informant B ☺ 2:35 ¶ 254, So, Access control come to that basic so bila kita classified and index, kita letak sekali security... in Informant B ☺ 2:36 ¶ 258, Sensitivity itu termasuk jugak

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Codes:

- Able to achieve the accuracy of information
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- Administrative Value, Historical Value, Financial Value & Legal Value
- Allow to keep document that have value only
- Believe “objective” can be important element in managing big data v’s
- Believe by identify sensitivity of data can allow to manage others V’s of big data
- Believe creation elements can manage volume and velocity of big data
- Believe not all elements records management practices can manage big data, maybe have but not many
- Believe RM Practices can open others eye’s in managing big data
- Believe “creation” elements is the most important element in managing big data v’s
- Big Data can increase due to third party
- Big data have relationship with records management when it been keep and it will be records
- Big data will be records once it be keep, have meaning, endorsed and have report
- Big data will be records once it been keep
- Classified data based on group allow data keep based on type
- Creation help to determines the need of data
- Creation is important in controlling volume of data
- Creation need to have objective in managing big data
- Data can be records once it can be keep and have knowledge or meaning
- Data from statistic department need to analyse first and endorse by authorise person before transfer to Records department
- Data need to big enough to easier the process of reading information and creating report
- Education need to have in order to manage big data
- Help to decide the data need to create or not
- Helps the data to be refer in future and easier the process of disposal
- How to handle structured and unstructured data
- Important to transfer records to electronic
- Increasing information will increase the capacity of records storage
- Information keep for next 20 years must have a method that applicable to be read in future
- Information upgrade need to be read for next future
- IoT lead to the increase big data
- Keep both active and inactive data.
- Keep data that have value only
- Need to have security measure
- Objective is important to manage big data
- Only certain people can access it based on sensitivity of data
- Overwhelming information affect the decision making
- Records in digital format help to identify period to keep
- Records Management standard maybe suitable or not in manage big data depends on situation
- Records professional must have knowledge to identify the owner & to manage complete data
- RM can open others eye about managing big data by having good practices
- RM help to avoid high costing in

maintenance storage • RP helps to manage big data by understand first the evolution of data & the importance of managing information ○ Statistic department responsible in managing big data before transfer to records department • Structured data is more easy to combine and handle compared to unstructured • The data can be manage using NAM elements (Emergent data) • The relationship between big data and records when the big data have meaning and can be keep then it is can consider as records ○ Understand the process is important to manage big data • Unproper RM practices will affect retrieval proces & difficulties in legal court issues • Unstructured data need to linked with other big platform to come out with knowledge or rich idea ○ Use and re-use elements important by use the records and creating knowledge that at the end can be call as corporate memory ○ Use and re-use elements important in managing elements Value data especially historical value • Users need to know the objective of finding information

● Able to manage big data V's

1 Documents:

1 Informant A

Text Document

Created: 23/12/2024 by NOR SAKILA ASNAWI, **Modified:** 25/12/2024 by NOR SAKILA ASNAWI

Quotations:

☺ 1:1 ¶ 8, Documents Management for example contracts need to be backup digitally and in Informant A ☺ 1:2 ¶ 10, if you looking at a scraping data or putting together others to abstract them, much easier to do in... in Informant A ☺ 1:3 ¶ 28, .. you know kind of volume of data and if you are in a very big organizations like Google and you ha... in Informant A ☺ 1:4 ¶ 36, I mean even IoT or something of that only vaguely familiar with but, just using example in our home,... in Informant A ☺ 1:5 ¶ 38, we have ten thousands customers were data have been hacked, we working very hard to make the situati... in Informant A ☺ 1:7 ¶ 40, . So, if you are no standard like there are known standard, then so that's this data could be manage... in Informant A ☺ 1:8 ¶ 48, Let's say when you sign a contract that digital versions of contract, you cannot just store in empl... in Informant A ☺ 1:9 ¶ 58, EVN: Yes, absolutely. I really could appreciate good records management. I mean, if you do not have... in Informant A ☺ 1:10 ¶ 60, , you can probably have great records management on paper, like process flow and procedure but if th... in Informant A ☺ 1:11 ¶ 66, But, its seems to me the records management is around what you do with that data. Do you do nothing... in Informant A ☺ 1:12 ¶ 70, there are not really similar, there are two different items to me that records management has relati... in Informant A ☺ 1:13 ¶ 77 – 78, NSA: Okay, in your opinion, did you believe that records management standards is suitable in managin... in Informant A ☺ 1:14 ¶ 78, But, there are also possibility big data can make the world worst. So, proper management of big data... in Informant A ☺ 1:15 ¶ 78, Security link, people or company using that data for purposes with not interested owner the data or... in Informant A ☺ 1:16 ¶ 78, . So, proper control in this instant lets said this recording might be manage and stored probably no... in Informant A ☺ 1:18 ¶ 92, So I think yes, should be some people or group of people that help the organizations and manage all... in Informant A ☺ 1:19 ¶ 94, Okay, one thing is that, I would be possible control the data directly because there are too much da... in Informant A ☺ 1:20 ¶ 94, Not necessary hands on, analyse the data themselves. I think that will not be responsibility records... in Informant A ☺ 1:21 ¶ 96, . The records professional probably need to know that standard very well. Make sure the organization... in Informant A ☺ 1:22 ¶ 98, I can conclude a conclusion on records management professional, focusing around procedure rather the... in Informant A ☺ 1:23 ¶ 102, So, I guess it is probably distributed practices when individual people managing data that comes to... in Informant A ☺ 1:24 ¶ 106, Let's said the customers sent me the excel spreadsheet of power plant data. So, those can be differe... in Informant A ☺ 1:25 ¶ 110, , lets said it comes in email then we will put in on our centralized server

so others engineer can... in Informant A ☺ 1:26 ¶ 110, So, we must make sure the employee do that for business critical and like I mention put in server, I... in Informant A ☺ 1:27 ¶ 110, So a long those line, you need a proper backup. So, in case somebody accidentally delete something, th... in Informant A ☺ 1:28 ¶ 131, , it is not clear to me how much efforts required to manage all this elements. Maybe the organizatio... in Informant A ☺ 1:29 ¶ 140, I think, it is about describe what data should be created or not created. Maybe, there are certain r... in Informant A ☺ 1:30 ¶ 141 – 142, . So, in that case, did you believe that the creation element can helps managing Big Data V's such a... in Informant A ☺ 1:31 ¶ 146, "Value" is bit difficult, but I guess could be a roles there. Maybe whether it can be create or not,... in Informant A ☺ 1:32 ¶ 154, Probably nothing. Because "capture" sounds like "creation" to me. So, I must not be understand on so... in Informant A ☺ 1:33 ¶ 166, Classification I think is like tagging the data with some kind method data to said that.. maybe if y... in Informant A ☺ 1:34 ¶ 167 – 168, You can classified and index it. At the end people can know where to retrieve that one document. So,... in Informant A ☺ 1:35 ¶ 176, Wait, back to the question, can classification handle the big data v's. I guess so, maybe variabilit... in Informant A ☺ 1:36 ¶ 180, I am trying to thinking in term of if there are big data sets and I need to tag then I will be able,... in Informant A ☺ 1:37 ¶ 184, Yes okay. Let's said I have valuable information but only one person have access then it is less rel... in Informant A ☺ 1:38 ¶ 186 – 188, EVN: Yes, I think so. NSA: How about others V's ? EVN: Maybe the "Velocity" but I am not really sure... in Informant A ☺ 1:39 ¶ 189 – 192, "storing records" element is important in managing Big Data V's especially related to Value and Viab... in Informant A ☺ 1:40 ¶ 194, I can see the Value is yes but Viability is hard to see so. I hesitate to say yes or know actually. in Informant A ☺ 1:41 ¶ 208, EVN: Yes. Maybe variety. Because I guess it also determine like if I want to create data, and migrat... in Informant A ☺ 1:42 ¶ 214, Because, if I kept the data forever, I won't have anymore space because the volume will be to great.... in Informant A ☺ 1:43 ¶ 224, EVN: I think, access control, creation. Okay yes maybe access control and creation. I think it is ar... in Informant A ☺ 1:44 ¶ 224 – 226, think it is around the security and misused of data will be mild. NSA: So, the access control is mo... in Informant A ☺ 1:45 ¶ 229 – 230, NSA: Then it is okay, we almost go to the conclusion. But, before that, are you think that, can the... in Informant A ☺ 1:46 ¶ 232, what can I see is more on opportunity rather than problem. I mean problem also can be positive but,... in Informant A ☺ 1:47 ¶ 232, You are asking about the Big Data V's, but the volume could be extreme if you try to create them. Ma... in Informant A ☺ 1:48 ¶ 234, Yes, because without control and standard, managing big data will become very difficult across many... in Informant A ☺ 1:49 ¶ 236, I guess, my point of view its same like the value of contributing to standardization. Standardizatio... in Informant A ☺ 1:50 ¶ 242, : Yes, absolutely. For people that have some knowledge of data, I am sure this would be much easier... in Informant A ☺ 1:51 ¶ 244, So, I will conclude, there are lots of settle differences and how records management gets standardiz... in Informant A ☺ 1:52 ¶ 78, . So, proper control in this instant lets said this recording might be manage and stored probably no... in Informant A ☺ 1:53 ¶ 106, Let's said the customers sent me the excel spreadsheet of power plant data. So, those can be differe... in Informant A ☺ 1:54 ¶ 167 – 168, You can classified and index it. At the end people can know where to retrieve that one document. So,... in Informant A ☺ 1:55 ¶ 38, What is the caused not being control ? I guess, I maybe I would be not educated security or not educ... in Informant A ☺ 1:56 ¶ 224, VN: I think, access control, creation. Okay yes maybe access control and creation. I think it is aro... in Informant A

Codes:

- "Creation" can helps managing Big Data V's such as Volume and Velocity ● Able to manage big data V's ● Able to manage the velocity of data ● Able to manage value but in certain ways ● Able to manage value of data ● Able to manage volume and velocity by not create all data ● Access control the most important element as it related to security ○ Backup data is needed in managing data ● Believe and agree RM standard is suitable in managing big data ● Believe migration and conversion can manage Variety, Volume and Velocity of big data ● Believe on need of people or groups of people in managing data in organisation ● Believe that Records

Management is suitable in Managing Big Data • Big data and Records Management is different entity but have relationship each others • Big data can be positive opportunities by creating new data sets based on that existing data • Big data can help in consumers selection in buying things • Big Data Issues in IoT : Data hacked due to data not in control and managed • Big data need to be manage by having proper management ○ Centralises system can help manage big data but not for small adhoc works ○ Centralized server will help in managing data ○ Centralized server will help in managing data and easy to access information • Easy to access correct information • Focus on having procedure is more important at the first place • Help in handling critical documents and information • Help to establish the best standard and alignment within the expert communities • Help to manage variability and variety • Help to open others eyes on the important of RM especially in managing the Big Data • Help to reduce storage • Help to retrieve the information • How to handle structured and unstructured data • IoT lead to the increasing of big data • New Emerge Solution: Backup Digitally ○ Not really sure on meaning of capture ○ Organization need to do costs benefit analysis to manage all elements • People will lost trust on information if data not be controlled ○ Personal distributed practices can be alternative in managing and control big data or information ○ Perspective on creation element • Protect value of data by having limited access • Providing security and the misused of data will be mild • Providing security and the misused of data will be mild. ○ Reasons of classification elements need in variety • Record Professional need to manage and establish the procedure • RM help to decrease issues in organisation related to the big data • RM procedure that not follow by others will be not use • RM standard need to improve the quality • The RP need to know that standard very well • To avoid caused of data not being controlled ○ Understanding of classification meaning • Viable research topic and should continually pursue by others experts • Volume of big data can be manage by create information based on specific needed

• Able to manage the velocity of data

1 Documents:

1 Informant A

Text Document

Created: 23/12/2024 by NOR SAKILA ASNAWI, **Modified:** 25/12/2024 by NOR SAKILA ASNAWI

Quotations:

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● Able to manage value and viability data

1 Documents:

3 Informant C

Text Document

Created: 23/12/2024 by NOR SAKILA ASNAWI, **Modified:** 25/12/2024 by NOR SAKILA ASNAWI

Quotations:

☺ 3:1 ¶ 20, when we talk about it is not about the amount of data but the various or type of data that need to b... in Informant C ☺ 3:2 ¶ 20, , based on our experience, the data itself is something can be questions by the user. In term of the... in Informant C ☺ 3:3 ¶ 22, Okay, from my context about the increased of big data, normally kita banyak jumpa data yang duplicat... in Informant C ☺ 3:4 ¶ 22, alam

masa yang sama because of the pressure from the market. Might be the organization thing that re... in Informant C ☺ 3:5 ¶ 22, So IOT from our understanding ialah mengambil kira kebanyakan data-data yang ada dikeluarkan ni yang bol... in Informant C ☺ 3:6 ¶ 24, Secara total from my point of view untuk IOT ni, dia punya keperluan utk dikawal memang sangat tingg... in Informant C ☺ 3:7 ¶ 24, Dan another question dia akan jd kepada veracity. Pada quality and accuracy. Benda tu something yang... in Informant C ☺ 3:8 ¶ 26, when we process the data. we are focusing on visualization platform. so bila kita nak, kita adalah s... in Informant C ☺ 3:9 ¶ 26, bila data sebanyak 15 juta data set yang kita terima daripada organization A, tetapi dalam 15 juta n... in Informant C ☺ 3:10 ¶ 26, . so bila start data tu kita visualize kan, context bila dia kata okay you visualize, kita nampak, d... in Informant C ☺ 3:11 ¶ 30, Normaly dekat industry bila satu-satu aktiviti or project and tender nak keluar, client akan mengeluark... in Informant C ☺ 3:12 ¶ 43, Pada saya sepatutnya untuk company dia memang akan memberi impact yg sangat baik. Contoh macam en sa... in Informant C ☺ 3:13 ¶ 49, Basically from my side it is , there is relationship because tanpa kita follow criteria the v's espe... in Informant C ☺ 3:14 ¶ 51, Okay. So the 4.2 the similarity between big data and records management. Pada saya dia ada perbezaan... in Informant C ☺ 3:15 ¶ 51, So then, did you believed records management standard is suitable in managing big data? Yes, pada sa... in Informant C ☺ 3:16 ¶ 55, Okay , pada saya semua pihak dalam organisasi. Kalau bercakap dalam context IT dia akan jadi tugas j... in Informant C ☺ 3:17 ¶ 55, . Okay 5.2, did you believed the roles of rp or people who deal with data and information is importa... in Informant C ☺ 3:18 ¶ 60, Okay, so ila 5.2 saya consider saya dah jawab lah ya, it is not important but very important lah. Or... in Informant C ☺ 3:19 ¶ 64, In the first place pada saya the record must be well maintain, well manage. So dia kena records prof... in Informant C ☺ 3:20 ¶ 68, Kita punya platform which is our product. Kita ada specialize to control. Kalau bercakap dengan, con... in Informant C ☺ 3:21 ¶ 86, saya rasa untuk creation, bila kita create record ni pertama kita tengok volume of record itu akan a... in Informant C ☺ 3:22 ¶ 94, So kalau kita pergi kepada your question, do believed element of rm standard iso 15489 is suitable f... in Informant C ☺ 3:23 ¶ 94, Creation sangat penting, nak avoid error. Kita nak terus dapatkan kualiti dan accuracy pada awalan.... in Informant C ☺ 3:24 ¶ 94, Classification dan indexing yes important in Informant C ☺ 3:25 ¶ 94, Dan ya ini yang paling penting yang saya pun selalu tekankan kepada staff saya is access control. Fr... in Informant C ☺ 3:26 ¶ 94, Storing record yes sure very important. Use and reuse, yes, data bila ada u kena guna dan u akan gun... in Informant C ☺ 3:27 ¶ 94, Migration and conversion sangat penting sebab sometime the compatibility of system dia perlukan conv... in Informant C ☺ 3:28 ¶ 96, so memang ada pun. Saya rasa disposition ni benda yang penting dan perlu hati-hati utk diuruskan. Th... in Informant C ☺ 3:29 ¶ 107 – 108, so classification and indexing, so adakah dia boleh handle the issue in big data v's that related to... in Informant C ☺ 3:30 ¶ 108, Berkenaan dengan 6.6 can the creation element help in managing big data v's, yes, such as volume an... in Informant C ☺ 3:31 ¶ 108, Do you think the storing record elements is important in managing big data v's related to the value... in Informant C ☺ 3:32 ¶ 110, Did you believed that the migration/conversion element is important and suitable in managing big dat... in Informant C ☺ 3:33 ¶ 113 – 114, : okay. So next is disposition. Did u think yang disposition ni element yang boleh manage big data v... in Informant C ☺ 3:34 ¶ 120, so for both creation and capture pada sy is veracity. Quality and accuracy pada saya yang is a must... in Informant C ☺ 3:35 ¶ 122, Saya pilih access control dulu. Saya nak ada kebenaran utk create record sebab bukan semua orang bol... in Informant C ☺ 3:36 ¶ 124, sebab bila saya tengok access control and, even access untuk create record itu sendiri pun kena ada... in Informant C ☺ 3:37 ¶ 126, yes, based on our experience, bila bagi kat semua orang utk create record macam-macam rekod di creat... in Informant C ☺ 3:38 ¶ 130, es records management sangat membantu dalam mengurang kan isu dalam organisasi especially dalam mana... in Informant C ☺ 3:39 ¶ 132 – 134, So 6.25, what is the relationship that u can see between big data v's and current organizational ope... in Informant C ☺ 3:40 ¶ 138, bila bercakap berkenaan dengan big data ni , memang saya akan banyak bercakap benda yang berkaitan d... in Informant C ☺ 3:41 ¶ 142, okay, sebab tadi objective

kajian awk ada cakap awk nak keluaran a guideline utk big data ni, so sy... in Informant C 3:42 ¶ 144, okay this research for me is important for very organisation in malaysia. Sebab dulu kita biasa deng... in Informant C 3:43 ¶ 124, sebab bila saya tengok access control and, even access untuk create record itu sendiri pun kena ada... in Informant C 3:44 ¶ 86, saya rasa untuk creation, bila kita create record ni pertama kita tengok volume of record itu akan a... in Informant C

Codes:

- Able to manage value and viability data ● Access control related to who creating the records first ● Allow to manage variety of data ● Believe classification and indexing is important in managing issue in big data ● Believe every people in organisation play important roles to manage data especially the top management ● Believe record management and big data have relationship each other ● Believe records management is important in managing big data ● Believe storing records is important ● Believe that records management standard is suitable to manage big data ● Believe that RP should lead and manage information first ● Believe that veracity element in the big data V is the most important element that need to be take care in managing big data ● Believe the increasing of big data will affect the organization ● Believe the roles of people who deal with data and information is important ● Believe the veracity element in big data can give impact if the data is not well manage and not accurate ● Believe this research can open others eyes to the importance of records management in managing big data ● Believe this research is a good impact in future ● Big data & RM is not similar but RM important for big data ● Big data is about various or type of data that need to be manage and utilised ● Component in IOT for data arrangement can increase the big data ● Create a quality and accurate document at the beginning ● Create confusion and do not have quality and accuracy ● Creation help to control volume and velocity of big data ● Disposition element help to control the volume of big data ● Disposition need to indicate dispose activity ● Duplication and redundancy of data lead to the increasing of big data that create the confusion ● Failure of control and manage data from IOT will increase the volume of big data ○ Have own product to control adress in Malaysia ● Help to retrieve the information ● Important due to the compatibility system ● ISO 15489 might be suitable in managing big data ○ Nature big data that not fix in daily life become challenges in big data ● Not all staff can access to the data ○ People who deal with records management need to have a good skills such as technical skills as added value in managing information ● Pressure of market also lead to the increasing of big data in organization ○ Quality of data become big challenges where many data need to visualise to get a quality data ● Records create without value can increase the volume ○ Requirement of data not really mentioned by client where need extra work to fulfil the data needed ● RM provide good impact to Organization ● The data that not been filter correctly will affect data veracity ○ The high volume of big data sometimes have duplication and need to separate where it can take a time to handle ● The records need to have value ○ visualisation data is important as one process to cross check Many data that involve many parties ● Without access control it will allow all people to simplify create the records

APPENDIX E

Interview Guideline

PENGENALAN PROSES TEMU BUAL (Rev 02 – 15th Jan 2022)

Item	Deskripsi
Universiti	Universiti Teknologi MARA (UiTM), Kampus Puncak Perdana, Shah Alam
Tajuk Kajian	Kesesuaian Standard Pengurusan Rekod dalam Menguruskan "Big Data": Kajian Kes dalam Organisasi di Malaysia.
Deskripsi Temu Bual	Temu bual ini merangkumi aspek: • Melibatkan rekod professional atau mereka yang berurusan dengan "big data". • Temu bual akan mengambil masa sekitar 1 hingga 2 jam. • Temu bual akan dijalankan di lokasi yang sesuai. Walaubagaimanapun, pandemic Covid19, temu bual akan dijalankan menggunakan platform "online meeting". • Temu bual akan direkodkan untuk tujuan rujukan.
Kriteria Calon Temu Bual	Kriteria calon temu bual: • Memahami konteks pengurusan rekod dan "big data". • Mampu untuk menghurai tentang pengurusan rekod dan "big data" • Mampu untuk menjawab soalan mengenai isu-isu umum yang berkaitan dengan "big data" dan kaedah yang digunakan untuk mengawal setiap isu tersebut. • Mampu untuk menghurai standard atau garis panduan dalam mengawal "big data". • Boleh bercakap dengan lancar. • Tiada masalah pendengaran.
Tujuan dan Objektif Kajian	Kajian ini bertujuan untuk memberikan panduan terbaik dalam mengurus "big data" melalui standard Pengurusan Rekod. Oleh itu, objektif kajian adalah seperti di bawah: • Untuk mengenal pasti keperluan keperluan pengurusan rekod dalam menangani isu berkaitan "big data".

Item	Deskripsi
	• Untuk mengetahui perspektif rekod professional dalam menguruskan “big data”. • Untuk mencari tahu akan kesesuaian elemen-elemen di dalam standard pengurusan rekod dalam menguruskan “big data” secara keseluruhan organisasi dan professional.
Skop Soalan Temu Bual	• Big data, isu-isu, dan big data V’s. • Gambaran pengurusan rekod dan standard. • Hubungan antara “big data” dan pengurusan rekod. • Perspektif atau pandangan rekod professional dalam menangani isu berkaitan “big data”. • Elemen di dalam standard pengurusan rekod yang sesuai dalam mengurus “big data” di dalam organisasi.
Penganjur	Doktor Falsafah dalam Pengurusan Maklumat (IM950), Fakulti Pengurusan Maklumat, UiTM Kampus Puncak Perdana.

SOALAN KAJIAN

Fokus Utama dalam Soalan Kajian bagi Temu Bual Bersama Informan A, B, dan C:

Bahagian 1: Pengenalan

- 1.1 Sila terangkan mengenai latar belakang anda.
- 1.2 Sila terangkan mengenai pekerjaan anda yang terkini dan pekerjaan sebelumnya beserta tanggungjawab yang anda galas.
- 1.3 Berapa lamakah anda bekerja di organisasi ini dan mengapa anda tertarik untuk menyertai organisasi ini?
- 1.4 Apakah kategori dan bahagian pekerjaan anda di dalam organisasi ini?

Bahagian 2: Big Data, Isu-Isu Berkenaan Big Data dan Big Data V's.

- 2.1 Apakah yang anda faham mengenai big data?
- 2.2 Apakah yang anda tahu mengenai sifat atau elemen yang terdapat dalam big data?
- 2.3 Pada pendapat anda, apakah elemen yang membawa kepada peningkatan big data?
- 2.4 Adakah anda percaya bahawa "Internet of Things (IoT)" adalah salah satu elemen penting yang membawa kepada peningkatan big data?
- 2.5 Pada Pendapat anda, apakah kesan sekiranya peningkatan big data tidak dikawal?
- 2.6 Adakah big data memberi kesan besar kepada organisasi anda dan dari segi apa?
- 2.7 Adakah organisasi anda menghadapi masalah yang berkaitan dengan big data?
- 2.8 Bagaimanakah organisasi anda menangani masalah yang berkaitan dengan big data?

Bahagian 3: Gambaran Keseluruhan Pengurusan Rekod dan Piawaian/Standard

- 3.1 Apa yang anda faham mengenai pengurusan rekod?
- 3.2 Adakah organisasi anda mempunyai pengurusan rekod yang baik?
- 3.3 Apakah standard atau panduan dalam pengurusan rekod yang diguna pakai dalam menguruskan organisasi anda?
- 3.4 Adakah anda percaya bahawa pengurusan rekod yang baik akan memberi kesan positif kepada organisasi?
- 3.5 Apakah langkah yang telah diambil oleh organisasi ini untuk memastikan pengurusan rekod dalam keadaan teratur dan baik?

Bahagian 4: Hubungan di antara Pengurusan Rekod dan "Big Data"

- 4.1 Adakah anda percaya bahawa big data berkait rapat dengan pengurusan rekod dan mempunyai hubungan antara satu sama lain?
- 4.2 Pada pandangan anda, apakah persamaan yang boleh di lihat antara pengurusan rekod dan big data?

- 4.3 Pada pandangan anda, adakah anda percaya bahawa piawaian/standard pengurusan rekod sesuai dan berupaya dalam menguruskan isu berkenaan big data terutama elemen dalam big data V?
- 4.4 Pada pandangan anda, apakah elemen yang terdapat di dalam pengurusan rekod yang boleh menangani isu berkenaan big data atau big data V?

Bahagian 5: Perspektif atau Pandangan Rekod Professional dalam Menangani Isu Berkaitan “Big Data”.

- 5.1 Pada pandangan anda, siapakah individu yang bertanggungjawab dalam menangani masalah berkenaan “big data” di setiap organisasi?
- 5.2 Adakah anda percaya bahawa peranan rekod professional atau mereka yang berurusan dengan maklumat dan data adalah penting dalam menguruskan big data?
- 5.3 Apakah pandangan anda sebagai rekod professional dalam menguruskan big data?
- 5.4 Apakah kaedah terkini yang digunakan dalam organisasi ini untuk mengurus dan mengawal lambakan big data?
- 5.5 Adakah kaedah yang digunakan di dalam organisasi ini dalam mengawal isu berkenaan big data berfungsi dan berjalan dengan baik?
- 5.6 Apakah pandangan anda dalam mengurus big data dengan menggunakan kaedah pengurusan rekod yang baik dalam organisasi?

Bahagian 6: Kesesuaian Elemen dalam Standard Pengurusan Rekod dalam Menguruskan “Big Data” secara Profesional dan dalam Keseluruhan Organisasi.

- 6.1 Pada pendapat anda, apakah praktis terkini dalam pengurusan rekod yang sesuai dalam menangani big data V?
- 6.2 Adakah anda percaya bahawa elemen yang terdapat dalam standard pengurusan rekod iaitu ISO 15489-1:2016(E) sesuai untuk mengurus big data?
- 6.3 Adakah anda sedar bahawa beberapa elemen dalam standard pengurusan rekod terutamanya ISO 15489-1:2016(E) mampu menguruskan Big Data? (Elemen seperti penghasilan data, penangkapan maklumat, klasifikasi dan pengindeksan, pengawalan akses, penyimpanan rekod, penggunaan rekod, migrasi / transformasi, dan pelupusan).
- 6.4 Pada pendapat anda apakah elemen yang sesuai di dalam standard pengurusan rekod bagi menguruskan big data secara professional dan keseluruhan organisasi?
- 6.5 Apakah yang anda faham melalui elemen “penghasilan data” yang terdapat dalam standard pengurusan rekod?
- 6.6 Adakah elemen “penghasilan data” mampu membantu dalam menangani isu Big Data V’s seperti kelajuan dan kepadatan penghasilan maklumat.
- 6.7 Apakah isu atau elemen lain dalam big data V yang boleh dikawal melalui elemen “penghasilan data”?
- 6.8 Apakah yang anda faham mengenai “penangkapan maklumat” yang terdapat dalam pengurusan rekod?

- 6.9 Pada pendapat anda, bolehkah elemen “penangkapan maklumat” berupaya mengurus big data V?
- 6.10 Adakah anda percaya bahawa elemen “klafikasi dan pengindeksan” juga mampu mengurus big data V dan bagaimanakah?
- 6.11 Bolehkah “klasifikasi dan pengindeksan” menangani masalah dalam big data V yang berkaitan dengan nilai, kelikatan, kebolehubahan, dan kepelbagaian data?
- 6.12 Pada pandangan anda, adakah elemen “pengawalan akses” penting dan sesuai dalam menguruskan big data V yang berkaitan dengan nilai?
- 6.13 Pada pandangan anda, adakah elemen “pengawalan akses” dapat mengendalikan isu lain yang terdapat dalam big data V?
- 6.14 Pada pandangan anda adakah elemen “penyimpanan rekod” penting dalam menguruskan isu dalam big data V yang berkaitan dengan nilai dan kebolehpercayaan data?
- 6.15 Pada pandangan anda, adakah elemen “penyimpanan rekod” dapat membantu menguruskan eleman atau isu lain yang terdapat dalam big data V
- 6.16 Adakah elemen “penggunaan rekod” penting dalam menguruskan big data V?
- 6.17 Apakah ada elemen atau isu lain yang berkaitan dengan big data yang dapat diuruskan melalui elemen “penggunaan rekod”?
- 6.18 Adakah anda percaya bahawa elemen “migrasi/transformasi” adalah penting serta sesuai untuk menguruskan isu kepelbagaian data dalam big data V dan mengapa?
- 6.19 Pada pandangan anda, adakah elemen “migrasi/tranformasi” juga dapat menguruskan isu lain yang berkaitan dengan big data V.
- 6.20 Pada pandangan anda, adakah elemen “pelupusan” sesuai untuk menguruskan isu big data V seperti kepadatan atau lambakan data dan volatiliti?
- 6.21 Pada pandangan anda, adakah elemen “pelupusan” mampu mengurus elemen atau isu lain yang terdapat dalam big data V?
- 6.22 Pada pandangan anda, elemen manakah dalam piawaian/standard pengurusan rekod yang paling penting dalam menguruskan isu berkenaan big data?
- 6.23 Pada pandangan anda, adakah terdapat elemen lain dalam pengurusan rekod yang anda tahu, juga diperlukan dan sesuai dalam menguruskan big data?
- 6.24 Pada pandangan anda, adakah pengurusan rekod membantu mengurangkan masalah dalam organisasi anda yang berkaitan dengan masalah big data?
- 6.25 Apakah hubungan yang dapat anda lihat antara big data V dengan operasi organisasi anda yang terkesan disebabkan oleh Big Data?

Section 7: Kesimpulan

- 7.1 Secara keseluruhan, adakah anda percaya bahawa pengurusan rekod sesuai dalam menguruskan big data dan mengapa?
- 7.2 Apakah pandangan anda mengenai kajian penyelidikan ini?
- 7.3 Apakah kesan kajian ini yang anda boleh lihat?
- 7.4 Bolehkah penyelidikan ini membuka mata ramai pihak terhadap kepentingan pengurusan rekod dalam menguruskan big data?

7.5 Apakah yang anda dapat simpulkan mengenai penyelidikan ini?

INTRODUCTION TO THE INTERVIEW PROCESS
(Rev 02 – as of 15th Jan 2022)

Items	Descriptions
University	Universiti Teknologi MARA (UiTM), Campus Puncak Perdana, Shah Alam
Research Title	Assessing the Suitability of Records Management Standards in Managing Big Data: A Multiple Cases Studies of Malaysian Organizations.
Interview Description	This Interview Consists: • Records professionals or people who deal with big data. • The interview section will take around 1 to 2 hours. • The interview will be conducted at appropriate locations. However, due to pandemic Covid19, the interview will be using an online meeting platform. • The interview will be recorded for future references
Informant Criteria	The Informant should have the following criteria: • Know about records management and big data • Able to elaborate on big data and records management • Able to answer general issues regarding big data facing by the organization and current method use to handle it. • Able to elaborate on records management standards/practices as a way to control big data. • Can speak fluently. • No earing's problem.
Aim dan Objektif Kajian	This study aims to provide the best guideline in managing big data through records management standards. Therefore, the objectives of this study as per below: • To identify records management requirements in dealing with big data V's • To ascertain the perspectives of records professionals in managing big data.

Items	Descriptions
	• To investigate the suitability of elements in records management standard in managing big data organizationally and professionally.
Scope of Questions for Interview	• Big data Environment, Issues, and Big Data V's • Overview of Records Management and the standards • Relationship between big data and Records Management • Perspective or view of records professional in handling big data. • Elements in Records Management Standards that are suitable in managing big data within organizational
Organizer	Doctor of Philosophy in Information Management (IM950), Faculty of Information Management, UiTM Campus Puncak Perdana.

RESEARCH QUESTIONS

Main Area of Focus of Interview Questions for Informant A, B, and C:

Section 1: Introduction

- 1.5 Can you explain your background?
- 1.6 Can you explain your current job responsibilities and previous job?
- 1.7 How long have you been working at this organization and why are you attached to join this organization?
- 1.8 Which department and category of work that you belong to in this organization?

Section 2: Big Data Environment, Issues and Big Data V's

- 2.9 What do you understand about big data?
- 2.10 What do you know about nature of big data or elements big data v's?
- 2.11 In your opinion what is elements that lead to the increasing of big data?
- 2.12 Did you believe that Internet of Things (IoT) is one of the important elements that lead to the increasing of big data?
- 2.13 In your opinion, what is the impact if the arising of big data in IoT is not be control?
- 2.14 Did the big data give a big impact in your organization and in terms of what?
- 2.15 Did your organization facing issues related to big data?
- 2.16 How's your organization handle issue related to big data?

Section 3: Overview of Records Management and the Standards

- 3.6 What do you understand about Records Management?
- 3.7 Did your organization have proper Records Management?
- 3.8 Did you follow any standard or best practice of Records Management in managing your organization?
- 3.9 Are you believe that good Records Management practices will give a good impact on the organizations?
- 3.10 What steps have been taken by this organization to ensure good Records Management?

Section 4: Relationship Between Big Data and Records Management?

- 4.5 Did you believe that big data is related to Records Management and has relationship with each other?
- 4.6 In your opinion, what is the similarity between big data and Records Management?
- 4.7 In your opinion, did you believe that Records Management Standards is suitable in Managing Big Data especially big data V's?

4.8 In your opinion, what are the Records Management Requirements that are able in dealing with Big Data V's?

Section 5: The Perspective of Records Professionals in Managing Big Data

5.7 In your point of view, who are responsible persons that are supposed to handle the big data issues in organizations?

5.8 Did you believe the roles of records professional or people who deal with data and information is important in managing big data?

5.9 Can I know your perspectives as records professionals in managing big data?

5.10 Did this organization have a current alternative in managing and control Big Data?

5.11 Did the current alternative works properly in control of the Big Data Issues?

5.12 What yours's perspective on managing big data using a Records Management approach in the organization?

Section 6: The Suitability of Elements in Records Management Standard in Managing Big Data Organizationally and Professionally.

6.26 In your opinion, which current records practice that suitable in dealing with Big Data V's?

6.27 Did you believe that elements in Records Management standard which are ISO 15489-1:2016(E) is suitable in managing big data?

6.28 Are you aware that some elements in Records Management Standards especially the ISO 15489-1:2016(E) are able in managing Big Data? (Elements such as Creation, Capture, Classification and Indexing, Access Control, Storing Records, Use and Reuse, Migration/Conversion, and Disposition).

6.29 Which elements that you think in Records Management Standard that suitable for Managing Big Data Organizational and Professionally?

6.30 What can you see about the "creation" element in Records Management Standard?

6.31 Can the "creation" element help in managing Big Data V's such as Volume and Velocity?

6.32 What other Big Data V's that you think can be managed or control through the "creation" element?.

6.33 What do you understand about the "capture" element in Records Management?

6.34 In your point of view, can the "capture" element be able to manage the Big Data V's?

6.35 Did you believe that the "classification and indexing" element is also able to manage Big Data V's and How?

6.36 Can the "classification and indexing" able to handle the issue in Big Data V's related to the Value, Viscosity, Variability, and Variety?

- 6.37 In your point of view, the “access control” element is important and suitable in managing Big Data V’s that related to the Value?
- 6.38 What other Big Data V’s that you think can be managed or control through the “access control” element.
- 6.39 Do you think that the “storing records” element is important in managing Big Data V’s related to the Value and Viability?
- 6.40 In your point of view, did the “storing records” element can help in managing other Big Data V’s.
- 6.41 Did the “use and re-use” element is important in managing Big Data V’s?
- 6.42 What others the Big Data V’s that can be managed through the “use and re-use” element?
- 6.43 Did you believe that the “migration/conversion” element is important and suitable in managing the Big Data V’s which is Variety and why?
- 6.44 What others the Big Data V’s that can be managed through the “migration/conversion” element?
- 6.45 Did you think that the “disposition” element is suitable in managing Big Data V’s such as Volume and Volatility?
- 6.46 What others the Big Data V’s that can be managed through the “disposition” element?
- 6.47 In your point of view, which elements in Records Management Standards are most important in managing Big Data?
- 6.48 What others Record Management element that you know is also needed and suitable in managing big data?
- 6.49 Can Records Management help to decrease issues in your organization related to the Big Data issues?
- 6.50 What is the relationship that you can see between Big Data V’s and current organizational Operations that affect due to the Big Data?

Section 7: Conclusion

- 7.6 Overall, did you believe that Records Managements is suitable in Managing Big Data and Why?
- 7.7 What is your point of view regarding this research?
- 7.8 What is the impact of this research that you can see?
- 7.9 Can this research open others' eyes to the importance of Records Management in managing Big Data?
- 7.10 What can you conclude regarding this research?



UNIVERSITI
TEKNOLOGI
MARA

Fakulti
Pengurusan
Maklumat

Our Reference : 600-FPM (HEA-6/3)

Date : 15th January 2022

Dear Sir,

PERMISSION TO CARRY OUT A RESEARCH REGARDING ASSESSING THE SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: A MULTIPLE CASES STUDIES OF MALAYSIAN ORGANIZATIONS.

Referring to the subject above, this letter is writing to gain permission a research with your organization.

2. This letter is writing to inform you that our student, Nor Sakila binti Asnawi (Student No.: 2019362875) from a program of Doctor of Philosophy in Information Management (IM950), UiTM Campus Puncak Perdana, Shah Alam would like to do research at your organization.

3. The purpose of this research is to identify the suitability of records management standards in managing big data, especially unstructured data. Kindly informed that, this is qualitative research where the collecting data through an interview.

4. In connection with this, we would like to request your permission to allow an interview or discussion about this research. Here below details of the research interview session :

Date	:	January 17 th , 2022 (Tuesday)
Time	:	10.00 am.
Platform	:	Microsoft Team Online Meeting (link will be provided)

5. For more information, you can refer to the interview guidelines attached to this invitation letter. Kindly be informed that all personal and confidential information will not be disclosed in the research report.

4. If there is any problem or question, please don't hesitate to contact me at _____ or _____

We hope that this request will merit your most favorable response.

Best Regards

PROF MADYA DR. IRWAN KAMARUDDIN ABD KADIR
Senior Lecturer/Supervisor
b.p:Dekan



Rujukan Kami : 600-FPM(HEA 5/3)
Tarikh : 15th Januari 2022

Tuan/Puan

MEMOHON KEBENARAN UNTUK MENJALANKAN PENYELIDIKAN MENGENAI KESESUAIAN STANDARD PENGURUSAN REKOD DALAM MENGURUSKAN “BIG DATA”: KAJIAN KES DALAM ORGANISASI DI MALAYSIA.

Dengan hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan pelajar Nor Sakila binti Asnawi (No. Pelajar : 2019362875) dari Program Doktor Falsafah Pengurusan Maklumat (IM950), UiTM Kampus Puncak Perdana, Shah Alam ingin memohon kebenaran untuk menjalankan penyelidikan di organisasi tuan/puan.

3. Tugas ini bertujuan bagi mengenalpasti kesesuaian standard pengurusan rekod dalam menguruskan “big data” terutama data yang tidak berstruktur. Tugas ini adalah berbentuk kualitatif sahaja iaitu secara temubual.

4. Berikut merupakan maklumat mengenai sesi temubual :

Tarikh : Januari 17th, 2022 (Selasa)
Masa : 10.00 am.
Platform : “Microsoft Team Online Meeting” (pautan akan diberi)

5. Untuk keterangan lebih lanjut, pihak tuan/puan boleh merujuk kepada garis panduan temubual yang dikepilkan bersama surat jemputan ini.

6. Adalah diharapkan pihak tuan/puan dapat memberikan peluang kepada pelajar berkenaan di dalam projek penyelidikan/ilmiah ini. Segala maklumat peribadi dan sulit tidak akan dinyatakan di dalam laporan pelajar itu nanti.

7. Sebarang masalah atau pertanyaan, tuan/puan boleh menghubungi saya di talian atau

Kerjasama dan sokongan yang diberikan oleh pihak tuan/puan di dalam perkara ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

Yang benar

PROF MADYA DR. IRWAN KAMARUDDIN ABD KADIR
Senior Lecturer/Supervisor
b.p:Dekan

APPENDIX F

Test Form Member Confirmation / Validation



Our Reference : 600-KPPIM (AKA-5/3)
Date : 2 April 2024

ملاسلاً مكيلع مللا تمحرو تتاكربو and Salam Sejahtera
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT RESEARCH FRAMEWORK VALIDATION ASSESSMENT

Respectfully, the above matter is referred.

2. This letter is writing to inform you that our student, Nor Sakila binti Asnawi (Student No.: 2019362875) from a program of Doctor of Philosophy in Information Management (IM950), UiTM Campus Puncak Perdana, Shah Alam seeks validation or confirmation regarding the data previously collected from your organization. This request refers to our earlier correspondence (Letter Ref: 600-FPM (HEA-6/3)) and the interview conducted on January 17th, 2022 (Tuesday)

3. The purpose of this validation is to confirm and refine the final research framework as part of the research's concluding results. We kindly request the assigned informant to review and validate the framework.

4. For your reference, we have attached the assessment guidelines to this letter. We assure you that all personal and confidential information will remain strictly protected and will not be disclosed in the research report.

5. Should you require any further clarification, please do not hesitate to contact us. We sincerely appreciate your time and cooperation in this matter.

Thank you for your kind attention and support.

اوسها، تقوى، موليا

"MALAYSIA MADANI"

"BERKHIDMAT UNTUK NEGARA"

Your sincerely

PROF MADYA DR. IRWAN KAMARUDDIN ABD KADIR

Senior Lecturer/Supervisor
b.p:Dekan

ASSESSING THE SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIPLE CASE STUDIES OF MALAYSIAN ORGANIZATIONS

1. Research Objectives And Research Questions

Objectives	Research Questions
RO 1.0: To evaluate current records management practices used that are suitable in dealing with big data V's.	RQ 1.0: Which current records practices that suitable in dealing with big data V's?
RO 2.0: To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.	RQ 2.0: What are the perspectives of records professionals on managing big data using a records management approach within organizations?
RO 3.0: To design and validate a records management framework for managing big data by integrating suitable elements from established records management standards.	RQ 3.1 : What elements of records management standards are suitable for developing a framework to manage big data?

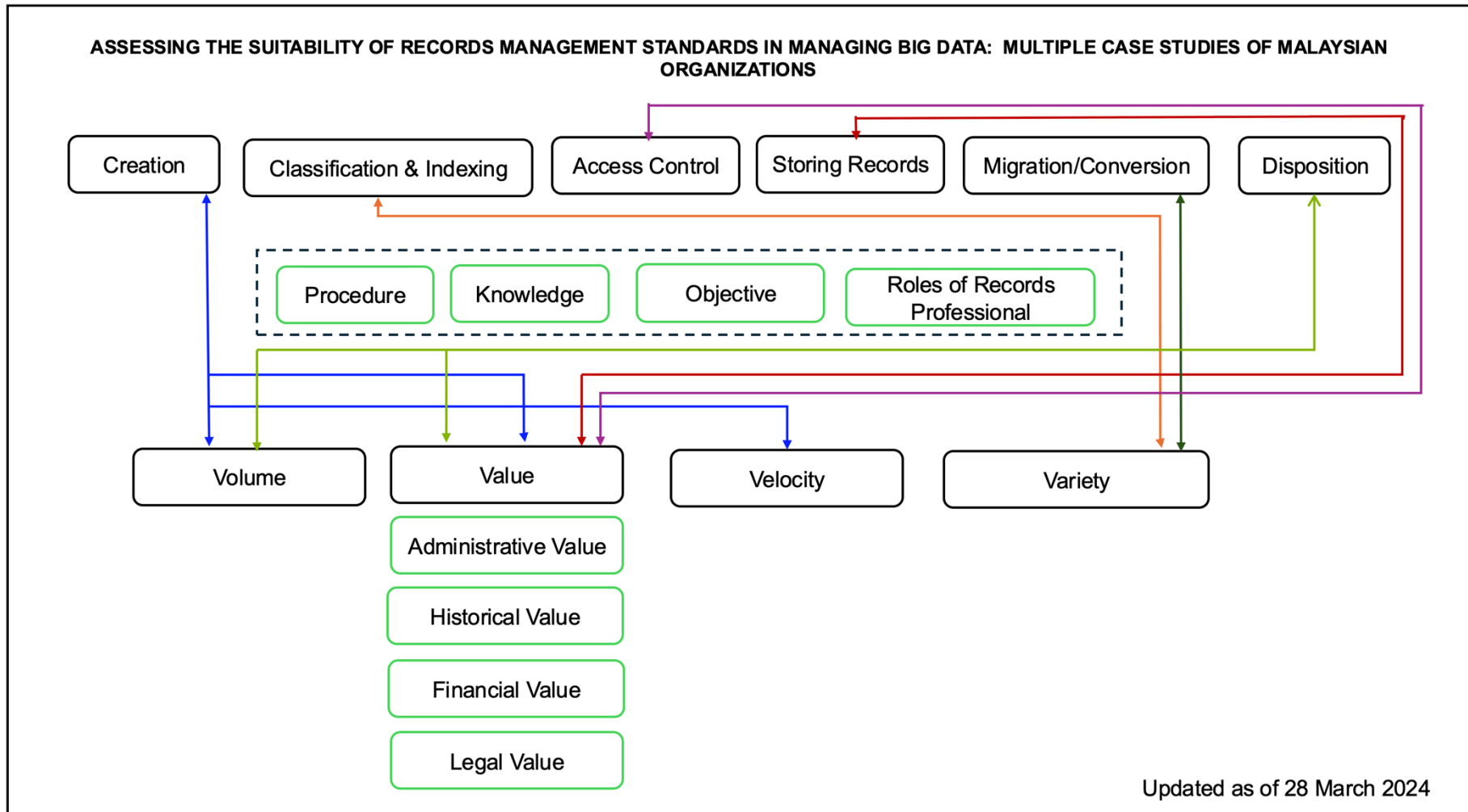
2. Final Result of Matrix Analysis (Based on Data Analysis)

FINAL RESULT OF MATRIX ANALYSIS (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 4 V'S OF BIG DATA			
		VOLUME	VALUE	VELOCITY	VARIETY
1	CREATION	☒	☒	☒	☐
2	CLASSIFICATION AND INDEXING	☐	☐	☐	☒
3	ACCESS CONTROL	☐	☒	☐	☐
4	STORING RECORDS	☐	☒	☐	☐
5	MIGRATION / CONVERSION	☐	☐	☐	☒
6	DISPOSITION	☒	☒	☐	☐

3. Final Research Framework



4. Member Checking / Validation Assessment

ELEMENT 1 : CREATION						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Creation	Volume					
	Velocity					
	Value					

ELEMENT 2 : CLASSIFICATION AND INDEXING

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Classification and Indexing	Variety					

ELEMENT 3 : ACCESS CONTROL

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Access Control	Value					

ELEMENT 4 : STORING RECORDS

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Storing Records	Value					

ELEMENT 5 : MIGRATION / CONVERSION

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Migration / Conversion	Variety					

ELEMENT 6 : DISPOSITION Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Disposition	Volume					
	Value					

EMERGENT ELEMENT : ADMINISTRATIVE VALUE, HISTORICAL VALUE, FINANCIAL VALUE AND LEGAL VALUE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Value: (Administrative Value; Historical Value; Financial Value; and Legal Value)	Data that does not meet four elements value and lacks any of these four types of value, should not be retained or stored.					

EMERGENT ELEMENT : PROCEDURE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Procedure	The use of procedures owed to the need of organizing the collected big data; this implies that procedures need to be very clear and well-structured.					

EMERGENT ELEMENT : OBJECTIVE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Objective	Each business process should have a clear goal for data creation, ensuring that all data serves a meaningful purpose. If data lacks a valid reason for being created, it becomes a waste of time and effort and should be avoided.					

EMERGENT ELEMENT : KNOWLEGDE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Knowledge	When the employees have a vast knowledge base, they are able to make wise choices concerning how the data will be processed, stored and used ensuring the data fulfills its purpose and adds value to the company.					

EMERGENT ELEMENT : ROLES OF RECORDS PROFESSIONAL

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Roles of Records Professional	A knowledgeable records professional plays a crucial role in ensuring effective records management in a company. They help develop and enforce policies, procedures, and plans for storing and retrieving data legally and efficiently. Their expertise in the records lifecycle from creation to disposal and helps organizations manage big data challenges like compliance, preservation, and storage.					

Overall Comments:

BY SIGNING HERE: I verify that the above information is accurate and complete.

Signature :

Date :

APPENDIX G

Results Test Form Member Confirmation / Validation

Informant A

ASSESSING THE SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIPLE CASE STUDIES OF MALAYSIAN ORGANIZATIONS

1. Research Objectives And Research Questions

Phase	Objectives	Research Questions
Phase 1	RO 1.0: To examine current records management practices that suitable in dealing with big data V's	RQ 1.0: Which current records practices that suitable in dealing with big data V's?
Phase 2	RO 2.0: To gain insights into records professionals' perspectives on managing big data using a records management approach within organizations.	RQ 2.0: What are the perspectives of records professionals on managing big data using a records management approach within organizations?
Phase 3	RO 3.0: To assess the suitable elements for developing a records management framework for managing big data.	RQ 3.1 : What elements of records management standards are suitable for developing a framework to manage big data?

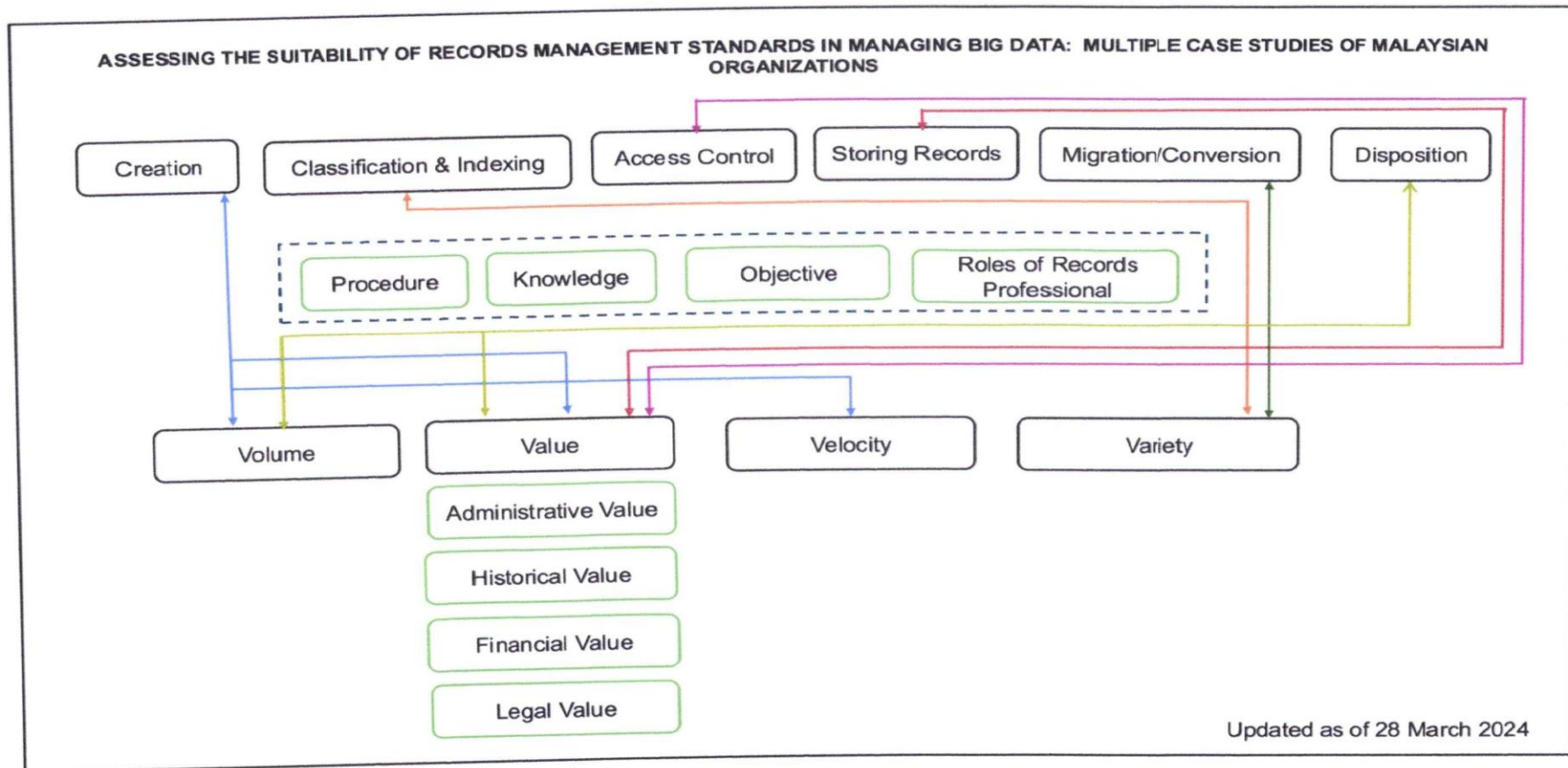
2. Final Result of Matrix Analysis (Based on Data Analysis)

FINAL RESULT OF MATRIX ANALYSIS (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 4 V'S OF BIG DATA			
		VOLUME	VALUE	VELOCITY	VARIETY
1	CREATION	☒	☒	☒	☐
2	CLASSIFICATION AND INDEXING	☐	☐	☐	☒
3	ACCESS CONTROL	☐	☒	☐	☐
4	STORING RECORDS	☐	☒	☐	☐
5	MIGRATION / CONVERSION	☐	☐	☐	☒
6	DISPOSITION	☒	☒	☐	☐

3. Final Research Framework



4. Member Checking / Validation Assessment

ELEMENT 1 : CREATION						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Creation	Volume				✓	
	Velocity				✓	
	Value				✓	

ELEMENT 2 : CLASSIFICATION AND INDEXING Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Classification and Indexing	Variety				✓	

ELEMENT 3 : ACCESS CONTROL						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Access Control	Value			✓		

ELEMENT 4 : STORING RECORDS						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Storing Records	Value				✓	

ELEMENT 5 : MIGRATION / CONVERSION						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Migration / Conversion	Variety			✓		

ELEMENT 6 : DISPOSITION

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Disposition	Volume				✓	
	Value			✓		

EMERGENT ELEMENT : ADMINISTRATIVE VALUE, HISTORICAL VALUE, FINANCIAL VALUE AND LEGAL VALUE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Value: (Administrative Value; Historical Value; Financial Value; and Legal Value)	Data that does not meet four elements value and lacks any of these four types of value, should not be retained or stored.				✓	

EMERGENT ELEMENT : PROCEDURE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Procedure	The use of procedures owed to the need of organizing the collected big data; this implies that procedures need to be very clear and well-structured.				✓	

EMERGENT ELEMENT : OBJECTIVE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Objective	Each business process should have a clear goal for data creation, ensuring that all data serves a meaningful purpose. If data lacks a valid reason for being created, it becomes a waste of time and effort and should be avoided.				✓	While true in theory, this may prove difficult for organizations as data creators may differ from the personnel familiar with the "value of the data"

EMERGENT ELEMENT : KNOWLEGDE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Knowledge	When the employees have a vast knowledge base, they are able to make wise choices concerning how the data will be processed, stored and used ensuring the data fulfills its purpose and adds value to the company.		✓			Organizations and employees have conflicting priorities and will often make unwise choices given the situation and incentives that they are exposed to.

EMERGENT ELEMENT : ROLES OF RECORDS PROFESSIONAL						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Roles of Records Professional	A knowledgeable records professional plays a crucial role in ensuring effective records management in a company. They help develop and enforce policies, procedures, and plans for storing and retrieving data legally and efficiently. Their expertise in the records lifecycle from creation to disposal and helps organizations manage big data challenges like compliance, preservation, and storage.				✓	Absolutely Agree! Organizations don't pay enough attention to this field.

Overall Comments:

Excellent work and this has enabled me to think more clearly about data and records management.

BY SIGNING HERE: I verify that the above information is accurate and complete.

Signature :

Date :


2 April 2024

Informant B

ASSESSING THE SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIPLE CASE STUDIES OF MALAYSIAN ORGANIZATIONS

1. Research Objectives And Research Questions

Objectives	Research Questions
RO 1.0: To evaluate current records management practices used that are suitable in dealing with big data V's.	RQ 1.0: Which current records practices that suitable in dealing with big data V's?
RO 2.0: To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.	RQ 2.0: What are the perspectives of records professionals on managing big data using a records management approach within organizations?
RO 3.0: To design and validate a records management framework for managing big data by integrating suitable elements from established records management standards.	RQ 3.1 : What elements of records management standards are suitable for developing a framework to manage big data?

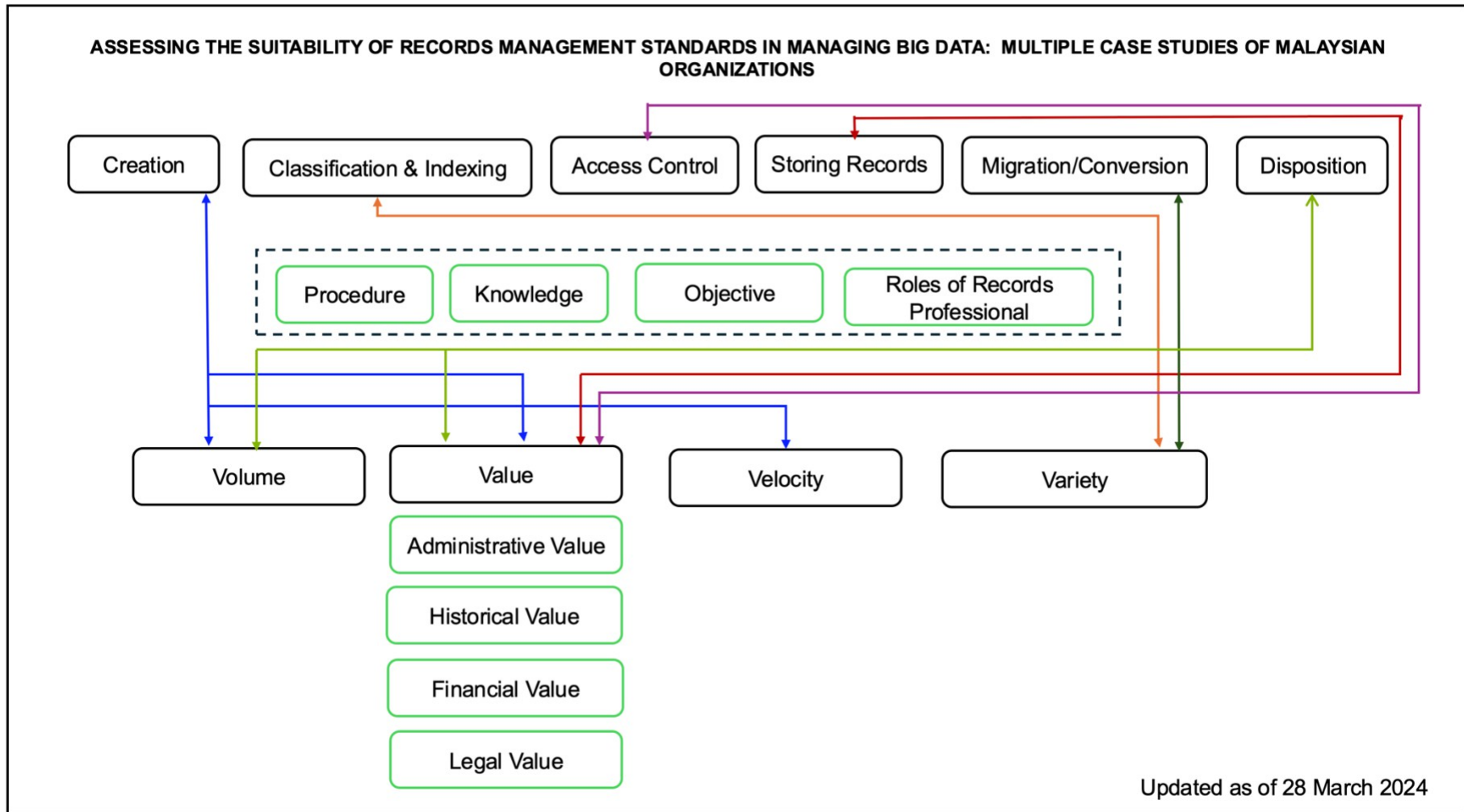
2. Final Result of Matrix Analysis (Based on Data Analysis)

FINAL RESULT OF MATRIX ANALYSIS (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 4 V'S OF BIG DATA			
		VOLUME	VALUE	VELOCITY	VARIETY
1	CREATION	☒	☒	☒	☐
2	CLASSIFICATION AND INDEXING	☐	☐	☐	☒
3	ACCESS CONTROL	☐	☒	☐	☐
4	STORING RECORDS	☐	☒	☐	☐
5	MIGRATION / CONVERSION	☐	☐	☐	☒
6	DISPOSITION	☒	☒	☐	☐

3. Final Research Framework



4. Member Checking / Validation Assessment

ELEMENT 1 : CREATION						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Creation	Volume				✓	
	Velocity				✓	
	Value				✓	

ELEMENT 2 : CLASSIFICATION AND INDEXING

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Classification and Indexing	Variety				✓	

ELEMENT 3 : ACCESS CONTROL

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Access Control	Value				✓	

ELEMENT 4 : STORING RECORDS

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Storing Records	Value				✓	

ELEMENT 5 : MIGRATION / CONVERSION

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Migration / Conversion	Variety				✓	

ELEMENT 6 : DISPOSITION						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Disposition	Volume				✓	
	Value				✓	

EMERGENT ELEMENT : ADMINISTRATIVE VALUE, HISTORICAL VALUE, FINANCIAL VALUE AND LEGAL VALUE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Value: (Administrative Value; Historical Value; Financial Value; and Legal Value)	Data that does not meet four elements value and lacks any of these four types of value, should not be retained or stored.				✓	

EMERGENT ELEMENT : PROCEDURE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Procedure	The use of procedures owed to the need of organizing the collected big data; this implies that procedures need to be very clear and well-structured.				✓	

EMERGENT ELEMENT : OBJECTIVE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Objective	Each business process should have a clear goal for data creation, ensuring that all data serves a meaningful purpose. If data lacks a valid reason for being created, it becomes a waste of time and effort and should be avoided.				✓	

EMERGENT ELEMENT : KNOWLEGDE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Knowledge	When the employees have a vast knowledge base, they are able to make wise choices concerning how the data will be processed, stored and used ensuring the data fulfills its purpose and adds value to the company.				✓	

EMERGENT ELEMENT : ROLES OF RECORDS PROFESSIONAL

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Roles of Records Professional	A knowledgeable records professional plays a crucial role in ensuring effective records management in a company. They help develop and enforce policies, procedures, and plans for storing and retrieving data legally and efficiently. Their expertise in the records lifecycle from creation to disposal and helps organizations manage big data challenges like compliance, preservation, and storage.				✓	Type text here

Overall Comments:

Overall...areas and elements covered met the set standard.

BY SIGNING HERE: I verify that the above information is accurate and complete.

Signature : 

Date : 20 April 2024

Informant C

ASSESSING THE SUITABILITY OF RECORDS MANAGEMENT STANDARDS IN MANAGING BIG DATA: MULTIPLE CASE STUDIES OF MALAYSIAN ORGANIZATIONS

1. Research Objectives And Research Questions

Objectives	Research Questions
RO 1.0: To evaluate current records management practices used that are suitable in dealing with big data V's.	RQ 1.0: Which current records practices that suitable in dealing with big data V's?
RO 2.0: To examine the perspectives and professional practices of records management professionals in managing big data using a records management approach within organizational settings.	RQ 2.0: What are the perspectives of records professionals on managing big data using a records management approach within organizations?
RO 3.0: To design and validate a records management framework for managing big data by integrating suitable elements from established records management standards.	RQ 3.1 : What elements of records management standards are suitable for developing a framework to manage big data?

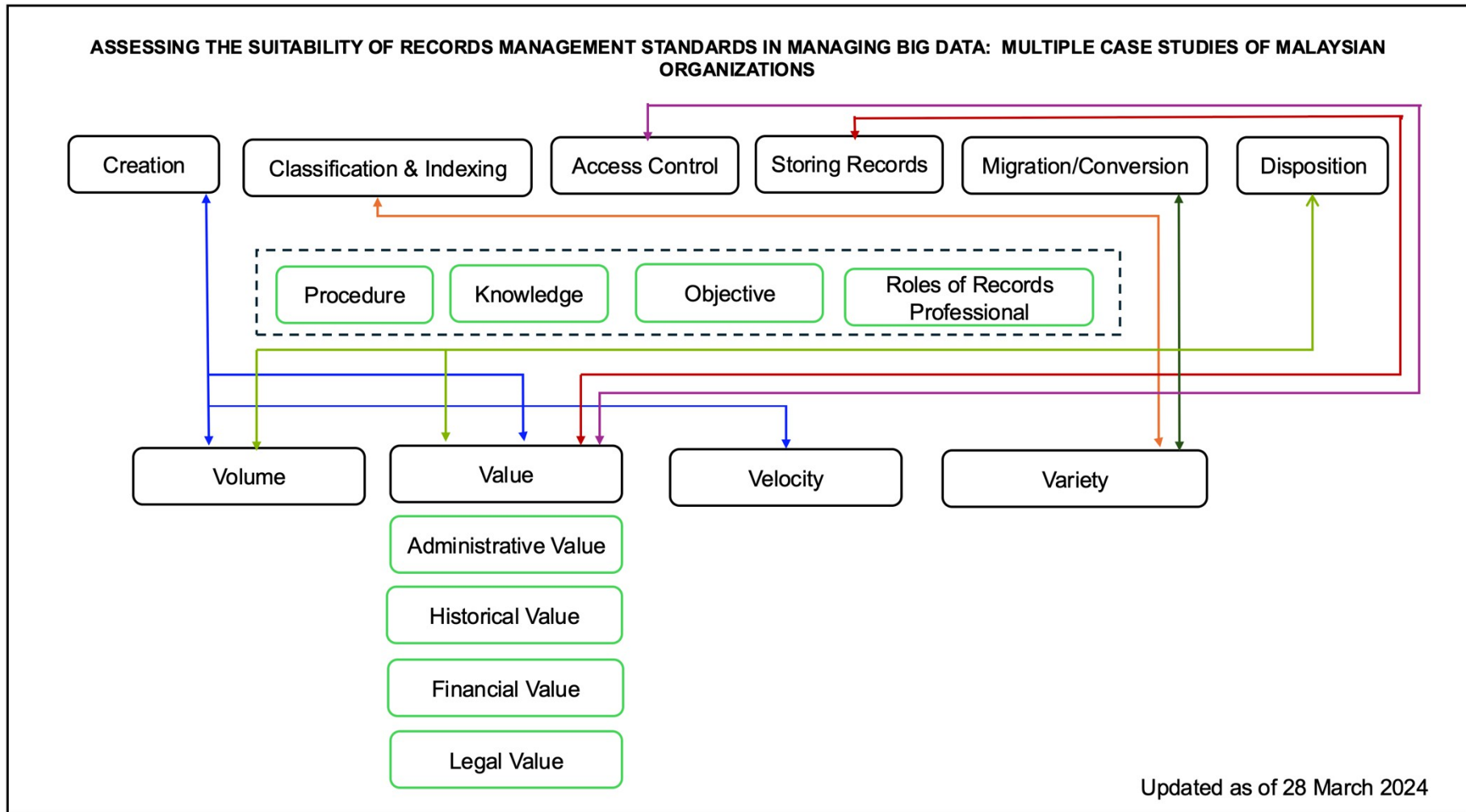
2. Final Result of Matrix Analysis (Based on Data Analysis)

FINAL RESULT OF MATRIX ANALYSIS (BASED ON DATA ANALYSIS)

Date: 3/18/2024

No	ELEMENTS IN RECORDS MANAGEMENT STANDARD	THE 4 V'S OF BIG DATA			
		VOLUME	VALUE	VELOCITY	VARIETY
1	CREATION	☒	☒	☒	☐
2	CLASSIFICATION AND INDEXING	☐	☐	☐	☒
3	ACCESS CONTROL	☐	☒	☐	☐
4	STORING RECORDS	☐	☒	☐	☐
5	MIGRATION / CONVERSION	☐	☐	☐	☒
6	DISPOSITION	☒	☒	☐	☐

3. Final Research Framework



4. Member Checking / Validation Assessment

ELEMENT 1 : CREATION						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Creation	Volume			/		
	Velocity				/	
	Value				/	

ELEMENT 2 : CLASSIFICATION AND INDEXING

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Classification and Indexing	Variety				/	

ELEMENT 3 : ACCESS CONTROL						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Access Control	Value				/	

ELEMENT 4 : STORING RECORDS						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Storing Records	Value				/	

ELEMENT 5 : MIGRATION / CONVERSION

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Migration / Conversion	Variety			/		

ELEMENT 6 : DISPOSITION Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Final Elements of Records Management (Suitable for Managing Big Data)	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Disposition	Volume				/	
	Value				/	

EMERGENT ELEMENT : ADMINISTRATIVE VALUE, HISTORICAL VALUE, FINANCIAL VALUE AND LEGAL VALUE Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Value: (Administrative Value; Historical Value; Financial Value; and Legal Value)	Data that does not meet four elements value and lacks any of these four types of value, should not be retained or stored.				/	True. In addition, the data must thoroughly evaluated based on potential use cases, analytics, and cost-effectiveness in order to understand the value.

EMERGENT ELEMENT : PROCEDURE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Procedure	The use of procedures owed to the need of organizing the collected big data; this implies that procedures need to be very clear and well-structured.				/	The procedures gives rooms in data quality & integrity as well as efficient data storing and processing. The procedures must be both structured and adaptable to handle large-scale, diverse, and fast-changing data efficiently.

EMERGENT ELEMENT : OBJECTIVE						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Objective	Each business process should have a clear goal for data creation, ensuring that all data serves a meaningful purpose. If data lacks a valid reason for being created, it becomes a waste of time and effort and should be avoided.				/	Clear objectives helps in avoiding data redundancy and excessive storage costs. The goal also important that the data relevance well managed for decision-making.

EMERGENT ELEMENT : KNOWLEGDE

Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:

Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Knowledge	When the employees have a vast knowledge base, they are able to make wise choices concerning how the data will be processed, stored and used ensuring the data fulfills its purpose and adds value to the company.				/	Employee knowledge is a key factor in effective Big Data, but it must be supported by strong governance, tools, and training to maximize value. Even with knowledgeable employees, there must be policies and procedures for handling data effectively. Employees need user-friendly data management tools such as knowledge on databases, cloud storage, AI-driven insights) to work efficiently. All of this required continuous training, so regular training is essential to keep employees updated.

EMERGENT ELEMENT : ROLES OF RECORDS PROFESSIONAL						
Instruction: Using the scale given, please indicate to what extent do you agree on the given statement by tick on the appropriate number:						
Emergent Elements in Records Management in Managing Big Data	Managing Big Data V's	Your Assessment (Kindly tick (/) which appropriate)				Comments
		(1) Not Suitable	(2) Suitable	(3) Very Suitable	(4) Strongly Suitable	
Roles of Records Professional	A knowledgeable records professional plays a crucial role in ensuring effective records management in a company. They help develop and enforce policies, procedures, and plans for storing and retrieving data legally and efficiently. Their expertise in the records lifecycle from creation to disposal and helps organizations manage big data challenges like compliance, preservation, and storage.				/	A knowledgeable records professional plays a crucial role in managing vast amounts of structured and unstructured data efficiently. There are expertise required such as metadata & classification, preservation & archiving. This is to ensure long-term availability and integrity of critical records through proper archival strategies. It also include analytics & insights which includes facilitating business intelligence by maintaining high-quality, well-organized records that can be analysed for decision-making.

Overall Comments:

Accepted and accurate

BY SIGNING HERE: I verify that the above information is accurate and complete.

Signature :

Date : 2nd April 2024

AUTHOR'S PROFILE



Nor Sakila Asnawi is currently an Adoption and Change Management (ACM) Specialist at Enfrasys Solutions Sdn. Bhd., where she delivers training and talks to various organizations on Microsoft 365 and related Microsoft technologies. She is also a former lecturer at the Faculty of Information Management, Universiti Teknologi MARA (UiTM), Segamat Campus, Johor. During her tenure as a lecturer, she taught courses in Records Management, Electronic Records Management, Digitization of Records, Records Center Management, Archive Management, Digital Forensics, and Study Skills. She holds a Bachelor of Information Science (Hons) in Records Management and a Master of Science in Records and Documents Management from UiTM. Her research interests include Electronic Records Management, Big Data Governance, Digital Transformation, and Archival Science. Her doctoral research focused on integrating records management standards into big data management within selected Malaysian organizations, culminating in the development of a comprehensive framework for managing big data effectively. Before joining academia, she accumulated over five years of professional experience as a Records and Projects Communication Manager at ERS Energy Sdn Bhd. She also worked as a Lead Document Controller at Radiance Solar Solutions Inc. (RSSI) in the Philippines, where she managed documentation systems and compliance processes for solar energy projects. During her internship, she managed to create 3 systems for Primeworks Studios, Media Prima Berhad TV3 using Visual Basic programming.

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- Nor Sakila Asnawi, Irwan Kamaruddin Abd Kadir, Azmi Ab Rahman, & Alwi Mohd Yunus. (2022). Records management and big data environment: The roles of records professional in managing big data. *Environment-Behaviour Proceedings Journal*, 7(SI10), 213–217. <https://doi.org/10.21834/ebpj.v7iSI10.4123>
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