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EFFECTIVENESS OF ELECTRONIC DOCUMENT MANAGEMENT SYSTEM FUNCTIONALITIES IN SARAWAK GOVERNMENT SECTOR

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CONFIRMATION BY PANEL OF EXAMINERS

I certify that a Panel of Examiners has met on 15 May 2025 to conduct the final examination of Dayangku Horiah Binti Awang Gani on her Doctors of Philosophy thesis entitled "Effectiveness of Electronic Document Management System Functionalities in Government Sector" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiner recommends that the student be awarded the relevant degree. The Panel of Examiners were as follows:

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AUTHOR'S DECLARATION

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

This study investigates the perceived effectiveness of electronic document management system (EDMS) functionalities and their relationship with information system effectiveness. Specifically, it explores how key dimensions of information system effectiveness, namely information quality, system quality, perceived usefulness, and user satisfaction are influenced by the functionalities of EDMS. Guided by the DeLone and McLean Information System (IS) Success Model and Seddon's Model of Information System Success Model, this study aims to examine the relationship between electronic documents management systems (EDMS) functionalities and the dimensions of IS success. The EDMS functionalities considered include automated information capture, federated search and retrieval, collaborative tools, hierarchical file indexing and classification, storage and archival methods, automated workflows, security and audit trails, and support administer compliance. These functionalities are analysed in relation to IS success dimensions, specifically information quality, system quality, perceived usefulness, and user satisfaction, to provide a comprehensive understanding of how EDMS contributes to organizational efficiency and user engagement. This study adopted a quantitative survey design to examine the effectiveness of electronic document management system (EDMS) in the government sector. Data were collected through an online questionnaire from employees who actively use EDMS and analysed using statistical techniques. The analysis focused on evaluating EDMS performance in terms of system effectiveness, functionality, and contribution to organizational processes. The analysis of the structural model findings revealed that the effectiveness of electronic document management systems (EDMS) in the government agencies is supported by four tested hypotheses (H1, H2, H3, and H4). Notably, system quality demonstrated a significant positive relationship with both perceived usefulness (T-value: 9.407) and user satisfaction (T-value: 1.989). These results underscore the critical role of system quality in enhancing user perceptions and satisfaction, emphasizing its importance in achieving successful EDMS implementation. It was found that the electronic document management system functionalities and the information system effectiveness have not been previously tested. As a result, this study provides evidence of the new construct for research on the contribution of the functionalities within the electronic document management system to the information system effectiveness or information system success. This study offers valuable insight and serves as a foundation for future research on electronic document management systems (EDMS) within the government sector. The findings can also be extended to explore the relationship between EDMS dimensions in other contexts, such as government-linked companies, government linked investment entities, and beyond, broadening the scope of understanding and application in diverse organizational settings.

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LIST OF SYMBOLS

Symbols

f^2	Assess The Impact Of An Exogenous (Independent) Variable On An Endogenous (Dependent) Variable In The Structural Model. It Quantifies How Much An Exogenous Construct Contributes To The R2 Value Of An Endogenous Construct, Indicating The Relative Importance Of Each Predictor.
n	Sample Size Or The Number Of Observations
Q^2	Measure Used To Assess The Model's Predictive Accuracy For Endogenous Constructs. It Evaluates How Well The Observed Values Of An Endogenous Constructs Are Reconstructed By The Model And Its Parameters.
R^2	Statistical Measure Used To Assess The Proportion Of Variance In A Dependent (Endogenous) Variable That Is Explained By One Or More Independent (Exogenous) Variables In The Structural Model.

LIST OF ABBREVIATIONS

Abbreviations

AVE	Average Variance Extracted
BI	Business Intelligence
BI	Business Intelligence
CACTUS	Case Tracking Unified System
CADD	Computer Assisted Drafting & Design
CB-SEM	Covariance-based Structural Equation Modeling
CFI	Comparative Fit Index
CM	Content Management
CMS	Content Management System
CR	Composite Reliability
CVI	Content Validity Index
DDMS	Digital Document Management System
DIP	Document Imaging and Processing
ECM	Enterprise Content Management
ECRM	Enterprise Content and Records Management
EDE	Electronic Data Exchange
EDMS	Electronic Document Management System
e-Government	Electronic Public Administration

EIS	Executive Information System
e-Prestasi	Public Service Assessment
e-Procurement	Dokumen Pengadaan Secara Elektronik
ERA	Electronic Records Archives
ERMS	Electronic Records Management System
e-SAN	Sistem Administrasi Negara Elektronik
FYA	For Your Action
FYI	For Your Information
GDS	Government Digital Service
HPE	Hewlett Packard
HRMIS	Human Resource Management Information System
HRPAYS	Human Resource and Payroll System
HTMT	Heterotrait-Monotrait
ICCS	Industrial Coordination Committee System
ICR	Intelligent Character Recognition
ICT	Information and Communications Technology
I-CVI	Item-Content Validity Index
InArCM	Integrated Archives and Document Management System
IS	Information System
ISM	Integrated Success Model
IT	Information Technology

KFA	Key Focus Activity
KIV	Keep in View
KM	Knowledge Management
LAKU	Lembaga Air Kawasan Utara
LASIS	Land Administration System
MMI	MetaMap Indexing
MSC	Multimedia Super Corridor
NAMES	Native Marriage Electronic System
NARA	The National Archives and Records Administration
NLP	Natural Language Processing
OCR	Optical Character Recognition
OMR	Optical Mark Recognition
PhD	Doctor of Philosophy
PLS-SEM	Partial Least Squares Structural Equation Modeling
PROACT	Paperless Registry Operation and Case Tracking
QR	Quick Response
RDIMS	Records, Document, and Information Management System
RMSEA	Root Mean Square Error of Approximation
RTPMS	Rural Transformation Project Monitoring System
SCS-GEMS	Government Employee Management System
S-CV	Scale Content Validity
S-CVI	Scale-Content Validity Index

SDLC	Systems-Development Life Cycle
SEM	Structural Equation Modeling
SESCO	Sarawak Electricity Supply Corporation
SGB	Single Government Bill
SPM	*Sijil Pelajaran Malaysia*
SPSS	Statistical Package for the Social Science
STPM	*Sijil Tinggi Pelajaran Malaysia*
TAM	Technology Acceptance Model
TMNet	Telekom Malaysia Networking
TPB	Theory of Planned Behaviour
TRIM	HPE Content Manager
UK	United Kingdom
USA	United States of America
UTAUT	Unified Theory of Acceptance and Use of Technology
Webmail	Sarawak Government Email

CHAPTER 1
INTRODUCTION

1.1 Overview

Chapter One offers a detailed background for this study. This chapter is divided into 13 sections and Table 1.1 provides the specifics of the outline. This chapter is outlined in Section 1.1. The background and the problem statement of this study are discussed in Sections 1.2 and 1.3. The research questions, objectives, and the overview of the research model are subsequently provided in Sections 1.4, 1.5 and 1.6 respectively. The scope of the research, the research assumption and the research methodology overview for this study are described in Sections 1.7, 1.8 and 1.9 respectively. The significance of the study and the definition of the terms are then discussed in Sections 1.10 and 1.11.

1.2 Background of the Study

Information systems (IS) contain a wide range of information technologies (IT) to accomplish certain activities, interact with, and inform diverse players in various organisational or social contexts, including computers, software, databases, communication systems, the Internet, mobile devices, and much more. In today's world, information system is the most important advantage that the institution should have in order to be at par with other institutions in the competition environment and sustain their existence. This is very crucial to compete in the global markets. This is also applicable in the public institutions all over the world. The effectiveness and productivity of public institutions improve the quality of service offered to the public, as it also results in a more efficient country and a competitive advantage over other countries. Today, the most crucial thing that institutions should have in their possession is an information system or an information management system to keep up with the competition and sustain their existence. All organisations and corporations need to set out active attempts to assist nations progress, as well as the ability to compete in global marketplaces. Hence, this applies for government agencies too (Rajabbaigy, 2012).

In recent years, information system is increasingly recognised as the most important investment in all institutions and organisations. As a result, it is important for organizations to gain access to information as fast as possible in order to allow improved decisionmaking, which is mostly based on documents created and received by organizations. Every organisation should provide information and documents in the most effective way (Odabaş, 2009). In the history of this field, information and document resources are widely employed in institutions and auditing, and verification tools. Many organisations have recognised the value of an Electronic Document Management System (EDMS), which is one of the integrated software components of Corporate Source Planning. It has advocated for its development alongside a strong information infrastructure. The effective management of EDMS also plays a key role in improving corporate success (Alshibly, 2007). Public institutions and organisations use EDMS to enable officials to create, store, and retrieve all official documents, securely and efficiently as evidence of their actions to carry out activities, perform management actions and fulfil their legal obligations. Electronic document management systems provide institutions and organisations with the opportunity to use their stored information and documents in an effective and efficient way (Sprague Jr., 1995).

Since the introduction of information technology (IT), the need to design and expand, electronic document management systems (EDMS) have grown and the use of software such as EDMS in government agencies and regulations across the country, by assuring the accuracy of documents created, stored, and transmitted in information systems. As a result, the required regulations for using EDMS in public institutions and organisations have been adopted. Furthermore, government agencies worldwide are now developing and implementing information technology to support the modernization of government (Jones, 2012). Most of the initiatives on EDMS are related to records created by agencies. EDMS in the e-government has become one of the most important issues of public sector transformation in many countries. Governments throughout the world are emphasizing on placing the effective records keeping system starting from using EDMS to be implemented in both private and public sector organizations. The study examined Electronic Document Management Systems (EDMS) revealing a comprehensive framework that includes software systems for document management, databases for metadata administration, and a range of additional technologies (Nguyen, Swatman & Fraunholz, 2008). The additional technologies encompassed in this category consist of document imaging, retrieval mechanisms, reporting tools, character recognition systems, document workflow facilitators, form processing tools, content management systems, digital signature management solutions, and technologies for storing and archiving documents. In addition, the research emphasizes the crucial significance of workflow, business process management, and collaboration as essential elements of EDMS, as emphasized by Yläjääski (2003).

Since the 1990s, many governments around the world have developed systems to conduct the main business of government electronically, with the evidence of transactions stored and retrieved on computers. The concept of electronic government has been implemented worldwide with the aim to move to a paperless environment, with the only record being the electronic record. In order to achieve the paperless environment, governments' organizations need to combine core records management functions with computerized business processes or workflows to administer born digital records and paper records. Since governments' agencies increasingly rely on electronic records for day-today operations, this situation has become a strong driving force for government agencies to either developed their own ERMS or purchase an ERMS or continue to use EIMS, EDMS, DBMS or any systems that do not comply to recordkeeping functional requirements and relevant standards. Like many national governments around the world, namely Germany, Korea, Australia, Canada, the United Kingdom (UK) and the United States of America (USA); Malaysia has developed electronic systems to conduct the government's main business with evidence of transactions created, stored and retrieved on computers. Today's popular EDMSs include Knowmax, pCloud, HubSpot, Alfresco, LogicalDOC, Feng Office, Nuxeo, KnowledgeTree, Seed DMS, Casebox, MasterControl Documents, MFiles, Worldox, Dokmee, Ademero, and Knowm. Sometimes, EDMS is called as Content Management System (CMS) and is widely considered as the component of Enterprise Content Management (ECM).

In the Malaysian Electronic Government systems which started in 1997, it served five applications for the public sectors which involved the day to day operations of 25 federal ministries and more than 118 federal departments and the delivery of a wide range of electronic services to about 35 million citizens (Yaacob & Sabai, 2011). The five Electronic Government systems are namely the licensing and related vehicles services; utility payment; procurement; generic office environment (GOE); human resources management information system (HRMIS); and project monitoring system (Johare et al., 2012) These five Electronic Government systems are operational not only at the Malaysian Federal Government, but also at Federal establishments situated in the 14 states of Malaysia. However, the individual State Government has the autonomy to use the Electronic Government systems or developed their own Electronic Records Management System or Electronic Document Management System or purchase the systems from vendors of their own choice. From these examples, many governments have a common goal of ensuring better quality of record keeping in their organizations through EDMS.

In Malaysia, Electronic Government initiative is identified as e-Government, which was launched back in 1997 after the government introduced Multimedia Super Corridor (MSC) in 1996 (Yaacob & Sabai 2011). Most of the initiatives on e-Government are related to records created by agencies. "Electronic government" has become one of the most important issues of public sector transformation in many countries. Governments throughout the world are emphasizing on placing the effective records keeping system to be implemented in both private and public sector organizations (Nguyen, Swatman & Fraunholz, 2008). This effort is to manage the exponential increase in both electronic records (Duranti, 1999) and the “unstructured information captured in paper and electronic formats, such as emails, word processed and spreadsheet contents” (Joseph, 2008), created by the user in an organization. Meanwhile, in an environment of records and archives, record is a term used to describe documentary evidence, irrespective of form or medium, created, received, maintained and used by an organization (public or private) or an individual in the pursuit of legal obligations or in business transactions. (Malaysia and Malaysia 2003);(2010) On the other hand, in a computer environment, record is a term used to define a complete set of information in a database. Database records that are also considered as documentary evidence in this context are composed of fields, each of which contains one item of information.

It is common, particularly in governments or organizations, to talk not about ‘computers’ but about ‘computer systems’. Therefore, an electronic record management system or ERMS can be considered as a set of computer programs designed to track and store records, especially but not exclusively electronic records. An ERMS is more than just an electronic filing cabinet: it can handle the tasks involved in creating and using documents; it can apply classification schemes and retention and disposal schedules; it can preserve; it can store and retrieve records in central or remote locations; it can protect the confidentiality of sensitive information (International Records Management Trust, 2009). Since 1990s, many governments around the world have developed systems to conduct the main business of government electronically, with the evidence of transactions stored and retrieved on computers. The concept of electronic government has been implemented worldwide with the aim to move to a paperless environment, with the only record being the electronic record. In order to achieve the paperless environment, governments' organizations need to combine core records management functions with computerized business processes or workflows to administer born digital records and paper records. Since governments' agencies increasingly rely on electronic records for day-to-day operations, this situation has become a strong driving force for government agencies to either developed their own ERMS or purchase an ERMS or continue to use EIMS, EDMS, DBMS or any systems that do not comply to recordkeeping functional requirements and relevant standards.

Like many national governments around the world, namely Australia, Canada, the United Kingdom (UK) and the United States of America (USA), Malaysia has developed electronic systems to conduct the government's main business with evidence of transactions created, stored and retrieved on computers. In the Malaysian Electronic Government systems which started in 1997, it has served five applications for the public sectors which involved the day-to-day operations of 25 federal ministries and more than 118 federal departments and the delivery of a wide range of electronic services to about 35 million citizens. The five Electronic Government systems namely the licensing and related vehicles services; utility payment; procurement; generic office environment (GOE); human resources management information system (HRMIS); and project monitoring system (Johare et al., 2012). These five Electronic Government systems are operational not only at the Malaysian Federal Government, but also at Federal establishments situated in the 14 states of Malaysia. However, the individual State Government has the autonomy to use the Electronic Government systems or developed their own Electronic Records Management System/EDMS or purchase Electronic Records Management System/EDMS from vendors of their own choice.

In the Sarawak State Government public services, applications are supported by decentralized microcomputer/ personnel computer-based systems in 152 establishments consisting of 11 State Ministries; 18 Chief Minister's Department; 21 State Departments; 12 State Residents' Offices; 40 District Offices; 25 State Local

Authorities and 25 State Statutory Bodies. Systems used to create, use and maintain born digital records consisting of variety of DBMS, EDMS and EIMS. Systems identified by the study undertaken by the State Library (Pustaka) in 2011 among others are NAMES-Native Marriage Electronic System; LASIS (Land Administration System), IMPIAN, HERMIS, HRPAYS, GEAENV, SMART 200 and SWAM. Out of these systems only PROACT (Paperless Registry Operation and Case Tracking) was specifically associated to electronic records management. It is a correspondence management system widely used in the Sarawak public services. In 2014, PROACT was replaced by Case Tracking Unified System (CACTUS). Staff at a prominent government agency in Malaysia preferred to use manual approach in their daily work (Yaacob & Sabai, 2011).

As a result of this development, researchers have become interested in assessing the effectiveness of EDMS. In previous studies, the Information Systems Success Model created by DeLone and McLean (2003) was primarily used. Information quality, systems quality, service quality, usage, and impacts are the constructs used for assessing effectiveness. Although the DeLone and Mclean models have been regarded as quite robust due to the thousands of researches that have validated them, other antecedents or independent variables must still be incorporated. DeLone and McLean (2003) emphasized that it is vital to measure the possible interactions among the success dimensions in order to isolate the effect of various independent variables with one or more of these dependent success dimensions. Thus, this study is to investigate the perceived effectiveness of EDMS functionalities and their relationship with information quality, system quality, perceived usefulness, and satisfaction.

1.3 Problem Statement

A systematic and secure document management system is essential for government agencies, as they handle large volumes of confidential information. In recent years, many organizations have transitioned towards paperless documentation to reduce operational costs and minimize the need for extensive physical storage. However, several government departments in Malaysia continue to rely on paper-based documentation. This reliance is attributed to limitations in the existing security infrastructure, which has hindered the adoption of digital solutions (Ramli, 2017). Additionally, certain business processes within these departments still mandate the storage of documents in physical form, further complicating efforts towards a fully paperless environment (Abidin & Husin, 2018). Research on digital adoption in the public sector identifies organizational readiness, management support, and user acceptance as key factors influencing the uptake of digital records systems, including EDMS and ERMS (Bizi, Ghazali, & Yunus, 2025; Lojonon & Alfred, 2025).

The Sarawak State Government, like many other government agencies around the world, relies heavily on document management systems to streamline workflows, improve accessibility, and ensure data security of records and document management within their administration, while policy commitments continue to build a future-ready civil service (Premier's Office, Sarawak, 2025). Nevertheless, despite the significant investment in electronic documents management systems (EDMS) across Malaysian public sector agencies, concerns persist regarding their effectiveness in fully meeting the diverse operational needs of government departments and agencies. Studies indicate that factors such as system usability, organizational readiness, and user adoption can affect the actual benefits of EDMS implementations (Ab Aziz, Yusof, & Mokhtar, 2018; Aziz, Yusof, Mokhtar, & Jambari, 2017). Recent evidence from other developing countries show that persistent challenges, including infrastructural limitations, organizational capacity gaps, and implementation barriers, continue to hinder the full realization of digital government benefits (Ayesha, Ahlan, Ibrahim, & Ahmed, 2025).

Several challenges have emerged, including inconsistencies in electronic documents management systems functionalities across departments, difficulties retrieving information, and weaknesses in data security protocols (Alwan et al, 2015). Nevertheless, the absence of comprehensive evaluation frameworks specifically designed for the specific needs of the Sarawak State Government is impeding the ability to analyse the effectiveness of current EDMS, as existing organizational models need further development and integration of key elements for Sarawak's context (Adenan, 2018). The absence of comprehensive evaluation frameworks specifically designed for the needs of the Sarawak State Government impedes the ability to analyse the effectiveness of current EDMS deployments. Existing organizational models require further development and integration of contextual elements that address both technical and behavioral determinants (Bizi et.al., 2025). Furthermore, research in other contexts such as in Zambia and East Africa highlight limitations in policy, infrastructure, training, and stakeholder involvement as persistent barriers to successful electronic records management adoption in the public sector (Akakandelwa & Akakandelwa, 2023; Tekle, 2024).

While the literature has extensively covered the studies on Electronic Document Management System (EDMS), gaps remain in theoretical, practical, and empirical aspects, particularly in comprehensive frameworks that link system functionalities with organizational outcomes, user acceptance influences, and empirical evaluation of system performance in Malaysia government settings (Karfa, Ghazali, & Yunus, 2025; Mohamad, Thani, Rosely, & Sakarji, 2023). This study aims to address these gaps by evaluating the effectiveness of EDMS functionalities in the Sarawak State Government. By examining the performance of system functionalities, their effectiveness can be assessed. Hence, the purpose of this study is to fill the gap of research on this subject. The following heading discussed the problem statement of this study in three perspectives namely theoretical, empirical, and practical gaps. The problems that prompted the undertaking of this research are outlined in the next paragraph.

1.3.1 Theoretical Gap

Although the DeLone and McLean (1992, 2003) Information Systems Success Model and Seddon's (1997) respecification provide robust frameworks to evaluate information system success, empirical studies in the Malaysian public sector remain limited, particularly in the context of Electronic Document Management Systems (EDMS). Previous research has established that information quality significantly affects perceived usefulness, user satisfaction, and system effectiveness in various sectors, including education, private organizations, and e-government contexts (Elmunsyah et al., 2023); Alduaij et al., 2024). However, there is a lack of empirical evidence specifically examining how these constructs operate within government agencies in Sarawak, where EDMS implementation is intended to streamline document workflows, improve accessibility, and enhance decision-making.

Furthermore, while (Seddon, 1997) emphasized perceived usefulness as a key measure of individual level net benefits, few studies have operationalized this construct to evaluate the actual performance and effectiveness of EDMS functionalities in a Malaysian state government context. Most prior research has focused on user satisfaction or general system adoption, leaving a gap in understanding how the quality of information outputs directly translates into perceived usefulness and improved job performance among government staff. The researcher identified an apparent theoretical gap in the prior research concerning the relationship between EDMS functionalities and the dimensions of information systems success measured in terms of information quality, systems quality, perceived usefulness and user satisfaction in the government sector.

The theory on Information System Success by DeLone and McLean is rather dated, and the current studies bear the fruit of this theoretical gap. Some of the prior theory appear to be important and a foundation worthy of recognition. However, an investigation in terms of perceived effectiveness of EDMS functionalities and their relationship with information quality, system quality, perceived usefulness, and satisfaction and theoretical development is warranted. Examining these issues is essential because they have an impact on overall effectiveness assessment and functional requirements have a positive impact on user satisfaction measured in terms of project delivery, business functionalities and technical functionalities.

Previous studies have provided empirical evidence on theories, model and framework on EDMS. Nevertheless, there is absence of comprehensive EDMS due to the lack of systematic research investigating the factors for successful EDMS implementation (Alshibly et al., 2016). Besides that, Afonso, Schwarz et al. (2015) found that there seems lack of attention concerning outcomes in the usage of the system and inconsistent approaches taken to study EDMS in terms of individual performance. Moreover, the number of literatures consisting of functional requirements of EDMS which place impact on the system's outcome study in Malaysia is almost nonexistence. There are limited number of theories, models and frameworks encompassing EDMS functionalities particularly in government sectors. Therefore, limited study and empirical evidence can prove the effectiveness of EDMS implementation in the government sector of Malaysia. However, there are plenty of research being conducted on the technical part of EDMS itself.

Problem statement provides a description of the current issues in this study leading the researcher to tackle the problem. The implementation of electronic-government initiatives has become one of the main goals in several countries including Malaysia. However, electronic government implementation is not an easy task. Initiatives of electronic governance have encountered various problems in their implementation and are therefore not fully implemented in developing countries (Al-Naimat, 2019).

In 1997, despite the achievement in implementing electronic government in Singapore, the major issues encountered during the first phase involved the need to transform civil servants' mindset, the ambiguity of e-government goals to agencies, a lack of technical and financial resources, and the digital divide issue (Ke & Kee Wei, 2004). At the same time, limited study has attempted to the subject on Electronic Document Management System effectiveness in the government sector.

The current body of literature reveals a gap in research concerning the implementation of Electronic Document Management Systems (EDMS) within public administration (Nguyen et al., 2008). Most of the research done are on the EDMS itself but not on the effectiveness of EDMS by users especially amongst public administration (Lawellen, 2015; Alshibly et al., 2016). A research by (Hu & Wu 2016) also revealed that there is a gap exists in the Information Systems (IS) Success Model for government-togovernment systems. Furthermore, limited research has focused on analysing the effectiveness of e-government systems within public organizations. Concerning the EDMS as the solution for the best information system in government, it is about exploring the user's system all-encompassing experience, how it interacts with the system, what impacts its experience, what motivates it, its feelings, usability and what internal environmental factors affect its experience. (Madden, 2016).

Majority of studies do not primarily focus on the effectiveness of EDMS functionalities. Instead, they explore other aspects of EDMS, such as the concept of electronic document management system and discuss opportunities and challenges of EDMS in government agencies by (Abdulkadhim et al., 2015). It presents a research framework for implementing EDMS in a government context. This framework identifies 13 common factors of EDMS. Conversely, a study conducted by Zarić et al. (2014) proposed a solution to enhance the electronic document management system within government institutions. The proposed solution presents a novel system designed to address different administrative requests while minimizing any disruption to standard end user habits and reducing the need for extensive end user training.

Previous study did not address the electronic document management system functionalities that have positive significant with the information system effectiveness (Jinhai, 2009; Belov, 2022). Therefore, this study addresses a critical theoretical gap by applying both Seddon's Information System Success Model as well as DeLone and McLean IS Success Framework to evaluate information quality and its impact on perceived usefulness in the Sarawak State Government EDMS.

1.3.2 Empirical Gaps

A notable empirical gap exists in the current literature, with limited rigorous research on the factors critical to the successful implementation of EDMS. Several of these underexplored factors seem to play a crucial role in the success of information systems and warrant further investigation. An empirical investigation of these issues is important because effectiveness assessment and functional requirements have a positive impact on user satisfaction. Furthermore, previous research has focused primarily on qualitative research concerning intend to use, use and overall performance of user in EDMS with dimension of user acceptance model or theory. No study to date has directly attempted to empirically evaluate the relationship between EDMS functionalities and the dimensions of information systems success. Studies on EDMS implementation in government is not widely discussed in research. Many studies have been done on EDMS implementation that have delivered some impressive benefits of governments in terms of connecting all departments, public servants to a variety of information and facilitates efficient communication and document handling (Abdulkadhim et al., 2015). However, very little empirical research has been done on effectiveness of EDMS functionalities in the context of government in Malaysia.

1.3.3 Practical Gaps

The existing body of literature reveals a significant practical gap in the research on Electronic Document Management Systems (EDMS). Despite considerable advancements on the theoretical frameworks surrounding EDMS, there remains a lack of rigorous, practice-oriented investigations. Specifically, certain critical factors contributing to the successful implementation of EDMS have been underexplored, resulting in a disconnect between theoretical insights and their application within the information systems field. Addressing these gaps is essential to bridge the divide between research and practice, ensuring that EDMS implementations are more effectively aligned with organizational needs and challenges. The field of information system is ripe for an investigation of practical focus research on effectiveness of EDMS. Many prior studies predominantly emphasize the theoretical aspects of user acceptance in the field of information systems. However, a noticeable gap exists in the form of limited practical studies and action-oriented research specifically addressing the effectiveness of Electronic Document Management Systems (EDMS). This gap underscores the need for empirical investigations that focus on real-world applications, offering practical insights to bridge the divide between theory and practical in this critical area of information systems research. This is an important and worthy investigation in the context of information system study. An investigation into these issues is essential, as they directly affect the overall effectiveness assessment of EDMS.

Practical gaps exist in understanding how functional requirements influence user satisfaction, particularly in relation to key performance areas such as project delivery, business functionalities, and technical capabilities. Furthermore, previous theoretical research has focused primarily on technological readiness; cost savings perceived benefits; time savings perceived benefits; productivity increasing perceived benefits; citizens service enhancing perceived benefits; and top management support. Very little practical research has been done on the effectiveness of EDMS functionalities in the context of government in Malaysia (Al-Hashimi et al., 2017). Meanwhile, work on EDMSs in public administration is lacking in the literature. In terms of the practical gaps, there is still a need to fulfil on electronic document management system's effectiveness in the government agencies field. Most of EDMS implementation research focus on a certain technical functionality of such system or given some conceptual proposals, while some studies discussed progress or failure in the implementation of EDMS in the government context (McLeod, 2012).

In the context of this study, Electronic Document Management System's services and effectiveness are almost non-existence. In the organizational or government context, literature dealing with information or document management often uses terminology based on the business concept, including enterprise content management (ECM), electronic record management (ERM), or enterprise content and record management (ECRM) (Jervis and Masoodian, 2014). The expansion of these terms reflects the evolution of the systems themselves as they have grown steadily to handle information in a wider range of electronic forms. The document management system, enterprise content management and electronic records management have become increasingly important for organizations as record management has become very complex, and that effective record management can result in significant cost saving and risk mitigation. These are also required to help comply with records management requirements, such as ISO 2019.

1.4 Purpose of the Study

The purpose of this study is to examine the relationship between EDMS functionalities (Automated Information Capture, Federated Search & Retrieval, Collaborative Tools, Hierarchical File Indexing & Classification, Storage & Archival Method, Automated Workflow, Security & Audit Trail, and Support & Administer Compliance) and the dimensions of information systems effectiveness measured in terms of information quality, systems quality, perceived usefulness, and user satisfaction.

1.5 Research Objectives

The following specifies the study objectives:

a) RO1: To examine the effectiveness of the document management systems used in Sarawak State Government.
b) RO2: To assess the performance of electronic document management system functionalities used in Sarawak State Government.
c) RO3: To assess the influence of the functionalities' performance on the effectiveness of the electronic document management systems.

1.6 Research Questions

Based on the research objectives, the following research questions are formulated:

a) RQ1: How effective are the electronic document management systems used in Sarawak State Government?
b) RQ2: What is the performance level of electronic document management system functionalities in the electronic document management systems used in Sarawak State Government?
c) RQ3: To what extent does the performance of functionalities determine the effectiveness of electronic document management systems in the Sarawak State Government?

1.7 Overview of Research Model

The number of literatures on EDMS studies in Malaysia is very small as stated in Subtopic 1.3 of the problem statement. Thus, there is no quantitative empirical analysis available for validating the relationships in the proposed research model. Studies are absent that ever mentioned about relationship between performance of functionalities and electronic document management services effectiveness. However, this research model was derived based on Delone and McLean IS success model (Delone & McLean, 2003) which was updated by Seddon, (1997). The framework contains two major categories, namely electronic document management system functionalities and information system effectiveness. Figure 1.1 shows the basic proposed conceptual framework for this study.

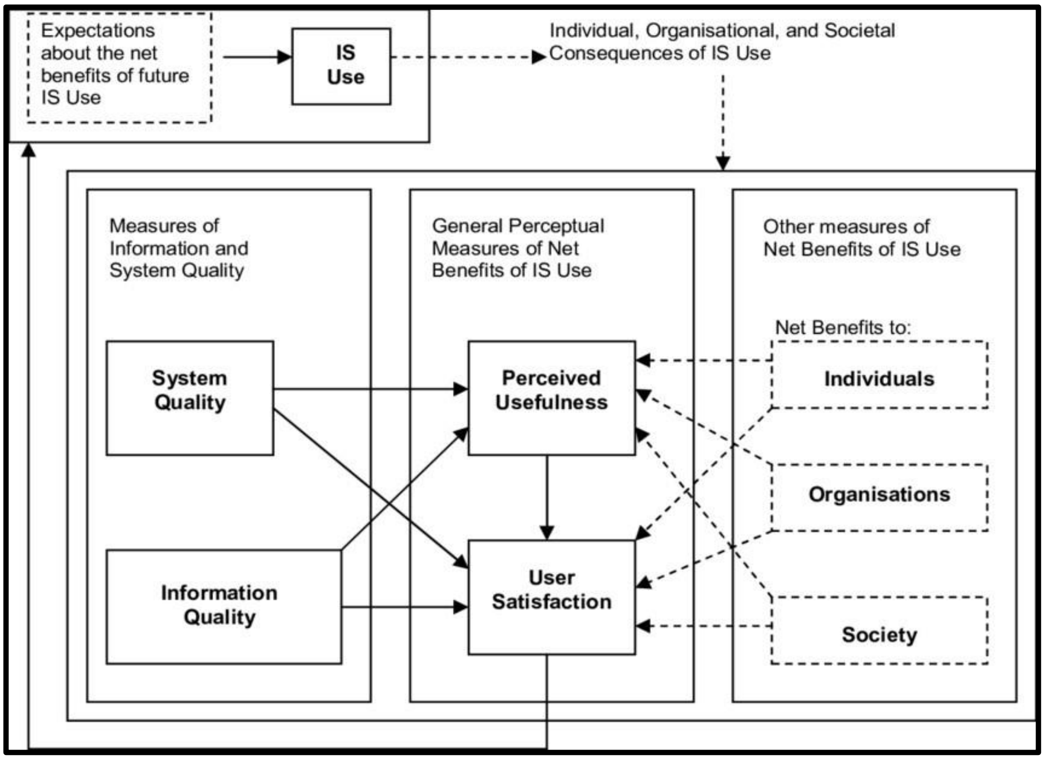

Figure 1.1 Seddon's Model of IS Success (1997)

1.8 Scope of the Study

This study emphasized on the assessment of the functionalities and effectiveness of the Electronic Document Management System in Sarawak Government agencies. The study focused on Electronic Document Management System functionalities

(Automated Information Capture; Federated Search and Retrieval; Collaboration Tools; Hierarchical File Indexing and Classification; Storage and Archival Method; Automated Workflow; Security and Audit Trail; and Support Administer compliance) and factors related to system effectiveness, which is information quality, system quality, satisfaction, and perceived usefulness, especially to the technology implementation such as EDMS. In order to verify the effectiveness of EDMS in Sarawak Government agencies, the validated survey instrument was disseminated to the respondents among public service of electronic document management system in 11 State Ministries; 18 Chief Minister's Department; 21 State Departments; 12 State Residents' Offices; 40 District Offices; 25 State Local Authorities and 25 State Statutory Bodies, as data collection instrument for this study.

In addition to the empirical investigation, this research incorporates a Systematic Literature Review (SLR) to establish the theoretical foundation and identify global best practices in EDMS implementation. The SLR covers indexed publications retrieved from Scopus, and Web of Science (Core Collections), focusing on studies published between 2015 to 2025. Only high-quality and peer-reviewed research articles were examined. Journal articles and conference papers were used in the inclusion criteria because their sources provide peer-reviewed and verified results, ensuring the credibility and reliability of the evidence collected. Publication such as magazines, blogs, technical notes, and nonpeer reviewed materials were excluded to maintain methodological rigour. To strengthen the analysis, bibliometric mapping and keyword co-occurrence analysis were conducted using VOSviewer, enabling the identification of research patterns, dominant themes, and relationships among EDMS-related concepts.

1.9 Significance of the Study

If Electronic Document Management System (EDMS) fully implemented in government agencies in modernizing public sector operations, such agencies can take advantage of its many benefits. This study emphasizes the transformative impact of EDMS in enhancing the efficiency and effectiveness of government processes. Hence, it minimizes errors, reduces reliance on manual labour, and promotes productivity improvements, enabling agencies to deliver better public services. Additionally, EDMS contributes to space savings by digitizing physical records, enhances cash flow through improved financial tracking, and fosters overall improvements in business processes. Significance of this study highlighted that the EDMS as a tool for optimizing government operations, supporting transparency, and ensuring better resource management. By implementing an EDMS, it can be worthwhile due to the numerous benefits it provides (Alshibly et al., 2017). In consideration of the study's advantages for government agencies and the civil service, it can also be claimed that the study should capture the interest of both researchers and practitioner communities from various information technology, information system, records management experts, government and other related field that ensure electronic document management system and information system success.

The study also benefits the body of knowledge of information system management as it results in the evidence towards the importance of EDMS functionalities in influencing the effectiveness of electronic document management system used in the government agencies. Some of the significances of this study are stated below:

1.9.1 Theoretical Contribution

Previous models and frameworks of electronic document management system focussed on the technical part of system development and behaviour of the user acceptance towards the system. Therefore, for this study, the proposed conceptual framework contributes to expending the information system success that related to electronic document management system effectiveness.

1.9.2 Empirical Study Contribution

In terms of empirical study of Electronic Document Management System among civil service in the government agencies, there are non-existent in the literature research on the functionalities of EDMS towards the effectiveness of the system used in the context of government in Malaysia. Most of the research discussed on the user acceptance and the behaviour of user of the system other than EDMS. Therefore, this study is among the first on EDMS study in the government agencies especially in Sarawak, Malaysia. Normally research on EDMS is still not common and unknown, particularly in Malaysia due to the fact that public agencies were normally asked to mandatorily adopt certain system by the authority.

1.9.3 Practical Contribution

Another contribution to new knowledge is that this study focuses, to a certain extent, on the electronic document management system effectiveness from the top to bottom management of users' perspective on the effectiveness in terms of information quality, system quality, satisfaction and perceived usefulness. As a result, the relationship between EDMS functionalities and the dimensions of information systems success measured in terms of information quality, systems quality, perceived usefulness and user satisfaction that have been identified addresses the effectiveness of Electronic Document Management System used by the agencies in the Sarawak state government.

1.10 Definition of Terms

Fourteen essential terms mainly Electronic Document Management System, Automated Information Capture, Federated Search and Retrieval, Collaboration Tools, Hierarchical File Indexing and Classification, Storage and Archival Method, Automated Workflow, Security and Audit Trail, and Support Administer Compliance, Information System Effectiveness, Information Quality, Systems Quality, Perceived Usefulness and User Satisfaction are worth defining as the terms shape the development of the proposed conceptual framework for this study.

1.10.1 Electronic Document Management System (EDMS)

EDMS has been applied across the globe in various organizations. EDMS can be defined as a group of information containing various types of documents which may exist at different locations within a network and support multiple accesses, updates and modifications simultaneously and automatically (Ismael & Okumus, 2017). Farik et al., (2015) defined an electronic document management system (EDMS) as a computerized system that facilitates the creation, collection, organizing, storage, retrieval, manipulation, and managed circulation of documents electronically. This means that, at least, a typical EDMS system consists of a holding centre where records are stored electronically; a method of adding documents to the storage area (or a number of methods); and method of record recognition and retrieval from storage area.

1.10.2 Automated Information Capture

Automated information capture is putting a document into an electronic format to automatically identify and classify information and make the information available within particular systems (Hamzah et al., 2018). Automated information capture mainly refers to the means of capturing information promptly by using the machine-readable automatic identification and data capture (AIDC) technology such as linear barcode, two dimensional multi-row barcode, matrix code, contact and non-contact magnetic devices, contact memory, and radio frequency identification system or RFIDs (Somapa et al., 2018). In the context of this study, automated information capture is one of the EDMS functionalities that transforms paper documents into digital files through high-volume scanning and OCR, that it can capture and store digital files at the point of creation from network folders and drives, Microsoft Office and other integrated systems, mobile devices and digital cameras. Data capture tools automatically add context and enhancements around imported files, such as image clean up, metadata entry and file classification via the system.

1.10.3 Federated Search and Retrieval

Federated search (also known as federated information retrieval or distributed information retrieval) is a method of simultaneously searching numerous text collections and to retrieve relevant answers (Shokouhi & Si, 2011). Federated search and retrieval are closely related with many other search methods. There are three closest areas to federated search and retrieval, namely vertical search, metasearch and peer-to-peer search, as many federated search techniques can be applied in related fields (Caswell & Wynstra, 2010). Through Federated search and retrieval, EDMS allows authorized employees to find files through document archives and databases, with typically file name, metadata, document content and more search capabilities.

1.10.4 Collaboration Tools

Collaboration tools in EDM systems enable all project-related electronic documents to be stored, updated, and shared through a common web server that enables parties involved to have access to documents real-time (Björk, 2003). This term also refers to software or platforms that "support the needs of two or more people working together on a common task to communicate, coordinate and/or process information" (Zhang & Galletta, 2006). EDMS provides the ability for streamlined collaboration to modify the documents. Annotations, editorial options for confidential material, highlighting tools, stamps, text boxes and other mark-up tools provide searchable context and decision points for file content.

1.10.5 Hierarchical File Indexing and Classification

Hierarchical folder structure has been commonly used for information management in the digital world since creation of the first computer. The most commonly used file indexing management system in the digital environment is the hierarchical folder structure built into computer operating system that enables users to arrange files into a structure of a tree (Ma, 2010). A well-built hierarchical structure enables the user to do indexing and classification. In EDMS, digital documents are organized into a central repository based on folder structures which keep documents automatically organized by department, date of creation, or other parameters of information management.

1.10.6 Storage and Archival Method

The archival storage provides the method to store, preserve and provide access to archived content. Typically, in small systems, storage can be stand alone and operated manually; while in larger systems, storage is typically implemented in conjunction with cataloguing applications as well as asset management systems, information retrieval systems, and access control systems in order to control and manage archived content as well as provide a controlled way to access it. In EDMS, storage can be defined as a way of protecting archival holdings in a secure manner while archival method is a method of retaining information outside of the internal memory of a computer (Zhang, 2010). EDMS can provide or attach to record retention schedules, making it simple for complete record lifecycle management to turn active documents into complying records.

1.10.7 Automated Workflow

Automated workflow in EDMS demonstrates a workflow-based document management mechanism by assigning task and tracking its progress of different people who are involved in the lifecycle of particular document ensuring that the document is aligned with the corresponding processes (Pho & Tambo, 2014) Automated workflow is the modelling and enacting of business processes by human and computer agents (Gary, 1999). In EDMS, it is a back-end automation varying from workflows that build directories and file new documents automatically, to advanced alerts that loop at crucial steps in internal business processes amongst end-users.

1.10.8 Security and Audit Trail

Security and audit trail (also known as an audit log) aims at detecting and preventing illegal and fraudulent user practices, collecting data about them in the database. The information gathered is analysed to determine security problems and their origin, to ensure that log records are stored securely and permanently, so that they can be detected when a security breach occurs (Roratto & Dias, 2014). This procedure allows any modifications to a database or file to be recorded. Thus, the need to identify such activities and to determine suspicious patterns are important requirements for system security. Furthermore, an audit should be carried out independently and transparently to ensure that all relevant information is classified. An audit trail, which can also be called audit log, is used to ensure an accurate flow of transactions in a system. Every detail of a source and entry of a document or transaction should be made based on a report or file.

1.10.9 Support Administer Compliance

Support administer compliance can be defined as compliance with legal requirements relating to the preservation of the authenticity and integrity of electronic documents throughout the entire electronic document life cycle (Hamidovic and Hamidovic, 2014). In general, the EDMS needs administration support in compliance with the legal criteria for electronic record keeping, data security, confidentiality, intellectual property, and preserving litigation, all of which play a vital role. Administer compliance allows EDMS to integrate regulatory rules into an electronic filing system. The regulator expects EDMS to demonstrate that sensitive information is stored correctly with all the required safety and security measures in place. EDMS also supports administer compliance through retention schedule that monitors destroy of files appropriately based on records standard.

1.10.10 Information System Effectiveness

Cho (2008) described information system effectiveness as how successful a system is in terms of user satisfaction and the impact of that system on individuals and the organization itself, while Seddon (1997) defined IS success as "a value judgment made by an individual, from the point of some stakeholder" and added by saying that an information system is "effective if the person or organisation that expended resources in auguring, learning to use or using the systems is better off as a result" (Seddon et al., 2002). On the other hand, the system must be well accepted by its users in order to be effective, thus it is crucial to find out how well they can utilize the EDMS functionalities and how keen they are to use the system.

1.10.10.1 Information quality

DeLone and McLean (2016) defined information quality as the set of desirable attributes inherent in the output generated by a system, such as management reports and web pages. These attributes include relevance, understandability, accuracy, conciseness, completeness, currency, timeliness, and usability, which collectively determine the effectiveness of the information in meeting users' needs and supporting decision-making processes. Therefore, information quality refers to the degree to which the output of a system fulfils its intended purpose by delivering data that is accurate, timely, and actionable. High-quality information is relevant, addressing the specific requirements of its users, and concise, presenting only essential details without redundancy. It must also be understandable, ensuring clarity, accessibility, and complete, compassing all necessary elements to provide a comprehensive perspective. Additionally, information should be current and up-to-date to maintain its applicability, while timeliness ensures it is available when needed. Usability emphasizes on practical or analytical contexts, making it an essential component of a system’s overall value.

In this study, the success dimension information quality constitutes the desirable characteristics of an information system output. A case in point would be the information an employee can generate using an EDMS, such as monthly report on incoming and outgoing mails in the government agencies or action taken by staffs on the task given. As a result, it encompasses measures that focus on the system's information quality and usefulness to users. Information quality is frequently cited as a crucial determinant of customer satisfaction.

1.10.10.2 System quality

System quality is the desirable characteristics of an information system. These measures typically focus on usability aspects and performance characteristics of the system under examination such as ease of use, system flexibility, system reliability, ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times (DeLone & McLean, 2016). Numerous additional measures have been proposed and implemented to further refine the conceptualization and assessment of the system quality construct. System quality refers to the technical performance and operational characteristics of a system that influence its usability, functionality, and efficiency. It encompasses attributes such as reliability, flexibility, response time, ease of use, and system integration. The measurement involves evaluating how well a system meets technical standards and user expectations. This is essential in assessing the system’s capability to deliver a seamless user experience, adapt to change requirement, and support the organization’s objectives effectively. In this study, system quality can be measured of EDMS processing system itself such as performance measures as resource utilization. It can also be measured on response time, turnaround time, system flexibility, and ease of use among the users of EDMS to measure system quality.

1.10.10.3 Perceived usefulness

Perceived usefulness is defined as a person's subjective assessment of a computer system's ease of use, which influences their perceived usefulness. As a result, it renders their acceptance of technology. It is defined as ‘the degree to which a person believes that using a particular technology enhances his or her job performance’ (Davis, 1989). Meanwhile, Seddon (1997) defined perceived usefulness as the degree to which a person believes that using a particular system has enhanced his or her job performance or his or her organization’s performance. In this study, perceived usefulness could be described as the using of EDMS would improve the way a user could complete a given task.

1.10.10.4 User satisfaction

In using an information system, its success can be measured in terms of user satisfaction. DeLone and McLean (2016) defined user satisfaction as the users’ level of satisfaction with reports, websites, and support services. For example, EDMS been measured based on the users’ satisfaction based on the characteristics of reports and of the underlying EDMS itself. Seddon (1997) defined user satisfaction as an evaluation on a pleasant-unpleasant continuum. Other than that, user satisfaction is also associated with the user attitudes towards the information system. User satisfaction with information is also an antecedent to a surrogate for user satisfaction as the degree of match between task characteristics and EDMS functionalities.

1.11 Chapter Summary

Chapter One presents an overview of the research. This study must be carried out as the researcher identified the problem statement and research gaps in this area. This chapter discussed the study limitations and determined the significance of the research. The researcher organized and presented the thesis in six (6) chapters. The subsequent chapters of this study are divided into:

a. Chapter Two: Literature Review
b. Chapter Three: Theoretical Framework
c. Chapter Four: Research Methodology
d. Chapter Five: Research Finding of the Study

e. Chapter Six: Discussion, Recommendation and Conclusion

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The implementation of Electronic Document Management System (EDMS) in government organizations is a critical step towards enhancing efficiency, ensuring compliance, and improving document management processes. This literature review aims to evaluate the existing research on the effectiveness of EDMS functionalities within government settings, with a specific focus on the Sarawak Government. By examining both the DeLone and McLean IS Success Model and the Seddon's IS Success Model, this review provides a comprehensive understanding of the factors that contribute to the successful implementation of EDMS. The review aims to identify gaps within the existing body of literature and provide a rationale for the necessity of further research in this area.

The literature review was carried out to provide a theoretical basis for this research. This chapter begins with an overview of Electronic Document Management System (EDMS) including its definitions, functions and relevance in contemporary government administration. It encompassed the eleventh sections. The first section of the chapter outlines the content. The second section draws conceptual and technical foundations of EDMS in terms of its definition, its connection to information systems (IS) success, its purpose, its functions, its components and its limitation. The third section reviews the theoretical models of EDMS. The fourth section presents the effectiveness of EDMS in public sector organizations. The fifth section presents the systematic review of EDMS research. The sixth section reviews the user acceptance and usage of EDMS. The seventh section provides an account of empirical studies on the EDMS functionalities and performance. The eighth section reviews the EDMS in Malaysia and Sarawak public sector context. The ninth section provides review about CACTUS system and functional architecture. The tenth section presents the synthesis of literature and gaps, while the last section concludes the chapter. Meanwhile, the theoretical models of EDMS are reviewed in Chapter Three.

2.2 Conceptual and Technical Foundations of EDMS

Electronic document management is crucial for establishing and developing the electronic government, as it involves scientific management ways, addressing characteristics, difficulties, and emphases (Kelemen & Mekovec, 2007). Electronic Document Management System (EDMS) plays an important role in transforming traditional government document management practices into efficient streamlined processes that enhance accessibility, security, and operational effectiveness. According to a study (Lee & Baskerville, 2003), implementing EDMS in government agencies offers several significant benefits: EDMS allows government agencies to store documents electronically, thus facilitating quick and easy access to information. This accessibility reduces the time and effort required for information capture and retrieval, therefore improving overall operational efficiency. By centralizing document storage and implementing robust security measures, EDMS helps governments ensure the confidentiality, integrity, and availability of sensitive information. This is crucial for compliance with data protection regulations and safeguarding against unauthorised access. EDMS automates document workflow, enabling government agencies to streamline approval processes, reduce manual errors, and enhance collaboration among departments. Automated workflows ensure tasks are completed in a timely manner, improving service delivery and responsiveness. Transitioning from paper-based to electronic document management reduces costs associated with printing, storage, and physical document handling. Government agencies can reallocate resources to more critical tasks while minimizing environmental impact through reduced paper consumption. In an increasingly digital world, EDMS supports government initiatives towards digital transformation. It provides a foundation for adopting emerging technologies, to further enhance document analysis, decision making processes, and citizen services.

Electronic Document Management System (EDMS) has become crucial instrument for modernizing government operations as it improves the management of documents and information. These functionalities exert substantial influence on information quality, system quality, perceived usefulness, and user satisfaction. Information quality is a critical metric in evaluating the effectiveness of EDMS. It refers to the accuracy, completeness, consistency, and relevance of the information managed by the system. The functionality of automated information capture helps in accurately and consistently capturing data, reducing human errors, and improving the overall quality of information. According to Yusof and Chell (1999), automated capture systems ensure that information is accurately entered and easily retrievable, enhancing its reliability and usability. As for the federated search and retrieval, by enabling comprehensive searches across multiple databases, this functionality improves the relevance and completeness of information retrieved. As noted by Davenport and Prusak (1998), federated search capabilities enhance the ability to find relevant information quickly, thus improving decision-making processes.

System quality refers to the performance, reliability, usability, and overall robustness of the EDMS. High system quality is essential for ensuring that the system meets user needs effectively. Automated workflows streamline business processes by reducing manual intervention and errors, thereby improving system performance. Agarwal and Prasad (1999) highlighted that workflow automation enhances system efficiency and user satisfaction by ensuring consistent task completion. As for the security and audit trail, this functionality ensures that all actions performed on documents are recorded and protected, which is crucial for preserving the reliability of the system and the trust of the users. Chen and Chengalur-Smith (2015) emphasized the importance of robust security functionality in maintaining the reliability and integrity of information systems. Perceived usefulness is the degree to which users believe that the EDMS enhances their job performance and productivity. The collaboration tools facilitate teamwork and information sharing, which significantly enhances perceived usefulness. Venkatesh et al. (2003) proposed that the adoption of collaborative tools enhances productivity and enhances users' views of the system's value. Effective indexing and classification make it easier for users to organize and retrieve documents, enhancing perceived usefulness. Seddon (1997) argued that well organized document management systems are perceived as more useful due to their ability to expedite the process of retrieving information.

User satisfaction measures the extent to which users are content with the EDMS and its functionalities. Storage and archival method is to ensure that users can easily access historical documents, which increases satisfaction. Bailey and Pearson (1983) discovered that the level of convenience in accessing information has significant effects on user satisfaction. Support and administer compliance ensuring that the EDMS supports compliance with regulations boosts user satisfaction and confidence. DeLone and McLean (1992) highlighted that compliance support features in information systems are crucial for maintaining user satisfaction and trust. Therefore, the effectiveness of EDMS functionalities is essential for improving the information quality, system quality, perceived usefulness, and user satisfaction. Each functionality, from automated information capture to compliance support, plays an important role in ensuring that the EDMS meets the needs of its users and contributes to more efficient and effective document management in government settings.

This literature review contributes to the understanding of Electronic Document Management Systems (EDMS) and their role in managing government documents. The purpose of this review is to examine and clarify the DeLone and McLean Information System Success Model and Seddon's IS Success Model, offering justifications for their importance in assessing the effectiveness of EDMS in government environments. Theoretical frameworks such as those proposed by DeLone and McLean (2003) and Seddon (1997) offer systematic method of assessing several aspects of system success, such as the information quality, system quality, perceived usefulness, and user satisfaction. The review also seeks to identify and describe the specific functionalities of EDMS that are critical for government document management. These functionalities include automated information capture, federated search and retrieval, collaborative tools, hierarchical file indexing and classification, storage and archival methods, automated workflow, security and audit trails, and support and administer compliance. Understanding these functionalities is essential to assess how they contribute to the overall effectiveness of the EDMS (Davenport & Prusak, 1998; Yusof & Chell, 1999). Apart from that, the literature review also evaluates the contribution of EDMS functionalities on information quality, system quality, perceived usefulness, and user satisfaction for determining the success of EDMS implementations. High-quality information, reliable systems, perceived usefulness and high user satisfaction are indicators of successful EDMS deployments (Venkatesh & Davis, 2000).

Computers were used as document recording and storage equipment in organization in the early 1970s, when record or document management systems were first introduced. Through time, document management was defined as organising and managing documentation concerning specific tasks and processes as their importance and use had increased. However, normally, the EDMS refers to a computerized system that facilitates the creation, collection, organization, storage, recovery, manipulation and managed circulation of documents in electronic format. Some studies have shown that Electronic Document Management System has become significant in government public sector. Subsequently, the advancement of information technologies has revolutionized documentation practices, leading to significant developments in document management systems. In particular, Electronic Document Management System (EDMS) has emerged as a crucial solution, driven by the widespread integration of computers within organizational processes. Beginning with definition of document, it is typically defined as a container of information comprising written or drawn information in a structured format for a certain purpose.

Traditionally, a document is a piece of paper or a collection of documents, such as a memo or a letter. Levien (1991) described a document as “recorded information structured for human consumption”. Meanwhile, Sprague Jr. (1995) defined a document as "a unit of recorded information structured for human consumption”. It is recorded and stored so that a speech or conversation without transcript is not a document. Central to the idea of the document is that it can be easily transmitted, stored, and processed as a whole. However, the definition of the term "document" has changed dramatically during the last decades. Part of the reason for this change is due to the development of information technology. The definition of document that accommodates technology acts as a snapshot of some information set that can incorporate many complex information types; exist in multiple places across a network; depend on other documents for information; change on the fly (as subordinate documents are updated); have an intricate structure; or complex data types such as full-motion video and voice annotations; and be accessed and modified by many people simultaneously (with permission)(Meier & Sprague, 1996).

Hence, this broad definition of documents is an important first step in developing an integrated approach to document management. Documents are processed and stored as digital object electronically rather than as physical objects. A document is no longer just a collection of words on a page; it is also a collection of elements or items linked to specific topics that have been grouped together. Thus, in the electronic age, a new definition of a document arises as an electronic information container that aggregates information from various sources in various forms on a specific topic to satisfy the needs of a specific person (Abbasova, 2020).

The literature on EDMS shows a variety of approaches in the development of EDMS that is closely related to the principles of document, document management and document management systems. The word "document" has undergone drastic changes in meaning over the past decades. This shift is related in part to information technology.

An electronic document is an electronic information container that collects information from a variety of sources in a variety of formats about a particular subject to meet the needs of a specific individual (Forcada et al., 2005). Document management can be defined as the process of tracking the official business transactions, decision-making records, and transitional essential documents of an organisation, which are represented in a document format (Giandon et al., 2002). As for Electronic Document Management, it refers to the system that is developed for the activities of document management that contain both electronic and manual documents managing the electronic documents (Srirahayu, 2018; Abbasova, 2020).

EDMS eliminates manual paperwork as well as decreases paperwork and recordkeeping duplications (Pho & Tambo, 2014). In Table 2.2, the features of two methods are compared: conventional paper management and EDMS (Lukicic & Sruk, 2008).

Table 2.1
Characteristics of the modern EDMS

Paper Management	EDMS
Lost time/productivity - documents are circling between departments	Secure global repository for the controlled documents
Time spent for finding / re-finding information	Independence of the document format
Problems with deploying new regulations, operating procedures etc.	One document in only one place Virtual documents - links to including doc.
Problem of existence of the single and the latest version	Attributes, keywords, full-text indexing, powerful search tools
Long production time – corrections, revision, approval, new version	Handling versions, renditions Automated review and approval
Single-user ownership	Workflow for document life cycle
Printing, distribution and storage costs	Automated change management
Poor and expensive security	Intuitive web interface
Increasing number of documents often becomes unmanageable	Electronic signature User acknowledgement- “to be read and understood’
Shipping costs for distant recipients	
Low capabilities for “to be read and understood notification”	Watermark print control Access and use monitoring and security
No effective common share of knowledge stored in personal documents	Multi-level access strategies for different types of documents and different stages in document lifecycle

Previous studies indicate that papers have been transformed, expedited, and automated using EDMS. Computers and Web-based information systems make it possible to create, store, transport, and display documents digitally. It has been widely researched that electronic document is mostly created by computers and available in a variety of formats, including word processing files, spreadsheets, graphics, video, audio, and bitmapped images. Several publications have also appeared in recent years documenting that web-based information systems allow many users in organization to exchange documents both internally and externally (Al Shibly, 2007).

2.2.1 Definition of Electronic Document Management System (EDMS)

There are many definitions of EDMS found from the government literature. STANDARD (2014) defined EDMS as computer-based application dealing with the management of documents throughout the document life cycle. This can include one or more technology, such as document imaging, paper or library facilities, workflow, management of company reports, form management and automated recognition of characters.

From a technological perspective, an Electronic Document Management System (EDMS) can be defined as an integrated system for managing diverse types of documents distributed across various locations within a network. It enables simultaneous and automated access, updates, and modifications, thereby enhancing efficiency and collaboration (Ismael & Okumus, 2017). EDMS also can be defined as information management technologies that utilize information and communication technology (ICT) to effectively handle and organize precious documents resources within government or business setting (Haidera, 2015). EDMS can also be specified as a document containing a conceptual information record (Gunnlaugsdottir, 2008). Other than that, Johnston and Bowen (2005) pointed out that the definition of EDMS as a record of information with certain characteristics such as the employee entity as part of an inventory or in a personal framework containing the information needed to reflect a given concept. Adam (2008) defined an Electronic Document Management System (EDMS) is a system integrated with applications such as Microsoft Office, enabling users to actively manage documents stored and indexed within a centralized repository. The system supports features such as checkin and check-out processes, version tracking, and revision control through versioning mechanisms. Additionally, many EDMS platforms incorporate Document Imaging and Processing (DIP) functionalities, allowing both paper-based and electronic documents to be scanned, indexed, and archived efficiently.

In terms of government administration, EDMS helps state agencies and municipal councils in governments to secure transfers of documents and complying with legal requirements (Wilkins et al., 2009). According to Borglund and Sundqvist (2007), EDMS allows organisations to manage documental records, to enhance management processes, to communicate concepts and ideas organizationally, to manage knowledge and to improve the effectiveness of activities, and to play an important role in organisational memory. At the public and private sector levels, EDMS has become a legal necessity in countries such as the US, the UK, Australia, Sweden and the European Union (Nguyễn et al., 2012). Kelemen and Mekovec (2007) referred EDMS as one of the new government programmes that make it easier to access and reuse information kept in the public sector and to respond to the need to accelerate the normal administration process. Government agencies use of information and communications technology (ICT) not only to transform ties with people and businesses, but also to increase transparency, lessen corruption, enhanced provision of government services, greater responsiveness and accountability of the government, and empowerment of people (Cecchini & Raina, 2004).

2.2.2 Purpose of Electronic Document Management System (EDMS)

Zdraveski et al. (2019) outlined the purpose of EDMS as follows: (i) to control increasing volume of documents; (ii) to provide access throughout the company through Internet or Extranet; (iii) to easily store, access, and modify information; and (iv) to perform their work and ensure data security and confidentiality, as well as managing business processes. Whereas from the perspective of Shobaki et al. (2017), the primary purpose of an Electronic Document Management System (EDMS) are: (i) to facilitate selfidentification and preliminary evaluation of documentation by providing archives with comprehensive information on an organization overall document inventory; (ii) to streamline the process of separating relevant documents from insignificant ones, thereby preventing the archive from being overwhelmed with unnecessary records; (iii) to ensure the availability of documents while minimizing administrative costs associated with document management services; (iv) to provide archivists with essential details, enabling them to effectively plan for space, staffing, and other operational requirements; and (v) to simplify core archival functions, including the organization, description, referencing of records and maintenance of the system.

2.2.3 Evolution of Electronic Document Management System (EDMS)

In the early evolution, electronic document management systems (EDMS) were developed from the 1980s to manage unstructured electronic information. However, evolution has started with technology for producing, managing, duplicating, and distributing documents such as plan drawings, bills, specifications, to name a few that have undergone many fundamental changes (Björk, 2001). The first move of document evolution was the introduction of photocopying in the 60's. In the early 1970's, industry innovators like Black and Veach, began to look at the potential to centrally store Computer Assisted Drafting & Design (CADD) drawings in an electronic format. The goal at that time was to increase efficiency by sharing CADD-generated documentation among engineers, designers, and draftspersons. This endeavour served as the foundation for document management technology development. Later in the 1980's, computer technology was introduced for daily work and mass utilization of CAD-systems, word-processing and other software. At the same time, fax was also being on demand for data transfer method to handle offers, send graphics, to name some. As a result of this work, the first commercially available large-format scanners were introduced. Thus, for these early imaging systems, storage space requirements were significant as few compression algorithms were developed.

Furthermore, systems were one-of-a-kind, with proprietary formats and little chance of upgrading to newer technology. Initially, the document control was developed for paper records, document microfilms and other "hard-copy" materials, such as x-rays or NDE material for mega-construction projects (non-destructive examination), like nuclear power stations. Initial development of document management and imaging platform management of electronic documents was done as separate, parallel activities. Imaging platforms became the standard for organisations with high volumes of paper documents. Initial document management systems focused on one format or very limited until the extensive adoption of personal computer and desktop applications commercial documents management applications were made available. As a result, the acronym EDMS was typically used to refer to the activities that originally defined an Engineering Document Management System and was more descriptive of a management program than a technology.

However, deployment of these early systems was very expensive and limited to government and large-scale engineering firms. As the cost of computers, networks, and storage decreased, the technology was introduced to various areas that were capable of supporting hundreds of thousands of users and a billion documents (Government, 2021). Later in the early 1090's, internet was introduced and has made everything possible with transfer of documents via email, and this is the great beginning of document management. The increase of XML since the late 1990s had an effect on electronic information preservation methods. Subsequently, in the 1990s, content management (CM) and knowledge management (KM) systems arose, followed by Cloud-based EDM systems, and enterprise content management (ECM) which was introduced in the early 2000s (Owczarek et al., 2006).

With the robust IT development, electronic document became more relevant by increasing the media richness in IT, more powerful computing, an increasing integration of technologies and the ability of electronic document in handling different kinds of media increase rapidly. When electronic storage becomes ever cheaper, item for graphics, sound, animated images as well as videos can be stored digitally. This leads to the emergence of a new definition of document in electronic age as electronic document. This enables the user, without having to create a paper document, to create an electronic document on a personal computer, to identify, collect and store the electronic document from the Internet, Intranet and Extranets electronically and to process and transmit a single electronic document to others on networks or even by internet users around the world at the same place (Meier & Sprague, 1996). The evolution then progressed to the use of email as a significant advancement in document management and communication among users. {Björk, 2003 #328}Finally, a more sophisticated method called Electronic Document Management System (EDMS) was used to store documents centrally on a web server, with users interacting with the central repository through standard web browser interfaces (Björk, 2003).

2.2.4 Development of Electronic Document Management System (EDMS)

An information system comprises five components: people, data, software, hardware, and a network that work together to convert input into output by converting data into information. The most important system resources used for processing information is software and hardware. Hardware refers to the equipment used to transform information, and software refers to programme collection as material resources. According to Silver, Markus, and Beath (1995), Information Systems can be defined as information systems implemented within an organization for the purpose of improving the effectiveness and efficiency of the organization. Capabilities of the information system and characteristics of the organization, its work systems, its people, and its development and implementation methodologies together determine the extent to which that purpose is achieved.

The following factors of information are namely: (1) Information Source: information can be collected from different sources, such as internal, external, primary and secondary sources; (2) Information Levels: information could also be classified based on its use at various levels in any organization, such as strategic information, tactical information and operational information; (3) Information Quality: information quality refers to reliability and usability. Timelines, accuracy, adequacy, relevance, completeness, explicitness and exception are some of the attributes that impact quality and (4) Information Perspective: information systems play a vital role in a variety of real-world perspectives, including end-user, organizational, and global society perspectives.

However, information is shared through many kinds of technology based upon industry. Documentation is the most reliable form for evidence of an internal or external business transaction. A document is everything that has been saved in an accessible source (Eloranta et al., 2001). Information technology and networks change the way professionals face many business processes. Essentially, Electronic Document Management Systems (EDMS) are utilized in a variety of industries, including banking, manufacturing, pharmaceuticals, insurance, and engineering (Joia, 1998).

In fact, government sector is also utilizing EDMS from strategic levels to the operational levels. Organizations develop an EDMS for creating, maintaining, and organizing data in the organization, as well as handling all synchronization processes, since an EDMS is frequently one of the most essential tools for management to integrate data gathering (Ismael & Okumus, 2017). Moreover, Sutton (1996) added that the increased volume of document production, publication, and corporate distribution via email systems and workstation file managers worsened the problems in the security, monitoring, tracking, and retrieval of documents. Apart from that, handling of document can be found in many formats, for instance recorded sounds and images (digitized papers or videotapes), drawings, design specifications, quality control reports, and others.

2.2.4.1 Systems-Development Life Cycle (SDLC)

To evaluate whether a system is functioning and working efficiently, it must go through several activities or stages. These standardized activities are used to manage the system development project throughout its lifespan. One of the most popular methodologies is system development life cycle (SDLC). The SDLC refers to the process of creating an information system or creating models that can be used to create an information system. SDLC aims at a high-quality system that meets the requirements of customers in terms of time, cost, effectiveness, and efficiency. It provides a number of system development phases and activities.

The SDLC process begins with the identifying problem or planning the development of the system, with the system's business value to the organization is identified. Planning is the most important step or phase to create successful system whereby problem is identified and solved; objectives, costs and other resources are discovered to decide whether to proceed with new system; as well as either to improve the current system or leave the system as it is.

Following that, the next stage is to analyse the problem to determine whether it is real or not. The analysis is to understand the requirement of the system such as the users' expectations for the systems, how it performs, the current system is investigated, improvement opportunities identified and a concept for the new system is developed to know the working of an EDMS with the objective such as (i) to identify the customer's need; (ii) to perform economic and technical analysis; (iii) to evaluate the system concept for feasibility; (iv) to allocate functions to hardware, software, people, database and other system elements; (v) to establish cost and schedule constraint; as well as (vi) to create a system definition that forms the foundation for subsequent engineering work (Gupta, 2017).

To proceed with the next step, the design phase takes place in SDLC. This is a good consideration of customers' requirement, especially in devising the user interface. Information collected to accomplish the logical design of the information system such as EDMS by using techniques of good form and screen design. This phase is important as it includes designing files or databases that store much of data needed by the decision makers of the organization. At this stage, design that included are controls and backup procedures to protect the system and the data. Additionally, it is also to produce program specification packets for programmers that each packet contains input and output layouts, file specifications and processing details such as data flow diagrams and system flowcharts (Jirava, 2004).

In the next step, system development subsequently involves a whole range of system requirements for EDMS and conditions that are considered as the actual construction process after having a whole and shown project for the requested system. Some of the structured techniques for designing and documenting software include structure charts works with users to develop effective documentation for software including procedure manuals, online help, frequently asked questions and read me files. At this stage, the system is considered as completed to be organized and then installed in customer buildings and ready to be tested. Testing always involved the real users, or by team of specialized peoples who test the system to warrant customers satisfaction. Moreover, it involves knowledge in coding and hardware arrangement or design (Kiplie et al., 2018). The last phase of system development is the implementation and maintenance. At this stage, the users handle the new system to verify on smooth conversion from old system to the new one or to test the newly system development. The process also includes setting up equipment and putting the new system into production to guarantee that it does not become obsolete before it is needed. Then, the system is rolled out and users evaluate its effectiveness.

2.2.4.2 Electronic Document Management System Example

Amidst the complex workings of modern government, the smooth exchange of information is crucial for effective governance. Hence, the implementation of Electronic Document Management Systems (EDMS) emerges as a revolutionary solution. As governments worldwide strive to modernize, it is crucial to comprehend the complexities, features, and results of implementing Electronic Document Management Systems (EDMS). This understanding is not only relevant, but also essential in determining the effectiveness of EDMS functionalities.

Electronic document management systems are widely used by numerous industries, including the United States government, to enhance document processing, storage, and execution. Meanwhile, in the United Kingdom, EDMS is a comprehensive electronic document management system implemented across the whole organization of the UK government (Jones, 2012). In Canada, electronic document management systems are widely used in diverse businesses, including the Canadian government, to enhance the efficiency of document processing, storage, and execution. Thus, the Government of Canada implemented the Records, Document, and Information Management System (RDIMS) for efficient document and records management.

In the New Zealand government, EDRMS implementation improves information quality, system quality, staff efficiency (satisfaction), and enhances knowledge base retention. Nevertheless, Electronic Document Management Systems are extensively utilized in various industries in Australia, including the Australian government. Similarly, Indonesia's government employs the Electronic Data Exchange (EDE) system, which manages imported goods notification documents through five stages. The Electronic Document Management System (EDMS) implemented across numerous e-government applications in Malaysia, encompassing e-services, e-procurement, Generic Office Environment, HRMIS, PMS, Electronic Labor Exchange, and e-Syariah, generally they have been widely regarded as successful by the public users (Mat Nayan et al., 2010). Table 2.3 lists examples of EDMS implemented in the government industries globally.

Table 2.2
Example of Electronic Document Management System (EDMS)

Country	EDMS
United Kingdom	Government Digital Service (GDS) Documentum SharePoint Alfresco Egress Switch
United States	GSA's Electronic Document Management System (EDMS) SharePoint Documentum Alfresco OpenText Content Suite IBM FileNet M-Files NARA Electronic Records Archives (ERA)
Canada	Records, Document, and Information Management System (RDIMS) OpenText Content Suite SharePoint Laserfiche IBM FileNet M-Files

New Zealand	Trim (HPE Content Manager) Microsoft SharePoint Objective ECM Alfresco M-Files Datacom Document Management
Australia	Objective ECM Micro Focus Content Manager (formerly HP TRIM) Microsoft SharePoint Alfresco RecordPoint Datacom Document Management
Indonesia	Sistem Administrasi Negara Elektronik (e-SAN) Electronic Data Exchange (EDE) system e-Office Dokumen Pengadaan Secara Elektronik (e-Procurement) InArCM (Integrated Archive and Document Management System)
Malaysia	Digital Document Management System (DDMS) Correspondence And Case Tracking Unified System (CACTUS) Human Resource Management Information System (HRMIS) e-Syariah

2.2.5 Components of EDMS

As IBM notes, most EDMS contain components such as metadata, indexing, security features, workflow, collaboration tools and versioning tools. Metadata is normally provided and includes the date a document is stored, its title and a description for each document. Indexing, retrieving and searching help users to identify documents based on document identifiers, metadata and content. When an organization implements a document management system, determining what kind of metadata it should capture and when it should be captured is extremely important. What type of documents are included in the EDMS vary from organization to organization, but some of those documents are parts of the information that must be retained for a long time.

Captures metadata at the stage of creation is particularly important when the information is electronic (Öberg, 2008). Security features protect documents, control access and support compliance. Workflow enables administrators to control the way documents flow through the agencies. Collaboration tools allow users to simultaneously edit documents, track and monitor changes. Versioning tools allow users to restore documents from previous versions. Abdulkadhim et al., (2015) proposed components of EDMS to be integrated with each other that include the integration components of document management, communication/messaging and also cooperation.

2.2.6 Functions of EDMS

Minnesota State Archives, Minnesota Historical Society listed that there are several basic functions for an EDMS that provides: (i) security control: This function controls which users have access to which information and must be able to protect non-public records; (ii) addition, designation, and version control: it allows users to add documents to the system and designate a document as an official government record and automatically assign the correct version designation; and (iii) metadata capture and use that allows the user to capture and use the metadata appropriate for the agency.

According to Sathiadas and Wikramanayake (2003), functions of EDMS are (i) document creation: where document as a container that puts together information from a number of different sources to meet the needs of a specific individual or organization, sources, in a variety of formats, around a particular subject; (ii) storage and retrieval: that involves document storage and retrieval in a storage device, such as hard disc, USB stick, to name a few; (iii) management: covers a broad area of effective management of all documents to meet the needs of the organization and individuals; (iv) version control: is a way to track a document's modifications and the ability to restore old versions of a document; (v) workflow: is a way to track the document status and who is responsible for that step; (vi) multiple delivery formats: to deliver different formats of document content, such as PDF, the word, image, to meet the requirements of the end users.

Additionally, Zdraveski et al., (2020) stated that the typical elements of a successful document management system should include a variation of functionalities, the most essential of which are as follows: (i) object searching, (ii) mark-up functionality, (iii) printing, document workflows and lifecycles, (iv) document security, document links, and (v) document status reporting, issuance/distribution document management and remote access. Besides, Burtylev et al., (2013) referred functions of EDMS as in Figure 2.1, while Strong (1999) pointed out that EDMS contain numerous core functions, including electronic document creation or capture, optional workflow tools, sub-systems for storage, communication tools, search and retrieval capabilities, and sub-systems for output.

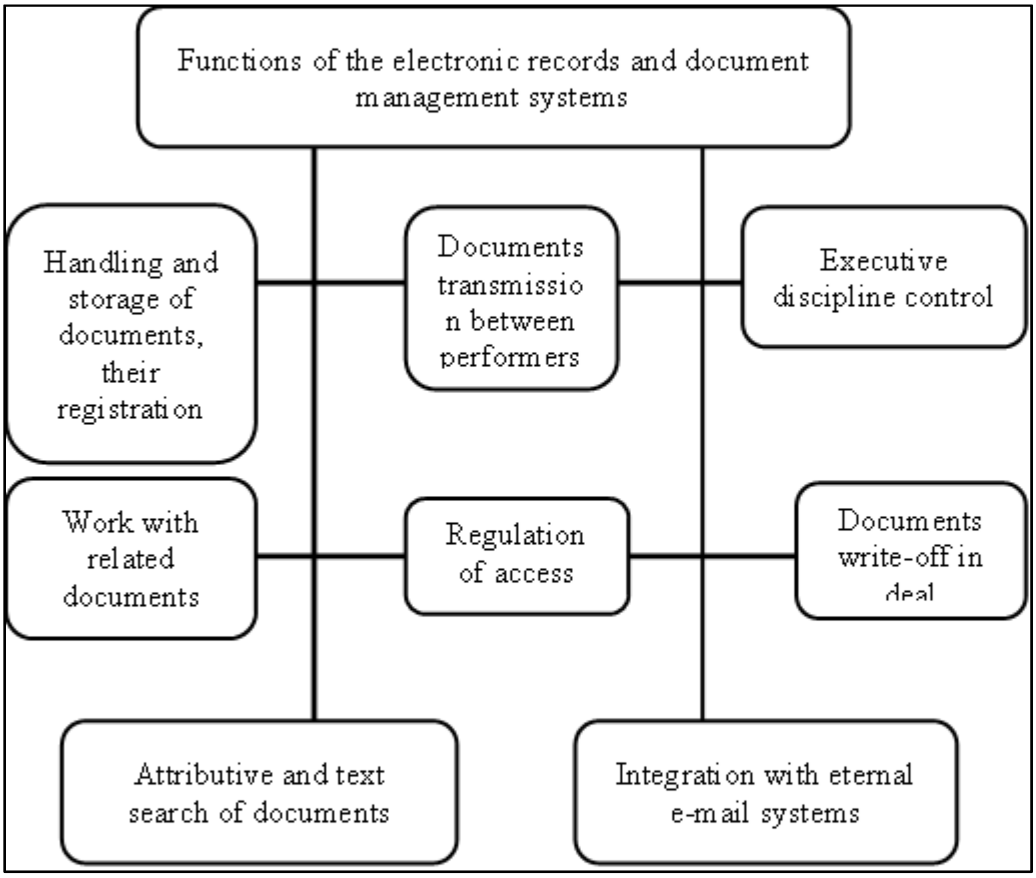

Figure 2.1 Typical Functions of EDMS

2.2.6.1 Functional Requirements and Non-Functional Requirements

Functional requirements are product features or functions that developers must implement to enable users to accomplish their tasks. Functional requirements generally describe system behavior under specific conditions. For instance, the system sends a confirmation email when a new user account is created. While non-functional requirements define how the system should perform and are unrelated to system functionality such as the system should be able to handle one million users without performance deterioration.

A functional requirement defines a system or its component. It defines those features of the system in EDMS that specifically satisfy a customer. There are six functionalities of EDMS which are discussed to have a direct impact on the system's outcome, required by users to complete their tasks. Automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; and support and administer compliance are all functional requirements of an EDMS.

The first functional requirement is the automated information captured that has been identified as being continuously captured paper documents from multiple locations and stored them in a centralized repository after document being scanned into the system. This allows the system to automatically transfer the document into the correct folder inside the depository and attempt to identify the document based on patterns or pre-set rules. In recent study, Abbasova (2020) mentioned, in order for EDMS to enhance the organizational activities, it must be able to perform the automated information capture and cover all types of documents that are part of the organization's policies and procedures: paper, electronic, fax, audio and video, among others. This is also discovered by Green (2015) that electronic document management systems can transform traditional micrographics-based document storage and retrieval into electronic document capture, hence improving productivity.

In the initial work by Ade Tutty Rokhayati et al. (2019), it was described that automated information capture is for a document management system to improve business operations. It must cover all types of documents such as paper, electronic, fax, audio and video, and many others that are part of the organization's processes and procedures in order to fulfil user's task. EDMS changes paper archives into digital records through high volume filtering and OCR. They can catch and store advanced documents with the purpose of creation from organize envelopes and drives, Microsoft Office and other incorporated frameworks, cell phones and digital cameras. As mentioned by Simske and Baggs (2004), automated information capture instruments consequently include setting and improving imported documents, for example, picture clean up, metadata section and record arrangement. Consequently, there are better decision-making processes, heightened workflow productivity, and a more efficient and prompt method of managing correspondence and cases within the integrated system (Wilkins et al., 2009). Automatic information or data capture in the system also enhances performance in inventory management, improving employee wages, responsibility, work content, and motivation (Lindau & Lumsden, 1999).

The second important EDMS functionality requirement discussed in this study is the federated search and retrieval. It is a technique for searching multiple text collections simultaneously. In certain environments, federated search is favoured over centralized search alternatives. EDMS enables approved representatives to locate documents from cross-sectional archive envelopes and archives, usually searching at resources like document name, metadata, report content, and more (Ade Tutty Rokhayati et al., 2019). Like any other system, one of the main functions of the EDMS should be to assist in the recovery and retrieval of user files in order to complete the users' task. The capability to search documents should, as far as possible, resemble current practice, thus relatively simple hierarchical folder structures are popular with end users, despite the more advanced features offered by meta data-based search mechanisms, such as federated search, which help satisfy the users (Björk, 2003). It entails efficiently searching and collecting data from several sources that are spread out and integrated into a single platform (Ghansah & Wu, 2015).

Another important constraint on all the work discussed in this area is the federated search in EDMS that can help users effectively find and access information in shared file repositories (Rader, 2007). Besides, it enables access to full content by managing electronic documents and content across various platforms (Paletta, 2014). Thus, EDMS optimization approaches to minimize the duration of search and processing tasks, to enhance the trustworthiness of information, and to efficiently deliver the necessary documents to the users (Jumanov et al., 2019).

Collaboration tools in EDMS enable the users to collaborate on documents from desktop, mobile, and tablet devices with the ability to connect with each other remotely and make collaborative changes to documents. As one of EDMS functional requirement, collaboration tools normally allow the users to work more effectively, providing users with a centralized location to upload, access, and review information. The functions of collaboration and sharing of documents with other objects are also called sharing in the document lifecycle. EDMS contains the capacity to change reports for streamlined collaboration such as function for comments, sensitive data redaction options, feature apparatuses, stamps, content boxes, and other markup instruments make it easy to set and choose focuses on the substance in documents (Ade Tutty Rokhayati et al., 2019).

It has also been pointed out on collaboration tools in the EDMS, with revision control, workflow-based review and document status-based access control can effectively store and share files in distributed modelling environments, enabling faster work on document changes (Orlov & Kurako, 2017). Such findings are also seen in a previous report in the research by Volarevic et al. (2000), by automating document creation, editing, and knowledge management, EDMS address issues in highly regulated industries. By creating, uploading and classifying new documents within a single interface, EDMS promotes transparency and scientific collaboration (Поліновський et al., 2014). Besides, it facilitates the movement of documents both within and outside the organization (Daudov et al., 2021) and allows user to immediately create and modify documents within the system (Burtylev et al., 2013). The EDMS also allows users to generate, upload, and classify new documents within a designated interface, avoiding the need to switch to different interface as well as the capability to alert users participating in the workflow when activities are completed at each level (Green, 2015). A study conducted by Pappel et al. (2019) discovered that EDMS has the ability to co-exist and interact with one another, as demonstrated by the case of Estonian local governments.

The file indexing and classification of documents in standard hierarchy is extremely important for the user in an organization to access documents, especially in electronic format such as EDMS. Hierarchical File Indexing and Classification facilitates document retrieval by limiting the area of search. As one of the EDMS functional requirement components, a classification scheme for records is a hierarchical classification method that can be used to ensure that documents are compiled, titled, retrieved, preserved, and disposed of. The individual electronic records are identified and grouped based on hierarchical file indexing and connected to the context of the organization in which they were produced or transmitted. The functional requirement of EDMS on Hierarchical File Indexing and Classification is very useful as user prefer to look for documents by browsing hierarchical search engine and an interface that organizes on the keyword-based queries into hierarchies that improve usability, search success rate and user satisfaction. Apart from that, hierarchical structures of indexing and classification identify the relationships of dependence between the categories and provide a valuable information source. Generally, the use of hierarchical structures allows for efficiencies in the searching of documents later. Hierarchical indexing and classification in EDMS enable users to refer to an index to determine the location of a file or document (Hajjar & AbouRizk, 2000). Hierarchical classification in EDMS also helps identify the management responsibility for a group of records, allowing for efficient records management (Silla & Freitas, 2011; Fong, 2015) The research also reported on the use of hierarchical classification functionality in electronic document management system that allows for the efficient organization of massive document collections, providing context for individual documents and records (Risch et al., 2020).

Hierarchical structures enable the use of a divide-and-conquer approach, hence resulting in higher efficiency and accuracy (Li et al., 2007). Despite the advancement of the hierarchical of indexing and classification, some authors disagreed (Dourish et al., 2000), hierarchical document structure is a logical way to store documents. However, it may not meet user's needs as one document may belong to many folders at the same time. Therefore, hierarchical of indexing and classification does not only improve the retrieval of documents, but also to browse and explore the collection (Risch et al., 2020), particularly in the electronic document management system as it could reduce the burden of manual indexing and classification.

The function of 'archival method' in EDMS is to manage and document records of continuing value under the control of an archival institution while "archival storage" is a source for data that is not needed for an organization's everyday operations but may have to be accessed occasionally. This formative view of storage and archival method focuses on the processes needed to ensure that records or documents are accessible and that their meaning is available over time to complete the users' task easily. According to Alokluk (2019), current organizations need to handle large amounts of data and needs to be protected for future access and use in most cases. In this context, the storage and archival method as the one of functional requirement of EDMS is very crucial as the digital archiving allows for long-term storage of digital documents in a single storage space to avoid circumstances where massive archive volumes hinder organizations from operating rapidly. As one of the functional requirements in order to complete the user's task in EDMS, once the documents have been entered into the document management system, they must be securely stored (Abbasova, 2020).

Management document storage and archival method solutions must be able to adapt to new technology as well as the organization's future expansion. Apart from that its function enable long-term document retention and archiving, that create a universal document management system compatible with all existing storage devices as well as new systems. As the EDMS functionality, archival storage must be connected to equipment that must provide a secure and reliable interface for transfer of holdings to the storage system and able to provide controlled access to the content for the users who have permission or rights to refer to them.

In the State Archives in Zagreb, a database has been developed to store archival documents, with permanent preservation format that includes appropriate metadata entry to facilitate searching and linking of keywords and content (Dmitrus, 2020).

Meanwhile, in Indonesia, EDMS enables saving documents into archival folders by physically protecting them against damage and restoring damaged parts, ensuring sustainability and extended life of use (Purnomo, 2018). A number of studies have examined the storage and archival methods in EDMS that document copying between computers is possible with EDMS (Moran, 2015) . EDMS in an advanced system, is able to employ machine learning techniques to automate decision-making processes, such as transitioning the state of a document from open to closed (Obukhov et al., 2019).

As the functional requirement of EDMS, automated workflow has emerged as a paradigm in the field of document management. This minimizes the use of paper and provides the necessary resources for businesses or government agencies to document business processes and manage the internal flow of information. EDMS has approval and flow control functions to enable organizational automated workflows (Pho & Tambo, 2014). This function allows actions from the first level of document content creation, through the revision process, to the final stage of document release automatically through EDMS. Automated workflow ensures every employee knows their expected role and what they are responsible for. As mentioned by Fernando et al. (2019), EDMS facilitates the establishment of ownership and responsibility for each step in the process, hence decreasing complexity. Automated workflow in EDMS allows management to look at the overall workflow process and view everything within the context of the bigger picture in the system that makes the users of the system to complete their task easily. In this way, more manpower can be allocated to the specific process to speed up processing of certain task.

In tax authorities, EDMS minimizes the duration and labour costs for processing and preparing papers, while enhancing operational effectiveness across multiple domains of collaborative work in the system (Bratarchuk & Milkina, 2021). EDMS is not only utilized in government organizations, but also in scientific organizations, where its implementation can significantly save costs related to human resources during the entire process of managing incoming papers (Artamonov et al., 2018). Moreover, the functional requirement of automated workflow in EDMS can enhance the benefits of document management by automating document routing across people, eliminating bottlenecks, and optimizing business processes. In a university in Manila, EDMS enhances document workflow by systematically arranging, regulating, and storing documents in a centralized repository (Atal et al., 2022). Thus, the automated workflow in EDMS facilitates the minimization of process errors by scanning all files/documents to ensure that all necessary information is captured (Ayaz & Yanartaş, 2020). This functionality is crucial for large branch offices, for organizations with headquarters and branch offices, and for organizations that plan to expand their system, making it easier for the users to complete their task in EDMS.

Another functional requirement in EDMS is security and audit trail, which is useful for document integrity. Audit trails can be used as evidence that a document is still the authorized copy. Security and audit trail can ensure that no unauthorized access can take place, while version control can ensure that it is easy to find the new, most current or accepted edition. A strict security system should allow each authorized person to perform the necessary duties (Abbasova, 2020). Should a legal requirement exist for the user to accomplish their task in an EDMS, it is difficult to show the integrity of an electronic document without document management. Hence, the actual electronic document is controlled and need to be shown to be controlled. Besides, document integrity can be ensured more easily when the users perform their task with security and audit trail in EDMS (Groenewald, 2004). Such findings are also seen that electronic documents management system has the capability to store documents interactions using unique serial numbers (Green, 2015). Document management system exceeds the capabilities of an archiving system by providing support for document creation, editing, change tracking, and event management (Björk, 2003).

Essentially, electronic document management system offers scalability, compatibility, availability, and dynamism, enabling the automation and security of documents flow (Abbasova, 2020). Moreover, support administer compliance is one of the important functional requirements in EDMS, built to keep document safe, secure, and compliant. This minimizes the chances of a document falling into the wrong hands as document created with automated technical controls need to ensure compliance with data regulations. Users of EDMS could access a document from EDMS without permission, but there is no user that could access a system that has confidential documents. The function of support administer compliance is that the document protection goes far beyond who can access the system. Users can be granted access to specific papers through the online document repository. As a result, it is feasible to safeguard the most essential papers for certain personnel who want access to them. It is possible to go even further by giving only some users access to all these documents, and others only part of the document. Administer compliance that ensures users are compliance to the standard of EDMS security, also ensures that documents are saved and are not lost or damaged (Abbasova, 2020).

2.2.7 Advantages of EDMS

The EDMS offers significant advantages and benefits to an organization. EDMS allows the organization to achieve more productive operations. It reduces transaction costs, automate processes, improve capacity, lessen errors, and save on labour cost (Kain & Koshy, 2013), particularly in reducing cost of printing for task distribution from top to bottom management. Shobaki et al., (2017) listed nineteen advantages of EDMS as the following:

a) Eliminate challenges associated with manual file management, such as damage, loss, theft, or other risks inherent to manual handling.
b) Facilitates participation at multiple levels, including file subjects, associated documents, and data related to specific topics.
c) Resolves storage issues by reducing physical space requirements by up to 90%.
d) Enables password protection for individual users to enhance security.
e) Provides password protection for software application archives within the organization.
f) Defines document workflows, allowing for seamless exchange between multiple users.
g) Establishes clear tracking mechanisms for document attachments and their associated workflows.
h) Enhances document retrieval, transmission, and transfer capabilities, ensuring real-time accessibility across multiple locations.
i) Manages the full lifecycle of documents, from creation to completion, with the ability to track all stages within the network and generate comprehensive reports.
j) Facilitates quick access to the substantive content of files and information through advanced classification and indexing systems.
k) Simplifies access to reports, statistics, and comparative tables through database integration that consolidate all organizational documents and data.

l) Eliminates temporal and geographical barriers among users, meeting the immediate need for information and documents.
m) Support simultaneous collaboration and secure document transmission without interruptions.
n) Ensure seamless integration and coordination of document and information handling operations within and beyond the organization.
o) Enables employees to engage with international standards for document and information management, fostering collaboration with local and global organizations.
p) Offers selective broadcasting of updated information and documentation services in real-time.
q) Ensure credibility and reliability of technical document and information systems, promoting trust in external collaboration.
r) Provides accuracy, speed, and security by maintaining alternative copies of files in multiple locations, safeguarding against risks.
s) Saves time and effort while optimizing resource utilization, thereby enhancing cost-effectiveness and economic efficiency. (Zdraveski, Janeska et al. 2020) also added that EDMS has many advantages as the following:
    i Generally efficient location and delivery of documentation.
    ii Ability to manage documents and data regardless of originating system or format.
    iii Ability to integrate computerized and paper-based systems.
    iv Control of access, distribution, and modification of documents.
    v Provision of document editing and mark-up tools

2.2.8 Limitations of EDMS

A significant portion of the literature addressing the limitations of Electronic Document Management System (EDMS) highlights its shortcomings in automated saving processes. Notably, the lack of legal credibility for EDMS outputs presents a critical issue, as these documents are not admissible in court issue unless authenticated with official signatures and seals (Shobaki et al., 2017). Grange and Scott (2010) also found that although there are significant security benefits to using an EDMS, it does not make it any more secure than paper-based systems. Shobaki et al. (2017) also added on other limitations which have been shown in the ability to modify and change what is dealt with in the automated systems, if the system supervision and control are not tightened. The electronic documents can be easily manipulated if the user prefers DMS over paper documents and not concerned about security. In a study by Grange and Scott (2010), British Broadcasting Corporation highlighted the electronic document with size which has no physical attributes are easily stolen in the smallest of vessels like compact disks or memory pens or other small devices.

Disadvantages related to the implementations of EDMS in organization by (Sutton 1996) that is still relevant until today highlights limitations as follows:

a) Disapproval of staff finding paper-based documents easier to use. Old paper-based documents need to be re-entered, starting with the most recent documents.
b) Lack of discipline relating to the way documents are filed or policies used to ensure the documents are stored securely.
c) Some organisations do not regard information as an asset so a system that manages information is not a priority.
d) Staff can become disheartened when companies ‘roll out’ new IS without adequate resources to training and skills building.

In view of all those mentioned so far, limitation of EDMS could be avoided, in particular when it involves the illegal activity as EDMS access makes an employee open for litigation. Furthermore, because all information is available to be accessed, it is important to ensure security of the documents. The organization has to make sure the higher level of IT involvement with the increased of IT engagement.

2.3 Effectiveness of EDMS in Public Sector Organizations

In the field of information management, it is difficult to decide what is effective implementation of EDMS, without a good explanation of what the system being studied is. Most studies on the effectiveness of Electronic Document Management System (EDMS) focus on the technical aspects of the system, while in terms of usage, they focus more on user acceptance of the EDMS. In this study, the effectiveness of EDMS is assessed using the Information System Success Model by Delone and McLean (2003). Most of the measures of the study on effectiveness of IS such as EDMS are from the framework of DeLone and McLean. They have extensively reviewed and organised past IS effectiveness studies and have suggested that an information system's performance level depends on the quality of the system itself. This includes production information, its usage level, whether users are delighted with it, and its effect on individuals and the organization (Cho, 2007). According to Cho (2007) and Tokdemir (2009) who claimed DeLone and McLean 's study was a major contribution to this field, there are six different dimensions of IS success, namely System Quality, Information Quality, Use, User Satisfaction, Individual Impact and Organizational Impact. Their study is on IS effectiveness within an organization in which IS usage is compulsory as they examined the impact of organizational learning on an information system effectiveness in terms of user satisfaction as well as individual and organisational progress.

EDMS is a tool for managing work-in-progress documents, encouraging the effective use and application of information, and enabling the creation of records. Alshibly et al. (2016) reiterated that effectiveness in the application of EDMS in an organization describes on how efficient an EDMS is in terms of user satisfaction and the impact the system has on persons and the organisation. Stefanovic et al. (2016) claimed that empirical results verified the validity of the D&M success model in the context of e-government, measuring the effectiveness of an e-government system in Republic of Serbia with analysis coming from the employees' perspective. Focusing on EDMS services, Burtylev et al., (2013) noted that the effective management and implementation of EDMS is because of automatic monitoring of the implementation and transparency throughout the organization at all levels of users. Thus, the effectiveness of EDMS is based on the functional requirements that make the users complete their task easily in this study.

In terms of system quality, usability aspects and performance of AIDC-automated information capture is increasingly becoming an essential aspect in any organization's information system (EDMS). According to Hamzah et al., (2018) automatic information capture is possible that can be done quickly, accurately through scan, imaging, display image, convert the information into electronic text with OCR, ICR, OMR, QR code, barcode and magnetic stripes, all can be downloaded and displayed electronically. The situation could make the users complete their task effectively and contribute to the quality of the information that the system produces and being useful for the users. Automated information capture with OCR gives a satisfactory level of accuracy and performance to the users as a means of entering hard copy documents into an EDMS in full text, made available for searching (Doverton, 2001).

EDMS empowers approved representatives to find documents and records from crosswise over archive envelopes and storehouses, while looking through abilities typically that include document name, metadata, report substance and more with federated search and retrieval functionalities. Accordingly, it is a user-centred approach utilized for evaluating system quality and information quality of EDMS. In terms of users' perspectives, there are satisfaction and perceived usefulness of EDMS usage. The effectiveness of EDMS is measured by the user point of view. The satisfaction in using EDMS is when the documents or data is reachable and can be retrieved anywhere, anytime and prompt response of search time (Hassan Yousef & Mohamed, 2014).

The effectiveness of EDMS contains the capacity to change reports for streamlined collaboration. Collaboration tools in EDMS allow comments, redaction alternatives for delicate data, feature apparatuses, stamps, content boxes and other markup instruments give accessible setting and choice focuses on the substance contained in documents (Ade Tutty Rokhayati et al., 2019) that show the effectiveness of EDMS based on system quality and information quality. A robust EDMS provides the capabilities and tools to effectively modify documents and streamline updates or decision-making by the users. In a case, collaboration tools support a Portuguese company of the ProCME group to minimize the difficulties in travel expenses and decreases communication costs when dealing internationally, as it is well accepted by the users and perceived usefulness as collaboration tools that are easy to use (Silva et al., 2014).

Limitations to the flat classification approach has changed with the growth of Internet (online information system such as EDMS). Thence, it is replaced by hierarchical structures documents that improve usability, search success rate and user satisfaction (Li et al., 2007). Wright et al., (1999) added that the hierarchical index illustrates the way that the MMI (MetaMap Indexing) comes along with the structural information provided, serve as the basis for determining which section of a large document best satisfies the user's information need. Hence, the hierarchical of indexing and classification allows for efficiencies and enable user to find the result in higher efficiency and accuracy via the information system like EDMS in government agencies.

A variety of methods exists to protect documents and records physically and electronically and ensures their stability and security effectively through storage and archival method. In EDMS, storage and archival method refers to document, which is not required on a day-to-day basis, but which needs to be retained for a certain period, and also information which is retained in perpetuity and referred to infrequently but periodically based on retention schedule. Adequately, Ade Tutty Rokhayati et al. (2019) stated that a software system is considered as an electronic document management system (EDMS) for storing and organising different kinds of documents effectively by arranging and dispersing records over the association for better and coordinated use inside day-by-day tasks.

An effective EDMS is important to support organizations in approaching a qualified information system. It must not only be viewed from the ability to store documents, but also to manage the workflow-style of activities and roles (Vlasios, 2009; Bae & Kim, 2002). Automated workflow management in the system has been developed to facilitate an automated and effective implementation of the business process in organizations. Hence, EDMS is the key factor in establishing technological support of integrated management system that controls the document process (Pho & Tambo, 2014). This is supported by Bae and Kim (2002) that EDMS must be evaluated not only in terms of its ability to store documents, but also in terms of its ability to handle the workflow-style of activities and roles.

The existence of an internal audit for information system such as EDMS increases the probability of appropriate safety measures and prevents or reduces negative consequences. In order to provide properly and effective protection to the organization assets, in the information system, a security audit is one of the best ways to determine the security efficiency of the system. Audit trail is one of the three areas of the computer activity that should be monitored on a regular basis to avoid the malicious acts of sabotage or fraud (Suduc et al., 2010) As stated by Roratto and Dias (2014), the main functionality of an audit trail is to save log records in a secure and permanent manner so that they can be detected in the event of a security breach. This is very crucial especially for the system that stores critical data, such as financial or production of an organization. With audit trail, the system allows identification of harmful actions, whether from internal or external, intentional or unintended causes. With the increasing dependence of critical data storage systems, development of new solutions for the monitoring and protection data such as audit trail in EDMS is important.

Support administer compliance is an essential functional requirement for the effectiveness of EDMS as researched by Zdraveski et al. (2020). Moreover, it was found that Macedonian companies and institutions follow the world standards for documents and records management although only 45% of Macedonian companies and institutions follow and comply with ISO standards in their EDMS. The EDMS could automatically track modifications to documents and metadata, creating a history of document use to maintain compliance with governance standards by having the function of check-in and check-out features to ensure information integrity and compliance to the rules and regulations by the organization. EDMS can help to set permissions and control document access to facilitate ongoing compliance through support administer compliance in the system. It also allows connection between documents to records retention schedules, thereby allowing system to easily turn active documents into compliant records.

2.4 Systematic Literature Review

2.4.1 Bibliometric Networks Analysis Methodology

This study employed a bibliometric network analysis method, mapping and visualizing the research landscape on the effectiveness of Electronic Document Management Systems (EDMS) in the Sarawak government sector. Bibliometric analysis offers a strong and objective method to test the evolution of a research area by examining the connections between the publications, authors, establishments, and the essential themes (Donthu et al., 2021). It provides reseracher with a scientific method of identifying the intellectual framework, trends, and gaps in the EDMS literature, which in turn leads to the qualitative synthesis of results in subsequent sections of this review.

The reason for selecting the bibliometric analysis is that it is capable of managing considerable amounts of bibliographic information systematically (Zupic & Cater, 2015). This approach, by imagining citation and co-occurrence networks, allows researcher to determine areas of dominance of research, scholars that have the greatest influence, patterns of collaboration, and conceptual clusters in relation to the EDMS functionalities and their roles in improving digital governance. The method is appropriate concerning the evidencebased and replicable principles of systematic literature review (SLR), thus it is most suitable when mapping the knowledge structures with regard to the EDMS adoption and utilization in the public sector.

2.4.2 Search Strings

The contents of the bibliometric databases used in this study were two popular and comprehensive academic databases, namely Scopus and the Web of Science (Core Collection). This choice of databases was predetermined by the large volumes of highquality, peer-reviewed publications and the good compatibility with the tools of bibliometric analysis, namely VOSviewer (Zupic et al., 2015; Van Eck and Waltman, 2010). The search was filtered to get only the publications within the year range specified from 2015 to 2025, thus ensuring that the literature review was able to capture the latest developments and emerging research trends around the adoption, functionality, and effectiveness of Electronic Document Management Systems (EDMS). Only the English language publications were taken into account to keep the consistency and to make it easier to interpret the data. Journal articles and conference papers were restricted as inclusion criteria because these sources offer peer-reviewed and verified results and comply with the aim of a systematic literature review. Since the reliability and academic rigor of the dataset was required, other types of documents, including but not limited to editorials, book chapters, dissertations, technical reports, and non-peer-reviewed materials, were excluded. The search results in a total count of 526 publications, including duplicates. After removing duplicates and non-English text, the year of publication (2015-2025) the number of publications is still high, at 415. Table 2.4 shows search strings used in the abovementioned sources.

Table 2.3
Search Strings

No.	Strings
1	Electronic Document Management System
2	Government Sector of Sarawak
3	Functionalities

Lastly, the database extraction, in the form of exportation of the RIS file type of all references, is produced using VOSviewer to provide a summary of the major research areas based on the strength of keywords displayed. In VOSviewer, the method used in the cooccurrence analysis is based on the number of times a particular term or keyword occurs in the same documents set. This method is employed to map the conceptual structure of a research field and show the relations among the important terms. Through the cooccurrence of terms, the researcher would be able to determine the dominant themes, the trends, and the general intellectual framework of a specific field of study. This discussion assists in the identification of the interdependence among various ideas and their changes with time.

Scopus database is also capable of producing full references as it enables users to export up to 20,000 documents in RIS format file, whereas Web of Science enables users to export up to 500 documents in Plant Text File format to create potent keywords in VOSviewer.

2.4.3 Inclusion and Exclusion of SLR Planning

Certain criteria were well formulated to facilitate the selection and assessment of suitable studies to ensure the stringency and balance of this systematic literature review is met. The inclusion criteria are used to outline the basic traits that the study need to have to be included in the analysis. The inclusion criterion was limited to the studies published within the years 2015-2025 since the year can be regarded as a decade of substantial development in the field of digital transformation and implementation of Electronic Document Management Systems (EDMS) in the public sector. The studies were published in well-known databases, namely Scopus and the Web of Science (WoS) so that only high-quality and peer-reviewed research articles were examined.

Published papers that were found to specifically discuss Electronic Document Management Systems (EDMS) or other similar systems like digital document management, document tracking, or workflow automation were included. The research papers were required to focus on functionality, implementation or adoption of EDMS in the government sector and its usage in the public administration, ministries, local councils and government agencies. Specific focus was put on the works that covered the topic of Government Sector of Sarawak which signifies the topicality of the local digital government programs. A survey with the use of either quantitative, qualitative or mixed-method was allowed, as long as the emission of the study was related to the role of EDMS functionality in improving efficiency, transparency, and service delivery in the context of a public sector organization.

Nevertheless, the exclusion criteria were used to delineate the features that excluded other studies before they could be included in the review. Only those articles published since 2015 were considered, as they were not included in the scope of time frame and they might not have been updated to the present development of the EDMS technologies. These studies were within the private or corporate arena or within a general information system or enterprise resource planning (ERP) with no special focus on EDMS were excluded. In addition, articles obtained in databases besides Scopus or Web of Science were filtered out because of the consistency in data quality. Studies that did not involve EDMS directly, including studies about other unrelated issues like document archiving without integration with digital technology, general policy of ICT, or non-functional features of public administration were also eliminated. Moreover, non-peer-reviewed literature, including dissertations, reports, theses, and editorials, and non-English publications and research that could not be accessed through full-text were excluded.

These inclusion and exclusion criteria help in this review by eliminating irrelevant, credible and methodologically flawed studies during the analysis. Such strict selection increases the validity, reliability and completeness of the review as it is possible to evaluate the efficiency of EDMS functioning in supporting the efficiency of the operations, transparency of governance and delivery of digital services in the government sphere in a more comprehensive way.

Table 2.4
Systematic Literature Review Planning

INCLUSION CRITERIA	EXCLUSION CRITERIA
Studies must explicitly focus on Electronic Document Management Systems (EDMS) or closely related systems such as digital document management, document tracking systems, or workflow management tools. Articles addressing EDMS implementation, functionality, adoption, or effectiveness within governmental or public sector contexts were prioritized.	Irrelevant Focus : Publications that focus solely on general information systems, content management, or enterprise resource planning (ERP) without specific reference to Electronic Document Management Systems (EDMS) were excluded.
Publications that discuss EDMS within public	Non-Governmental Contexts:

INCLUSION CRITERIA	EXCLUSION CRITERIA
administration, government agencies, local councils, ministries, or public institutions were included. Studies referring to regional or national e-government initiatives, including specific contexts such as the Government Sector of Sarawak, were also considered relevant.	Exclusions were also made for studies solely focused on private, corporate, commercial, or non-public governmental sectors, since this review focuses only on the public and governmental use of EDMS.
Databases: Scopus, Web of Science	Databases: Other than those mentioned
Limited to articles published in peer-reviewed journals and conference proceedings because these sources undergo editorial scrutiny and rigorous peer assessment, ensuring academic quality and methodological soundness.	Documents such as editorials, book chapters, dissertations, reports, theses, policy papers, or grey literature were excluded due to the absence of standardized peer-review processes.
Date Range: Studies published between 2015-2025.	Date Range: Excluding studies published before 2015.
Empirical or Conceptual Contribution: Both empirical (quantitative, qualitative, or mixed method) and conceptual/theoretical studies that contribute to understanding EDMS functionality, adoption, or evaluation were considered eligible.	Duplications: Duplicate records retrieved from Scopus and Web of Science were removed during the screening and deduplication phase to ensure the uniqueness of the dataset.
Language: Language limited to English only.	Language: Studies that used language other than English.

2.4.4 Finding of VOSVIEWER

The review process followed a structured approach, involving several essential stages: selecting appropriate databases, defining search keywords, applying inclusion and exclusion criteria, extracting relevant data, and conducting bibliometric analysis using VOSviewer. This approach allowed for the identification of research patterns, emerging themes, and significant contributors within the field of EDMS, ensuring a comprehensive understanding of how these systems enhance efficiency and functionality in public administration.

2.4.4.1 Result of Search Strategy using Search Strings

The initial database search yielded a substantial number of records, which were then refined through multiple screening phases. The first phase involved the removal of duplicates across both databases. Subsequently, the titles and abstracts of the remaining publications were carefully reviewed to assess their relevance to the study focus. A large number of studies were excluded at this stage due to their lack of alignment with the research scope such as those focusing on private sector applications, general information systems, or unrelated technological systems.

The ultimate dataset included the publications that directly covered the implementation, effectiveness, or functionality of EDMS in the government institutions with the focus on such aspects as workflow efficiency, document accessibility, user adoption, and the results of the digital transformation. The chosen articles were then analyzed in terms of bibliometric features through VOSviewer that made it possible to visualize the co-occurrence of keywords, collaboration networks among authors, and temporal trends of research.

Table 2.5 presents a summary of the findings obtained from each database, highlighting the number of records retrieved, screened, and ultimately included for bibliometric mapping and thematic analysis. The results from VOSviewer further support the identification of key research clusters and frequently occurring terms that reflect the current state and evolution of EDMS studies within the government sector.

Table 2.5
Representing the Number of found Publications

Database	Number of Papers	Filter Based on Title	Filter Based on Abstract, Language & Year of Publication
Scopus	340	7	7
Web of Science	186	6	5

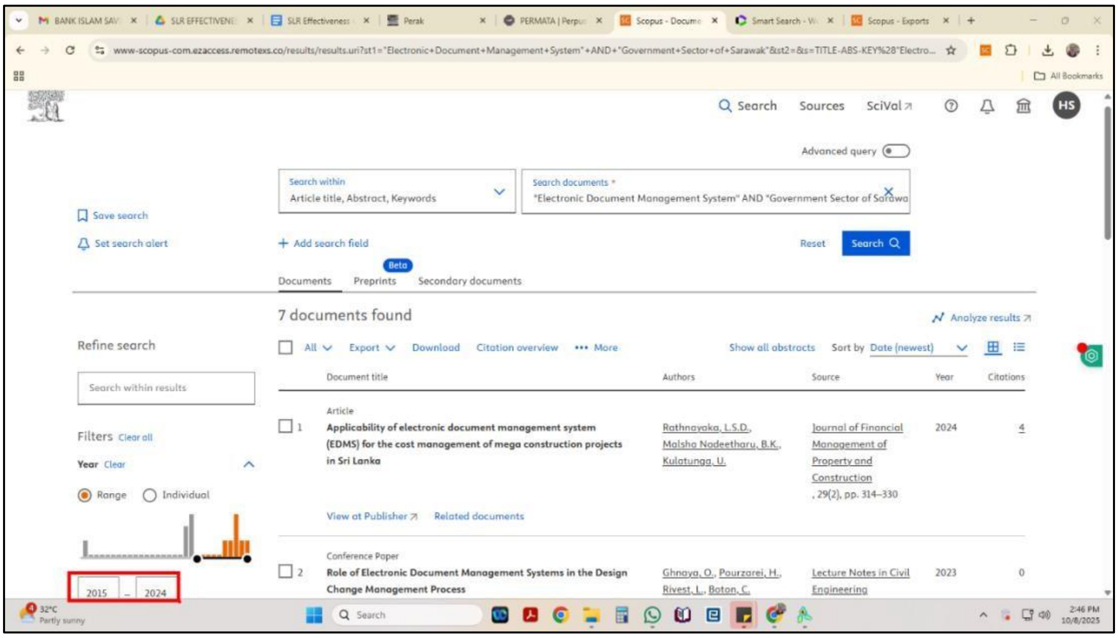

Figure 2.2 Inclusive Criteria Results for Scopus Database

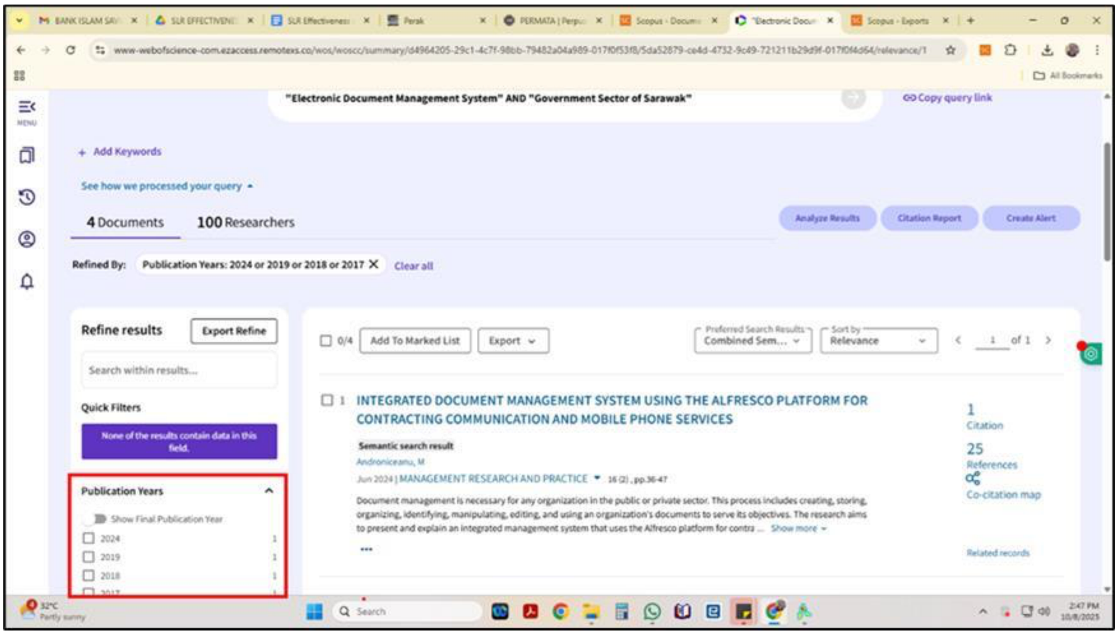

Figure 2.3 Inclusion Criteria Result for Web of Science Database

2.4.4.2 Results of Search Strategy using VOSviewer

A search strategy was performed using VOSviewer to gain an overview of the major research fields in a scientific area, how these areas with related aspects are connected, and to ultimately understand the magnitude of various domains of research topic debate. Figures 2.4 until 2.5 illustrate that the database cloud for selected study keywords indicate a larger size for the terms library and information, as the majority of articles are associated with these specific keywords.

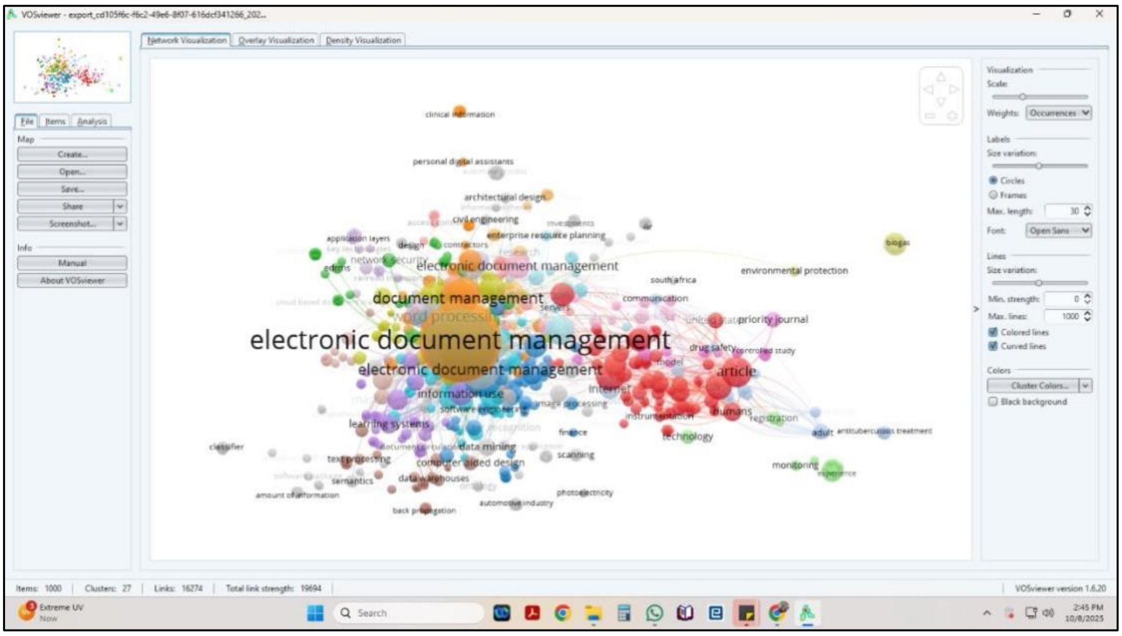

Figure 2.4 Scopus Database

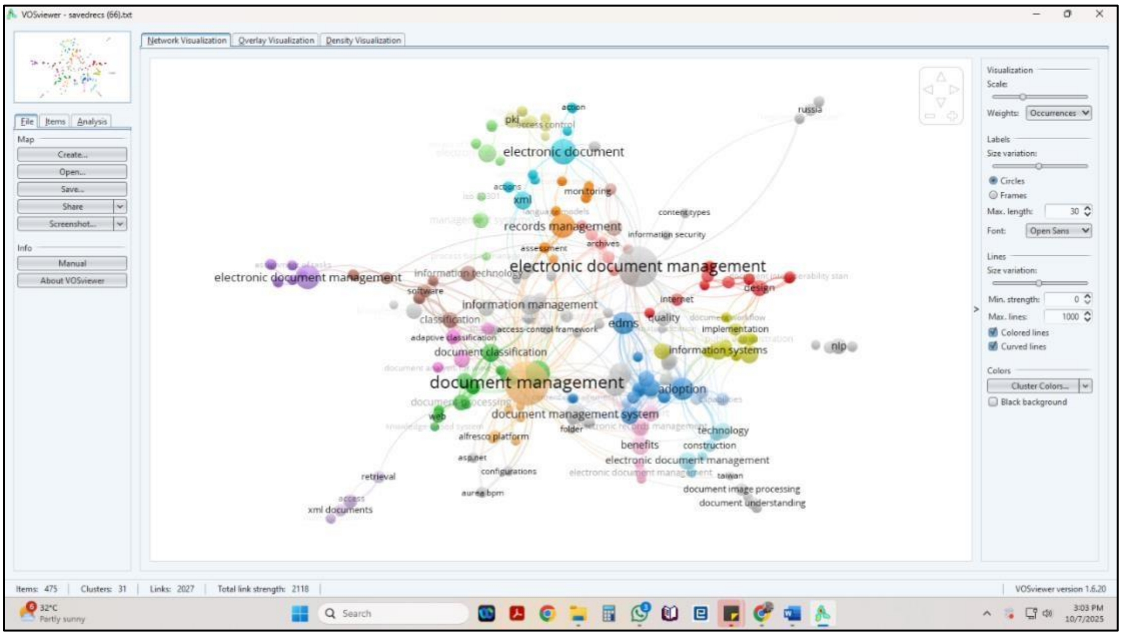

Figure 2.5 Web of Science Database

The search string in this study, “Electronic Document Management System” AND “Government Sector of Sarawak” AND “Functionalities,” is highly focused and specific in integrating three dimensions. It first recognizes the technological system of the Electronic Document Management System (EDMS), next, it specifies Sarawak Government as the geographical and administrative context and, finally, it researches the scope narrowed to functionalities, which are the system's operational and performance aspects.

The specific search terms led to the retrieval of seven relevant studies, which form a narrow but significant subset of the wider body of EDMS research. Analyzing these studies in the context of the VOSviewer bibliometric visualization indicates that the selected studies correspond to a focused research area in an extensive network of literature about EDMS, Information Systems, and associated fields.

2.4.4.3 Thematic Alignment with VOSviewer Clusters

The VOSviewer map shows multiple clusters of research themes and how they are interconnected. The seven chosen papers fit into these clusters, primarily are as follows:

1. Core Theme (Green/Central Cluster):

The central cluster in the visualization that consists of the dominating concepts in document management and electronic document management. The seven papers strongly align with this cluster and focus on the development, implementation, and optimization of EDMS. This cluster is indicative of the theoretical and practical fundamentals of the entire research topic.

2. Information Systems and Software Functionality (Blue Cluster):

Considering the search focuses on functionalities, the selected papers also fit into the cluster concerning information systems, system quality, software engineering and information science. These papers examine how certain functionalities of EDMS affect system performance, user satisfaction, and organizational efficiency. The papers emphasize the EDMS determinants of usability, accessibility, interoperability, reliability, and overall effectiveness.

3. Applied and Evaluation Context (Red Cluster):

Due to the research focus on the government sector of Sarawak, the papers correspond with the cluster that covers evaluation and applied studies. This includes the assessment of the adoption, utilization, and management of EDMS within organizational and administrative contexts. This includes studies on user acceptance, the challenges of implementation, the impact of policy, and the overarching influence of digitized governance and service delivery on the public sector.

2.4.4.4 Position of the Seven Papers in the Broader Research Landscape

Essentially, the seven papers occupy a distinct but interrelated position in the VOSviewer network as a result of the convergence of three key research areas: the primary literature on EDMS and the management of electronic documents and related technologies; the information systems literature, with a focus on the functionalities and quality dimensions of systems; and the literature on the public sector, particularly the Government of Sarawak.

If VOSviewer analyses were carried out on only these seven papers, the outputs would show a much smaller and well-integrated network. The more dominant and repeating nodes would be “Electronic Document Management System”, “Functionality/Functionalities”, “System Quality/Effectiveness”, and “Sarawak Government”. These nodes would show the critical and fundamental linkages across the technological, functional, and contextual aspects of the study.

On the whole, the wider visualization in VOSviewer reflects the whole research ecosystem pertaining to EDMS, including various research streams on the digital management of information, software systems, and organizational level integration. However, the seven papers focus on a narrower segment of this ecosystem particularly the functional evaluation of Electronic Document Management Systems used in the Government of Sarawak. This narrower focus is critical in demonstrating how the functionalities of an EDMS are constructed, tailored, and refined to bolster governance and administrative efficiency in a regional public sector.

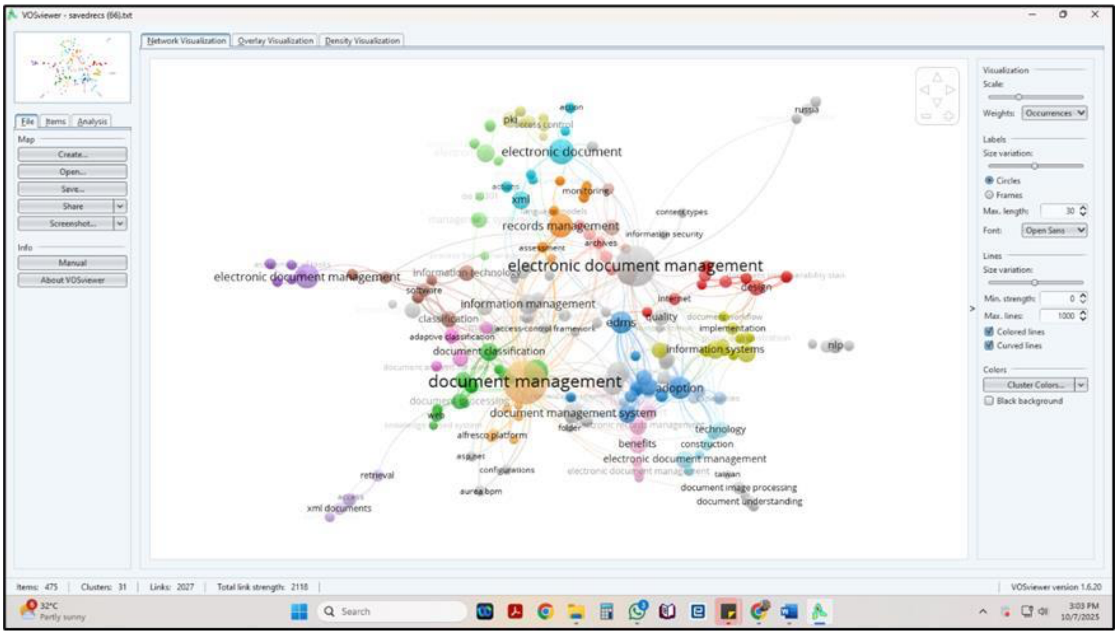

Figure 2.6 WOS Database

The network visualization in VOSviewer gives a detailed view of how the key terms from the chosen papers relate to one another. Each of these terms is a building block of the overall theme concerning the research on Electronic Document Management Systems (EDMS) in the Sarawak Government. How these clusters are understood, and their relationships are described can be found in Table 2.6.

Table 2.6
VOSviewer terms and connection

VOSviewer terms	**Cluster/Connection**	**Meaning of cluster**
Functionalities	Largest Central Node	Reflects the central investigative theme of the reviewed studies, specifically, how the EDMS performs and supports operational efficiency within the government sector.
VOSviewer terms	Cluster/Connection	Meaning of cluster

Sarawak Government	Highly Connected Node	Denotes the specific organizational and geographical context of the studies. It connects the broader EDMS framework to its localized application within public sector institutions in Sarawak.
IS Effectiveness Model	Strong Connection	Indicates the methodological framework used in most of the reviewed papers, particularly the DeLone and McLean Information Systems Success Model, which is applied to assess system functionality and effectiveness.
System Quality	Strong Connection	Represents one of the main variables associated with EDMS performance. It reflects how well the system is designed and maintained to meet user needs.
Information Quality	Strong Connection	Refers to the accuracy, relevance, and completeness of information generated and managed by the EDMS. This variable directly affects user trust and system reliability.
User Satisfaction	Strong Connection	Serves as the ultimate outcome variable, reflecting user perceptions and acceptance of the EDMS. It is strongly linked to both system quality and information quality.

Core Functionalities Investigated Analyzing the retrieved papers also reveals a consistent examination of some core functionalities of the EDMS within the context of the Government of Sarawak. These functionalities are the critical technical and operational elements that shape system effectiveness and user satisfaction. Key functionalities include:

a) Automated Information Capture: Facilitating the input and digitization of official documents to improve access and management.
b) Federated Search and Retrieval: Allowing users to search and find documents scattered across different departments and repositories.
c) Collaboration Tools: Providing documents to government personnel and allowing communication and collaborative work.
d) Hierarchical File Indexing and Classification: Structuring file organization to enhance retrieval based on classes, departments, levels, and access restrictions.
e) Storage and Archival Methods: Providing secure, accessible, and permanent digital document retention systems for preservation.
f) Automated Workflow: Document routing, approval, and task management for administrative functions to increase efficiency.
g) Security and Audit Trail: Document access, edits, and transactions of a system are recorded to ensure accountability and integrity.

In conclusion, the six documents together constitute a cohesive and targeted stream of research on the appraisal of Electronic Document Management Systems in the Sarawak Government. Investigating the different functions of an EDMS and their contribution to system quality, information quality, and user satisfaction, and hence their effect on organizational effectiveness, is critical. The robust connections among these concepts in the VOSviewer map indicate a singular and cohesive conceptual construct in which system functions pertaining to technology, evaluation frameworks of the system, and the context of application integrate to account for the success of EDMS in the public sector.

Table 2.7
Data Extraction

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
Scopus	Ewa Ziemba, Tomasz Papaj,	To propose a framewor k of	Mixed methods: literature review +	They found 23 potential CSFs grouped under four	They measured the importance of each CSF via questionnaire	This article already focuses on government

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
	Danuta Descours (2022). Critical Success Factors for Adopting Electronic Document Management Systems in Government Units	critical success factors (CSFs) for adopting EDMS in government units; to identify such factors specifically for local government units in Poland.	interviews with 28 field experts + questionnaire survey. They first created a broad set of factors (23) from literature, then filtered/identified the most important ones (9 CSFs) for Polish local government units.	categories (economic, organizational, technological, legal). Then, from those, nine factors were identified as critical (highest means/medians + expert opinion). Among the nine: legislation imposing obligation to adopt EDMS; technological readiness; quality of back-office software & integration with front-office and ERP; employees' awareness; front- & back-office software functionality & scope; information security. Also noted that	(how strongly respondents rated each factor, via metrics like arithmetic mean, median). They also grouped factors and used expert opinion + statistical thresholds (means/medians) to decide which ones are "critical." So, outcome measures are factor importance ratings, comparative ranking, and identification of a subset of CSFs.	units, which aligns with study setting. • It provides a framework of CSFs that can compare or adapt (e.g. see whether these same factors appear in your context). • The mixed methods approach (literature + expert interviews + survey) may give ideas for methodology. • The outcomes measured (importance ratings, ranking of success factors) could help you decide how to measure the "effectiveness" of EDMS functionalities.

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
				economic factors were not among the nine most critical in this context		
Scopus	Guo, Fangyu; Jahren, Charles T.; Turkan, Yelda (2019). Electronic Document Management Systems for the Transportation Construction Industry.	To present and analyse the current state of EDM system implementation in leading US transportation agencies; to develop a framework for the selection and implementation of EDM systems for transportation construction (i.e. helping other	Qualitative case study approach: four case studies with US state transportation agencies. They studied current practices, benefits, and challenges. Compared/contrasted the cases to extract common functionalities and unique characteristics	• EDM implementation is not as widespread in transportation construction as in building construction, though increasing. • Document sharing among stakeholders improved via EDM. • Benefits included: enhanced data integrity, transparency, and improved communication efficiency. • Challenges included: selecting functionalities, integration with existing systems, managing large data	• Observations from case studies (qualitative) e.g. in interviews/document reviews what practices agencies have, what benefits/challenges they report. • Framework development: they extracted common functionalities and characteristics. • No standard quantitative metric across all cases (e.g. "time saved" or "cost saved") was uniform; more descriptive/qualitative.	• It deals with EDM/EDMS in a domain that is analogous to government sector transportation agencies are government departments/agencies. • It explores functionalities, benefits, and challenges of EDMS implementation, which directly ties into interest in "effectiveness of EDMS functionalities." • The framework they propose could help identify which functionalities are worth

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
		agencies pick & deploy EDM systems)		(e.g. huge files), training & stakeholder engagement.		measuring or including in study. • Their findings about challenges (large file management, stakeholder training, integration) can help decide what control/mediating variables to include or test. • Their methodology (case studies leading to framework) might inform methodological design or literature extraction approach (e.g., combining case studies + thematic analysis).
Scopus	Nikolina, I. I.; Hulivata, I. O.; Husak, L. P.;	The aim is to substantiate methodolo	Mixed theoretical & empirical design: • Theoretical	• The authors propose an integrated index model (LDGI)	• LDGI (Local Digital Governance Index / Integrated index	• They include electronic document management as one of the

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
	Radzihovska, L. M. (2020). Assessment of Digitalization of Public Management and Administration at the Level of Territorial Communities. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 2020, Issue 5	gy for applying mathematical methods to assess digitalization of public management and administration, and to develop and test a model for this assessment at the level of territorial communities in Ukraine.	methods: analysis, synthesis, systematization, generalization • Empirical methods: observation, mathematical & statistical analysis, modelling, comparison, also expert survey • They developed a model and then tested with data from a territorial community (Vinnytsia city united territorial community) for years 2014-2018.	composed of four sub-indices: service provision quality & public information access; website functionality; digital socio-political inclusion; internal electronic document management system of local self-government bodies. • They found that their model allows systematic analysis and forecasting of digitalization levels at the territorial community level. • The model was applied in Vinnytsia, and it showed variation over time (2014-	of digitalization) and its sub-indices (service & information access; website functionality; socio-political inclusion; internal e-document management) • Ratings/weights assigned via expert survey for indicators • Statistical / mathematical modelling over time (2014-2018) + forecasting for future years • Comparative /ranking clusters of territorial communities (based on values)	subindices shows internal EDMS is seen as part of effectiveness/ digitalization in local governments. • Their approach of building an integrated index with multiple functionalities helps in thinking what functionalities to include (not only EDMS but also website, public inclusion etc.).

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
				2018) in rate of digitalization; also forecasted values for 2019-2020. • The inner electronic document management system is one important component (i.e. internal E-document management was included as a subindex).		
Scopus	Rathnayaka, L. S. D., Koralage, B. K. M. N., Nadeetharu, U., & Kulatunga, U. (2023). Applicability of Electronic Document Management System (EDMS) for the Cost Management of Mega Constructio	The study aims to provide strategies for the effective application of EDMS to the cost management of mega construction projects in Sri Lanka. It	Qualitative approach: 12 semi-structured expert interviews with quantity surveying experts (judgemental sampling). Data analysed using manual content analysis.	• EDMS is more suitable than traditional methods (TDMS) for mega projects in aspects such as functionality, neutrality, interoperability, space, reversibility, and delivery speed. • There are contradictory	The study measures perceptions / suitability of various EDMS functions compared to TDMS: functionality, interoperability, etc. Also examines challenges and feasible solutions as outcomes. There is no quantitative cost-saving or	High relevance: focuses on "effectiveness / applicability of EDMS functionalities" in a developing country (Sri Lanka) • Gives themes (functionality, interoperability, stakeholder perception, technical

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
	n Projects in Sri Lanka. Journal of Financial Management of Property and Construction	recognizes that traditional document management systems (TDMS) in developing countries hinder cost target achievement and seeks to identify what features and functions of EDMS are suitable, what challenges exist, and what feasible solutions are possible in the Sri Lankan context.		views among experts about cost and security trade-offs. • Five transitional challenges identified under three key themes: cost, stakeholder perception, and technical difficulties. • Four root causes for those challenges. • Seven suggestions provided to address transitional challenges. Three key feasible solutions were identified, of which the development of local (Sri Lankan) EDMS software with low initial cost is highlighted as	performance metric in numbers (e.g. % cost saved), but qualitative assessments from experts.	challenges) which might include in study's themes for effectiveness. • Their identification of transitional challenges and feasible solutions gives possible variables or moderating/mediating factors to test (e.g. cost, security, stakeholder perception).

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
				the most feasible.		
Scopus	Silvia Mastrolembo Ventura, Lorenzo D'Alvia, & Elena Ferrari. (2023). Role of Electronic Document Management Systems in the Design Change Management Process. In Advances in Construction ICT and Automation (pp. 673–685).	The paper aims to explore the role of Electronic Document Management Systems (EDMS) in supporting the Design Change Management Process (DCMP) within construction projects. It investigates how EDMS functionalities such as version control, workflow automation, and information sharing contribute to	The study employs a qualitative case study approach using real-world construction projects as references. It integrates a process mapping analysis to model the flow of design changes, supported by the implementation of EDMS tools. The methodology includes evaluating system features that directly influence communication efficiency and traceability during design modifications.	• EDMS provides a structured approach to managing design revisions and ensuring traceability of modifications. • Enhanced collaboration and information flow among architects, engineers, and contractors. • Reduction in design inconsistencies and delays caused by manual document handling. • Identified that the integration between EDMS and BIM tools further improves project coordination	•Performance indicators such as error reduction, time efficiency, and workflow transparency. • Qualitative assessment through user feedback and process analysis. •Improvements in the documentation and tracking of design changes measured against baseline manual systems.	• Highly relevant as it demonstrates how EDMS functionalities (workflow management, version control, traceability) directly contribute to process efficiency core to your research focus on effectiveness of EDMS functionalities. •The study's focus on integration, collaboration, and traceability provides evidence for how these functionalities enhance digital transformation in professional and

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		minimizing design errors and improving collaboration among project stakeholders.		and reduces rework.		government sectors. •The construction sector findings offer transferable insights to public sector document workflows, especially regarding system reliability and user collaboration.
Web of Science	Sunindyo, Wikan; Hendradjaya, Bayu; Saptawati, G. A. Putri; Widagdo, Tricya E. (2014). Document Tracking Technology to Support Indonesian Local E-Governments. Lecture Notes in Computer Science, pages 338-	To propose and design models of a document tracking system integrated into e-government business processes in Indonesian local governments. To address how	Developed three generic models of a document tracking system. Applied in pilot projects: one in an administration office and one in a city that is excited about full e-government adoption. They built a prototype and evaluated its effects (qualitatively, pilot	• The prototype improved productivity, clarified and simplified business processes. • It supported the measurement of processes. •Demonstrated potential to enhance the quality of local e-government services in Indonesia.	• Qualitative improvements in productivity • Simplification and clarity of business processes • Capability to measure processes (process measurement) • Enhanced service quality in the local e-government context.	•The study is in the government / local e-government context, same domain. •Focuses on document tracking as a good example of a specific EDMS-related functionality. •Shows how adding tracking can affect process efficiency, user service quality, etc. • Their

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
	347.	tracking electronic documents can improve effectiveness & efficiency, especially where government business processes often change.	implementation).	• The document tracking technology helps manage, handle, and track documents, especially in the face of frequent modifications in business processes.		methodology of prototype & pilot gives ideas for how to test functionalities practically. •The outcomes measured (productivity, process clarity, service quality) are good candidates for a study that can measure under "effectiveness". • It also gives insight into challenges: implementing tracking models in local government, business process changes; might compare how local context handles frequent business process

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
						modification.
Scopus	Istratova, Eugene & Sin, Dina (2022). Development of a Data Mining Subsystem for the Citeck Electronic Document Management System. Lecture Notes in Networks and Systems, Conference Paper, pp. 344-353.	The paper aims to design and develop a data mining subsystem for the Citeck EDMS to enhance its functionality; specifically to enable extraction of useful patterns, improve document retrieval, classification, and support decision-making based on document usage data.	The study uses a development / design science methodology: modeling and designing subsystem architecture, integrating data mining techniques with the existing Citeck EDMS. It includes prototype development, specification of data mining algorithms, and possibly evaluation on sample datasets.	The developed subsystem was able to identify patterns in document usage, improve classification and retrieval, and help administrators / users gain insights from document metadata. It shows that adding data mining to EDMS increases value: beyond just storage, the system supports analytics and intelligence from document data.	Outcomes measured in terms of effectiveness of document retrieval/classification (accuracy, retrieval time), patterns discovered, usability/perceived usefulness of analytics component, improvements over existing/documented baseline such as manual methods or basic EDMS features. (Exact metrics depend on data used e.g. precision/recall or user evaluation)	This is very relevant: aligns with your focus on EDMS functionalities and how they improve effectiveness. The data mining subsystem shows an advanced functionality useful for incorporating more than just basic retrieval, but analytics, pattern detection. It can help you include variables like classification accuracy, analytics usefulness, metadata usage. Also shows how system enhancement beyond basic EDMS could be a factor in government

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
						sector effectiveness.
Web of Science	Ab Aziz, A. A., Yusof, Z. M., Mokhtar, U. A., & Jambari, D. I. (2018). Electronic Document and Records Management System Implementation in Malaysia: A Preliminary Study of Issues Embracing the Initiative. Presented at the International Conference on Information, Springer, 2018	The primary objective of this study was to identify and analyze the key issues and challenges in implementing the Electronic Document and Records Management System (EDRMS) in Malaysian government agencies. The study sought to uncover the barriers affecting system adoption, user engageme	The study adopted a qualitative preliminary research design, using document analysis and semi-structured interviews with selected public sector officials and system users involved in the EDRMS initiative. This approach allowed the researchers to gather insights into the operational challenges, user perceptions, and institutional factors affecting the adoption process. Additionally, the study reviewed government	The findings revealed several critical barriers hindering the successful adoption of EDRMS in Malaysian public agencies. These include: • Limited system functionality and integration issues that affected user confidence; • Lack of user awareness and inadequate training programs; • Insufficient top management support and poor policy enforcement; • Concerns about data	Outcomes were measured through qualitative data coding and thematic analysis based on interviews and document reviews. The authors assessed outcomes such as: • The extent of system adoption and usage among agencies • Perceived user satisfaction with system functionality • Policy compliance levels and • Identified barriers and improvement factors in the implementation framework. • Expert validation was also used to confirm the proposed	This study is highly relevant to the current research on the Effectiveness of Electronic Document Management System (EDMS) Functionalities in the Government Sector. Both studies focus on assessing system effectiveness, user engagement, and organizational readiness in public sector digital initiatives. The Malaysian context makes it especially valuable, as it highlights local implementation realities,

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
		nt, and policy alignment within the context of Malaysia's digital governance initiatives. The theme of the research revolves around digital transformation in the public sector, focusing on organizational readiness, system capability, and user adaptation in implementing EDRMS.	policies and implementation guidelines related to digital records management to support contextual analysis.	security, privacy, and system reliability; • Resistance to organizational change among government staff.	guidelines and ensure relevance to the Malaysian public sector context.	policy frameworks, and cultural factors that influence EDMS adoption. The identified issues such as system capability, management support, data security, and user awareness, directly align with the key constructs of your research, offering empirical grounding for conceptual framework and discussion.
Web of Science	Aziz, A. A., Yusof, Z. M., Mokhtar, U. A., & Jambari, D.	The study aims to identify the influencin	The study employed a mixed-method approach, combining literature	• Fourteen influencing factors were identified from the literature, of	• Expert validation and ranking of influencing factors. • Measurement	• Highly relevant to the current research on Effectiveness of EDMS

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
	I. (2017). Establishing Policy for the Implementation of Electronic Document and Records Management System in Public Sector in Malaysia: The Influencing Factors.	g factors affecting the implementation of the Electronic Document and Records Management System (EDRMS) within Malaysia's public sector. It also seeks to assess the appropriateness of these factors to inform the establishment of a comprehensive policy that ensures successful system adoption.	review and expert interviews (from MAMPU and the National Archives of Malaysia).Fourteen influencing factors were initially identified from prior studies and subsequently narrowed down and ranked through expert validation to determine the most significant factors.	which ten were validated by experts as most critical. • The main challenges were user rejection, lack of awareness and training, and absence of clear policy guidelines. • The study emphasizes the need for a well-structured policy framework to guide implementation and ensure system sustainability in the public sector.	of perceived importance and readiness toward EDRMS implementation. • Qualitative evaluation of policy adequacy and user acceptance levels.	Functionalities in the Government Sector, especially in the Malaysian context. • Highlights the importance of policy, user awareness, and training as critical success factors for system effectiveness. • Provides empirical evidence on governance and implementation challenges that align with the focus of evaluating EDMS functionalities in Sarawak's government sector.
Web of Science	Andronicea nu, Mihai (2024). Integrated	The study aims to present and	Case-study method. The author describes the	The study reports multiple advantages of	Measures are qualitative / descriptive: improvements	Very relevant: • Demonstrates a real example

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
	Document Management System Using The Alfresco Platform For Contracting Communication And Mobile Phone Services. Management Research and Practice, Vol. 16(2), pp.36-47.	explain an integrated document management system architecture based on the Alfresco platform for contracting communication and mobile phone services in an organization. The theme is how integrating EDMS (using Alfresco) can improve efficiency and effectiveness in document handling for contracting/telecommunications related	architecture of the integrated document management model, shows implementation in the context of contracting / mobile phone services. Likely includes system design, needs analysis, technical architecture, and evaluation of the new system's advantages	the Alfresco-based system: increased level of efficiency and effectiveness in document processing, improvements in document retrieval and management, more streamlined contracting communication, better document organization. The author suggests this model is a "good practice" that could be generalized beyond the specific contracting/mobile phone services scenario	in efficiency, effectiveness (likely perceived), system architecture performance, perhaps time / process improvements. Exact quantitative metrics (e.g. % time saved) are not clearly given in summary.	of EDMS functionality using Alfresco, including contracting & communication workflows useful for seeing how functionalities can be structured. • The model shows what "efficiency and effectiveness" look like in practice, which helps define what outcomes might measure in study. • Offers architectural insights (what components are involved) that might adapt or compare to government-sector EDMS in Sarawak / Malaysia. • Since it's a

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
		functions.				recent article (2024), it reflects modern EDMS/platform capabilities and challenges.
Web of Science	Nugraha, I. G. B. B., Bandung, Y., & Zaky, A. (2019). Official Document Management for Government Service in Indonesia using Smart Contract. IEEE International Smart Cities Conference (ISC2), 2019.	To explore the use of smart contract technology in managing official government documents/services in Indonesia. The study investigates how blockchain/smart contracts can be used to enhance authenticity, integrity, transparency, and maybe automate	Based on what's available: a design/architecture / prototype approach. Likely includes conceptual modeling, system design with smart contract logic, and maybe a pilot or scenario application	The study finds that using smart contracts for official document management can improve security, trust, and integrity of documents. It suggests that such technologies reduce possibilities of fraud or tampering and may automate or enforce certain rules for document handling (e.g. version control, access, audit trail) via the smart contract logic.	Perceived properties like document authenticity, transparency, integrity, possibly system design performance (if measured). But not clear if there are numeric outcome metrics (time saved, error reduction etc.) from the source summary.	•Very relevant: It shows application of EDMS functionality using modern technologies (smart contracts/blockchain) in a government environment. • Highlights functionalities like document integrity, authenticity, audit-trail, enforcement of rules (which are likely to be relevant "effectiveness" measures in your study). • Offers example of advanced

Database	Author, Year of Publication & Title	Study Objectives / Study Themes	Study Design / Study Methodology	Key Finding	Outcome Measure	Relevance to our study
		portions of document workflows in a government context.				EDMS implementation resolving trust/security issues, which might be a gap in your setting. • Can help derive variables to measure (e.g. integrity, transparency, rule compliance, user trust) and include literature/theoretical support when discussing these in your thesis.

2.4.5 Discussion of Findings

The analysis of studies featured in Scopus and Web of Science shows how unevenly advanced and articulated is the development and application of Electronic Document Management Systems (EDMS) in the government sector. There are some literatures that document the many functions EDMS serve as gateways to enhance efficiency, transparency, and accountability in the public sector (Ziemba, Papaj, & Descours, 2022; Ab Aziz et al., 2018). However, effectiveness is contingent on institutional preparedness, policy context, acceptance of users, and the level of technology in place.

EDMS literature (Ziemba et al., 2022; Rahman & Hashim, 2021), highlighting the role of key success factors, namely top management support, compliance with rules, and change management, sheds light on how these factors influence the potential of EDMS. The case of Malaysia mirrors this reality: despite policies, EDMS implementation is still met with practical challenges, mainly people are disinclined to change, the users are not trained, and poor alignment with the existing administrative systems (Ab Aziz et al. 2017, 2018). These challenges show that, even in the case of Malaysian policies, the lack of operational implementation is the primary problem.

Technological advancements are reflected in the works of Guo, Jahren, and Turkan (2019), Ventura, D'Alvia, and Ferrari (2023), as well as Istratova and Sin (2022), with regard to intelligent automation, data mining, and the AI-enabled functionalities of EDMS. The automation of document classification and retrieval markedly enhances the accuracy and efficiency of decision-making, which is critical for larger and more complex organizations. Androniceanu (2024) and López-García et al. (2020) discussed the integration of open-source platforms, which enhances the flexibility and scalability of document management systems, especially for organizations with varying operational needs and lower budgets.

For developing nations, as illustrated by Nugraha, Bandung, and Zaky (2019) as well as Sunindyo et al. (2014), the value of EDMS in improving transparency and minimizing bureaucratic red tape is unquestionable. The blockchain-enabled smart contract and document tracking systems that feature technologies for e-Government transformation in Southeast Asia, particularly in Malaysia and Indonesia, where trust and auditability in digital systems are key governance challenges.

Furthermore, Rathnayaka et al. (2023) and Nikolina et al. (2020) highlighted the other potential uses of EDMS, namely, cost management, analytical decision making, and digital transformation in public management. These studies consistently indicate that EDMS is being used as an administrative tool, thus reducing the value of EDMS as a strategic facilitator of digital governance and organizational learning. However, studies examining the extent to which EDMS systems users' satisfaction, service delivery, and organizational performance gaps are scarce. Most of the available research concentrates on use challenges or design-technical frameworks, neglecting the quantitative value of postimplementation studies. Future research focused on government policy gaps on EDMS should assess, ideally, enact, and quantify measures that relate to digital policy EDMS environments.

2.4.6 Summary of the SLR Findings

To conclude, the examined literature points out that the successful implementation of EDMS in government organizations primarily hinges on the correspondence between the system's technological capabilities and the institution's policy alignment, human capital, and governance culture. While governments adopt digital systems, the level of digital interoperability and maturity which are fundamental components of EDMS still vary across different environments.

Hence, the literature broadly aligns on the premise that an integrated, user-oriented, and data-centric EDMS is capable of substantially improving administrative functions, eliminating redundancies, and enhancing service delivery to the public. However, the literature notes that this occurs when an institution invests in meaningful and realistic training opportunities, system assessments, and other improvement initiatives.

2.5 User Acceptance and Usage of EDMS

Alshibly's (2014) study on the acceptance of Electronic Document Management System (EDMS) identified system characteristics as the most significant determinant influencing user acceptance. The findings further revealed that both ease of use and perceived usefulness positively impact the adoption and utilization of EDMS, underscoring their critical roles in shaping user attitudes towards the system. A study by Hung et al., (2009) also found that perceived usefulness of the system, are amongst the significant predictors of users' intention to utilize EDMS. Afonso et al. (2015) in their study also found that EDMS users believe that the use of this information system helps them obtain performance benefits in their work.

In addition, it was revealed that search functionality, reliability, accessibility, and security of EDMS, are the major reasons for adoption and acceptance of EDMS in Ilorin Metropolis (Balogun et al., 2019). This is supported by Tiitinen et al. (2000) in their study that confirmed the acceptance and effectiveness of using EDMS is related to concerns about the information system. Working with documents represent the computer abilities of the user, the time that the work takes on the computer and the use of computers and papers as part of their routine. The findings of research by Kaaki et al. (2013) illustrated that the acceptance of EDMS is affected by the nature of the administration of the organization using EDMS and the level of ICT aptitude in the wider population is believed to limit the range of utilisation services available. However, in Sri Lankan construction industry, it is identified that the greatest barrier to adopt and accept EDMS in the industry is the lack of knowledge about EDM systems (Fernando et al., 2019). These are amongst the cases of successful user acceptance towards the electronic document management system.

In Canada, Canadian municipality implemented an EDRMS to improve work productivity, promote information sharing, reduce the volume of paper records, and facilitate production and maintenance of authentic and reliable electronic records (Mosweu, Bwalya, & Mutshewa, 2016). They are able to influence the users to accept and adopt the system once it was rolled out. Meanwhile in New Zealand, the adoption of EDRMS in public institutions was promoted by the implementation of a user-friendly interface. To moderate system restrictions at the design stage, an early consultation was carried out by the project team to seek advice from key users within the affected departments to understand the business requirements (Yin, 2014).

User acceptance in contemporary information system (IS) literature is one of the most mature research areas (Venkatesh, 2003). Most of research done on the user acceptance are discussed in several streams. Research on technology acceptance can be categorized into distinct streams. One stream focuses on individual acceptance of technology, utilizing intention or actual use as the dependent variable (Compeau & Higgins, 1995) Another stream emphasizes the successful implementation of technology at the organizational level (Leonard-Barton & Deschamps, 1988), while the third examines the concept of task-technology fit, which evaluates the alignment between technological capabilities and task requirements (Goodhue & Thompson, 1995).

Essentially, this study focuses on the individual acceptance of technology by looking at the human factors contributed to their acceptance. According to Dillon (2001), user acceptance is the demonstrable willingness of the user group to use IT for the tasks it is intended to support. He also defined user acceptance based on human factors to influence the design and implementation process in a way that minimizes the risk of users resisting or rejecting the system. Thus, the construct applies to situations in which users feel that they engage with the system to provide proof of use or use of technology.

There are several user acceptance modules built on theories, such as the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Reasoned Action from Davis, Bagozzi and Warshaw (1989), Theory of Interpersonal Behavior (Triandis, 1977), Diffusion of Innovation Theory (Rogers, 1983), Theory of Planned Behavior (Schifter & Ajzen, 1985), Technology Acceptance Model (TAM) (Davis, 1989), Model of PC Utilization (MPCU) (Thompson et al.,1991), Theory of Planned Behaviour (TPB) (Ajzen, 1991), Innovation Diffusion Theory (IDT) (Moore & Benbasat, 1991), Combined TAM and TPB (TAM_TPB) (Taylor & Todd, 1995), Technology Acceptance Model 2 (Venkatesh, 2000), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and Theoretical Integration of User Satisfaction and Technology Acceptance (Wixom & Todd, 2005). These theories of user acceptance are determination to capture the acceptance and use of information in organizations. The common features of these models are the belief towards technology that are to be used which contribute to the impact of their actual usage behaviour (Agarwal & Karahanna, 2000).

2.6 Empirical Studies on Electronic Document Management System Functionalities and Performance

Table 2.8 showcase previous studies on functionalities and effectiveness of EDMS. The dominant models used were the DeLone and McLean Information System Success Model and Respecified Version of DeLone and McLean (1992) Model of IS Success. The explanations and discussion of previous studies create a better understanding of the topic. Hence, it can be concluded that the focus of previous research falls into two categories (i) Electronic Document Management System functionalities; and (ii) Information System Effectiveness (Success). The subtopic shared the various perspectives of previous models developed by various experts in particular concepts.

2.6.1 Previous Studies on Electronic Document Management System Functionalities

It is important to mention that, in the context of this study, the research had focused on the system functionalities in Electronic Document Management System.

However, not many studies had been undertaken into the process of implementing EDMS in the government context (Abdulkadhim et al., 2015). As elaborated in Chapter Three, the selected model incorporates twelve variables. With regard to information system effectiveness, four variables were adopted from Information System Success Model DeLone and Mclean (1991, 2003) and also derived from Seddon (1997), namely information quality, system quality, and user satisfaction. Additionally, perceived usefulness was derived from The Respecified Model of IS Success (and Use) by Seddon (1997).

As for the functionalities of EDMS, eight variables explored were automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; and support and administer compliance. These eight variables, taken from the functionality of EDMS were found to have strong influence of information system success (effectiveness). EDMS functionality is, by definition, available in EDMS are what enables the documents to be managed as an information resource rather than as a collection of files (Sprague Jr., 1995). According to Sprague, this functionalities would influence the effectiveness of EDMS such as creation of document (automated information capture); storage of the document where it kept (storage and archival method); retrieval of document and how the document retrieve (federated search and retrieval); transmit or route of document where and how the document can be transmitted in the EDMS (automated workflow); as well as display/print and access control.

Finally, factors encompass that can be displayed and printed by who and who owns it, who can read it and who can amend it (hierarchical file indexing and classification; security and audit trail); version control what is the current version of the document, what are the previous versions that are still needed and status reporting on who has the document, what is its recent activity (collaborative tools); retention management on what are the legal retention requirements, corporate policy requirements, how to destroy the paper and electronic versions and the disaster recovery on how and where are the backup copies kept, what are the recovery procedure (support and administer compliance). Meanwhile, according to Zantout and Marir (1999), the most important EDMS functionalities are those that allow users to directly manipulate documents; index and store documents in order to retrieve them; communicate through the exchange of documents; collaborate around documents; as well as model and automate the flow of documents.

With regards to the studies that focus on effectiveness of EDMS functionalities, much research emphasizes the crucial role and impact these systems have in transforming organizational environments. Researchers have explored many aspects of EDMS features, providing insight into their subtle influences on organizational processes, user experiences, and overall effectiveness.

Table 2.8

Previous Studies on EDMS

Authors	Aims of Study	Variables Examined	Research Method	Main Findings
Mutimba, Collins Juma (2014)	This research examines the implementation of the Electronic Document Management System (EDMS) within the Ministry of Education, Science, and Technology (MoHEST).	Policy and legal framework; User needs; RM Infrastructure	qualitative and quantitative	MoHEST still uses the manual records management system despite the fact that an EDRMS has been installed; MoHEST has a records management policy that is not known to everyone; there are inadequate documentation, inadequate finances and resistance to change by staff thus affecting the implementation of the EDRMS
Abaci, Kenan (2020)	This study aims to evaluate the effectiveness of the Electronic Document Management System (EDMS) in achieving key organizational outcomes, including administrative control, productivity, job satisfaction, operational effectiveness, and security.	Managerial control; productivity; job satisfaction; efficiency; security.	quantitative	As perception of managerial control, efficiency, and productivity associated with Electronic Document Management Systems (EDMS) applications improve, employees' job satisfaction increases, leading to enhanced overall institutional efficiency.

Haider Abdulkadhim (2015)	This study aims to propose a theoretical framework for the implementation process of Electronic Document Management System (EDMS) in government settings.	Individual Change, Organizational Change and Common Factors.	quantitative	This study aims to provide government practitioners, including system developers, senior managers, and project managers, with a deeper understanding of the Electronic Document Management Systems (EDMS) implementation process. It seeks to identify the key activities involved at each stage, thereby enhancing comprehension of the overall process.

Authors	Aims of Study	Variables Examined	Research Method	Main Findings
Hang Thu Pho, Torben Tambo (2014)	This study seeks to propose best practices for establishing the interrelation between Electronic Document Management System (EDMS) and Information Management Systems (IMS).	process-oriented organizations; workflow; document flow; IMS and EDMS	qualitative, interpretivistic, longitudinal empirical study	The improvement and effectiveness of Information Management System (IMS) have often overlooked the role of Electronic Document Management Systems (EDMS) as a critical factor in providing appropriate technological support for IMS processes. Properly implementing EDMS can significantly enhance organizational learning, improve the accuracy of documentation, and foster crossorganizational collaboration.
Arkan Mahmood and Ibrahim Taner Okumus.	This research aims to examine the critical success factors influencing the implementation of Electronic Document Management System (EDMS) in government organizations.	Technological readiness; Top management support; Training and involvement; Resource availability; System-related factors; Work environment and culture.	systematic literature review, eight face-toface interviews, and a questionnaire survey	Top management support is critical to the success of Electronic Document Management Systems (EDMS). Additionally, the availability of resources has been identified as a key determinant for successful EDMS implementation, with the success of the system closely linked to the level of technological resources available. Furthermore, training and user involvement are essential to ensuring the successful deployment of EDMS, as is the technological readiness of the organization.

Authors	Aims of Study	Variables Examined	Research Method	Main Findings
Haitham Hmoud Alshibly (2007)	This study seeks to identify the most critical success factors that significantly impact the successful implementation and adoption of Electronic Document Management Systems (EDMS).	Technological readiness; top management support; cost savings perceived benefits; citizens service enhancing perceived benefits; time savings perceived benefits; productivity increasing perceived benefits.	quantitative	Top management support and technological readiness are identified as the most crucial critical success factors in the successful realization of Electronic Document Management Systems (EDMS).
Haitham H. AlShibly	This research aims to analyse and expand the understanding of the factors influencing user acceptance of Electronic Document Management System (EDMS). Additionally, it seeks to develop a model that can be applied to assess user acceptance within the context of developing economics, such as Jordan.	Perceived System Quality; Perceived Information Quality; EDMS Perceived Ease of Use; EDMS Perceived Usefulness; EDMS Acceptance.	quantitative	System characteristics are the most significant determinants influencing the acceptance of Electronic Management Systems (EDMS).
Mohammed khair I. Kassab, Samy S. Abu Naser, Mazen J. Al Shobaki	This study aims to identify the role of policies and procedures in the success of Electronic Document Management Systems (EDMS), examining how they contribute to the effective implementation and adoption of such systems.	age; nature of job; specialization.	quantitative	The analysis revealed no statistically significant differences in the responses of the study population regarding the role of policies and procedures in the success of the Electronic Document Management Systems (EDMS) at the Palestinian Pension Agency, when categorized by variables such as age, job nature, and specialization.
Haitham Alshiblya; Raymond Chiongb, and Yukun Bao	This study investigates the critical success factor that influence the implementation of Electronic Documents Management Systems (EDMS) in government organizations.	Technological readiness; Top management support; Training and involvement; Resource availability; System related factors; Work environment and culture	quantitative	Six categories of factors have been identified as critical to the success of an Electronic Document Management Systems (EDMS), all of which are perceived as highly important for the successful implementation of the system.

Al-Dalaeen, Aswan S., Sattam Allahawiah and Al- Balqa' (2020)	This research evaluates the quality attributes of Electronic Document Management Systems (EDMS) and examines their direct impact on employee satisfaction within Jordanian construction companies.	Quality of EDMS (Quality of Content; Quality of Design; Quality of Organisation; and Ease of Use); User Satisfaction and System Performance.	a description analytical approach to collect data via a designed survey to be analysed using the SPSS package	The quality attributes of the Electronic Document Management Systems (EDMS) have a significant impact on both the satisfaction and performance of companies operating within the construction sector.
Azlina Ab Aziz et. al. (2018)	This study aims to identify the factors that influence the decision-making process regarding the adoption of Electronic Document Management Systems (EDMS).	Performance expectancy; effort expectancy; social influence; facilitating conditions; system quality; information quality; service quality; perceived value of records;	qualitative	As a result of the study, a new conceptual model for the adoption of Electronic Document and Records Management System (EDRMS) in the Malaysian public sector was developed.

Authors	Aims of Study	Variables Examined	Research Method	Main Findings
		top management support; training; financial support; policy; security		
Te-Jen Su et.al. (2017)	This study investigates the usability of Document Management Systems (EDMS) in government organizations, with a focus on human factors engineering.	system interface; System function; System usability.	quantitative	Improvements to the help function were found to enhance user satisfaction. Additionally, the document management system interface was examined and validated through human factor engineering principles, leading to the development of a system that complies with Human-Machine Interface (HMI) standards.
Al Shobaki, Mazen J., Samy S. Abu Naser, and Mohammed khair I. Kassab (2017)	This study aims to assess the current status of the application of Electronic Document Management Systems (EDMS) in government institutions.	age, nature of the job, specialization, qualification, number of years of experience.	Census method	The analysis revealed no statistically significant differences in the responses of the study population regarding the implementation of the Electronic Document Management System (EDMS) in governmental institutions, with respect to variables such as age, job nature, specialization, qualifications, and years of experience.

Estrera, Joseph (2008)	This research aims to develop and implement an Electronic Document Management Systems (EDMS) to support the Quality Management System at Capitol University.	Functionality (organization, security, management); Time and money savings.	quantitative	The findings revealed the Automated System is more effective than the existing system. Therefore, the use of EDMS for the three colleges of Capitol University has proven to be beneficial in terms of functionality, cost and time.
Vincent Cho (2008)	This study evaluates the influence of Organizational Learning (OL) on the effectiveness of an Electronic Document Management Systems (EDMS).	firm size, communication effectiveness, Learning orientation, management support, user satisfaction, individual impact and organisational impact	Questionnaire	Management support has been found to positively influence user satisfaction, individual enrichment in the use of the Electronic Document Management Systems (EDMS), as well as the organizational impact.

Authors	Aims of Study	Variables Examined	Research Method	Main Findings
Emre Sezgin et.al. (2013)	This study aims to identify the factors influencing the use of Electronic Document Management Systems (EDMS) and contribute to the existing body of knowledge on user acceptance of technology.	intention; Attitude; Perceived Usefulness; Perceived Ease of Use; Social Norms; Facilitating Conditions; Selfefficacy; Trust; Job relevance; Output quality.	survey method	The study demonstrated that the new system provided the necessary functionalities and was positively received by the majority of users.

In studies focusing on information system effectiveness, the Information System Success Model by Delone and McLean (1991, 2003) as well as the Respecified Model of IS Success (and Use) by Seddon (1997) have been the most widely utilized frameworks. Apart from the eight variables of the EDMS functionalities, the model also consists of four related constructs namely information quality, system quality, user satisfaction and perceived usefulness. The information quality is the users' perception of EDMS functionalities information in completeness; security; availability; accuracy; relevance; timeliness; and understandability of the system. System quality is the users' perception of EDMS functionalities in terms of reliability, responsiveness, and user friendliness of the system. Meanwhile, satisfaction with the system by measuring the EDMS functionalities while assessing information system effectiveness consist of the element of self-efficacy; repeat visits; personalization; perceived risk; and enjoyment while using the system. In terms of perceived usefulness, it can be defined as an individual's perception that using the system with EDMS functionalities improves performance and the success of an information system (performance; effectiveness; productivity; risk perception; and trust).

With regard to studies focus on effectiveness of EDMS functionalities, there is no specific models or theories that suit to generalize the nature of EDMS functionalities study. However, previous study explores a different perspective of EDMS effectiveness to identify the best model and framework to measure performance. A considerable body of research has been conducted on the effectiveness of information systems (IS). This term applies to how successful a system is in terms of system quality, information quality, utilisation, user satisfaction, and impact on individuals and organisations (Seddon, 1997; Rai et al., 2002; Delone & McLean, 2003; Cho, 2008). This helps researcher to get clear picture of the character of the EDMS effectiveness to be used to develop a conceptual model and theories in terms of EDMS functionalities that examine the relationship between EDMS functionalities, and the dimensions of information systems success measured in terms of information quality, systems quality, perceived usefulness, and user satisfaction.

As illustrated in Table 2.9, the majority of the studies adopted a quantitative approach, with survey research serving as the primary data collection method, and questionnaires as the main research instrument. The data analysis that used were measuring variables using statistical techniques either multiple or path analysist (SEM PLS).

Table 2.9
Previous Studies on Information System Success

Authors	Aims of Study	Variables Examined	Research Method	Main Findings

Authors	Aims of Study	Variables Examined	Research Method	Main Findings
Seddon (1997)	To present and justify respecified and slightly extended version of DeLone and McLean's Model (IS Success; IS Use; IS Evaluation: IS Effectiveness)	Information System (Implicit in the Model); Net Benefit; The study examines various factors, including expectations regarding the net benefits of future Information System (IS) use, actual IS use, and the individual, organizational, and societal consequences of IS use. Additionally, it explores IS Success, system quality, information quality, perceived usefulness, user satisfaction, and net benefits to individuals, organizations, and society, along with the role of volitional IS use.	Data collection from a sample case, measuring variables using statistical techniques (Ordinary least square regression, PLS and LISREL)	It introduces four new variables (Expectations, Consequences, Perceived Usefulness and Net Benefits) and reassembling the links between the variables, it has been possible to develop the re-specified and slightly extended model of IS Use and IS Success.
William Delone and Ephraim McLean (2016)	To formulate a comprehensive model of Information System Success to measure some aspect of Management Information System success research that has been attempted in the past.	System Quality; Information Quality; Information Use; User Satisfaction; Individual Impact; Organizational Impact	Quantitative survey	a series of recommendations regarding current and future measurement of IS success.
Abdel Nasser H. Zaied (2012)	To demonstrate how the proposed model can be applied and supporting the decision makers in evaluating and developing the information systems.	The study investigates several factors influencing the adoption and success of Information Systems, including behavioural intention, information quality, management support, perceived ease of use, perceived usefulness, service quality, system quality, training, user satisfaction, and user involvement.	Questionnaire and interview	The proposed model and its components have demonstrated their potential as a valuable tool for decision-makers in organizations, particularly in evaluating the implementation of information systems.

Helaiel Almutairi (2001)	To develop a model that can be used to measure the success of information systems within public organizations.	System Quality, Information Quality, System Usage, User Satisfaction, Individual Impact, and Organizational Impact; External Environment Satisfaction	Questionnaires	Information systems success is a three variables model. This model proposes that Satisfaction affects Individual Impact that, in turn, affects Organizational Impact. Also, Satisfaction directly affects Organizational Impact.
Hussein, Abdul Karim, and Selamat, 2007)	to investigate the influence of technological factors on Delone and McLean's IS success dimension.	The technological factors were represented by IS competency, IS facilities, IS integration, IS structure and user support. The IS success dimensions used in the study were systems quality, information quality, perceived usefulness, and user satisfaction	survey method	The findings indicate that all the technological factors are significantly correlated with the four IS success dimensions. The study concludes that the technological factors investigated were very important in ensuring the successful utilization and implementation of information systems in the electronic government agencies.
Ojo (2017)	This study adapts the widely recognized DeLone and McLean Information System Success Model to the context of hospital information systems in a developing country.	System quality, information quality, service quality, use, user satisfaction, perceived net benefit.	survey research design and structural equation modelling technique was used to validate the model's constructs.	The findings from this study run contrary to similar studies in the healthcare sector that have called for more focus on service quality to improve user satisfaction and consequently achieve systems success.

2.7 Electronic Document Management System (EDMS) in Malaysia and Public Sector Context

As this study focuses on the EDMS implemented in the government sector, an account of the functionalities of the EDMS in the Sarawak Government selected agencies is reviewed. The Sarawak Government is an authority governing Sarawak. The government agencies comprising 11 State Ministries; 20 Chief Minister's Department; 21 State Departments ;12 State Residents' Offices; 40 District Offices; 26 State Local Authorities and 26 State Statutory Bodies. The Chief Minister is assisted by a Cabinet of State Ministers and State government agencies, carrying out the policies drawn up by the legislative assembly through the Sarawak Civil Service. Service delivery performance sets the benchmark for quality in public service. The efficient method of records management ensures the transparency and credibility of an organisation delivering services and acts as a strategic resource for public sector (Wan Mohd Saman and Haider, 2012). In Sarawak, the government's mission is to transform the Civil Service through High Performance Team and Excellent Service Delivery that consist of the following (Government, 2010):

a) Work hand-in-glove with the leadership of the State.
b) Accelerate the holistic development of the State.
c) Preserve multi-racial harmony amongst our people.
d) Plan, Implement and Monitor Projects efficiently and effectively.
e) Enhance organizational and service excellence through efficient and effective work procedures and systems.
f) Engage and delight customers through business-friendly processes.
g) Nurture a working environment that generates creativity and innovation; and
h) Develop professional and personal skills and competencies through best practices and life-long learning

To reach this mission, the Sarawak Civil Service adhere to the following common shared value:

a) High Integrity
b) Respect for Others
c) Obedience to the Law
d) Kind and Caring
e) Professional Work Ethics
f) A Sense of Urgency and Timeliness
g) Team Spirit
h) Action and Result-Oriented

Among other initiatives on digital government, there are three types of online services managed by the public service namely Government to Community (G-C) Services, Government to Business (G-B) Services and Government to Government (G-G) Services. The table below listed online services by the Sarawak Government.

Table 2.10
Government to Community (G-C) Services

System	Descriptions

Talikhidmat	For enquiries, complaints and suggestion to all the Government and non-Government organisation
Paybills	For payment of Water Bills (Rural Water Supply Department of Sarawak, Kuching Water Board, Sibu Water Board, LAKU Management Sdn. Bhd.) For payment of electricity bills (SESCO) For payment of Telecommunications (Telephone and Internet Service) bills (Telekom Malaysia Bhd., TMNet) For payment of Study loan (State Public Service Commissions) For payment of Study Loan (Yayasan Sarawak) For payment of Councils' assessment bills (25 Councils) For payment of Land Rent and Land Installment Premium (Land and Survey Department)
e-Recruitment	For application to Join Public Service in 29 State Government Agencies
e-Scholarship	For application of Scholarships from State Public Services Commissions.
eLibraries	Online Public Access Catalog E-Newspaper Sarawak State Bibliography Electronic Text Research Sarawak Authors Sarawak Business Directory
eR**&**DO	Apply for child adoption Check child adoption application status Register Probate with District Office Check Probate registration status
e-Booking	Booking of the State Government facilities
Handy	Guide to Sarawak Government Services
iHydro	Online Water Level & Rainfall Data
e-Map	Search for land information as well as to purchase maps
e-Rent	Land Rent & Premium Enquiry
LawNet	To search and view ordinances and laws related to Sarawak
e-Munakahat	Online application of pre-marriage

e-Dakwah	Apply speaker for Islamic teaching and dakwah credentials

Table 2.11
Government to Business (G-B) Services

System	Descriptions
eLibraries	Sarawak Business Directory
eR&DO	Search business name availability
	Register business name
	Check status of the business name registration
e-Contractor and Consultant	Search and view contractors Registry.
	Register as Government Contractor / Consultant
e-Tender Notice	View the state government tender notice
eMINDS	Electrical Inspectorate Unit Main Information, Network and Database System (Wayleave, Energy Balance, Register as Switchboard Manufacturer, Register as Electrical Installation Contractor, Certification of Approval (COA)/ Import Permit, Register as Competent Person (Wireman/ Chargeman/Competent Electrical Engineer/Electrical Services Engineer/Electrical Supervisor)
Entrepreneur Registration	Register with the State Government to participate in the training and promotion programme for native entrepreneur.
Industrial Coordination Committee System (ICCS)	Application for Manufacturing Permit and Industrial Lot developed by MID via Ministry of Industrial Development Sarawak.
Home Apps	For housing developers and advocates in Sarawak to apply for normal and low-cost housing licenses and permits. And for the house purchasers to lodge a Tribunal claims.

Table 2.12
Government to government (G-G) Services

System	Descriptions
SCS-GEMS	Government Employee Management System
Webmail	Sarawak Government Email
e-Prestasi	Public Service Assessment
RTPMS	Rural Transformation Project Monitoring System
CACTUS	Correspondence and Case Tracking Unified System

Under the 26th Strategic Action of Sarawak Digital Strategy Plan 2018 – 2022, the objectives are to create an open and seamless digital government; and to innovate and improve government service delivery. Programs initiated under this strategic action are open data, encourage innovation and new ideas in using government data, executive information system (EIS)/Business Intelligence (BI), innovative and creativities circles, key focus activity (KFA), high performance team solutions, improvement on service delivery especially frontline service improvement, smart applications to enhance service, one stop service and Single Government Bill (SGB) (State Service Modernisation 2018). Figure 1 is the Strategic Actions No 26 for initiate digital government based on five principles.

Table 2.13
Sarawak Digital Economy Strategy Plan 2018 - 2022

Sarawak Digital Government: Strategic Actions No.26
Initiate Digital Government based on the five principles
Open Government
Data Centric Government
Innovative Government
Excellent Service Delivery
Excellent Digital Governance

Table 2.14
Program Example Sarawak Digital Government Strategic

Programme Examples:
Executive Information System (EIS)/Business Intelligence (BI)
Initiatives such as Innovative and Creativities Circles, Key Focus Activity (KFA), High Performance Team Solutions
Improvement on service delivery especially Frontline service improvement
Smart applications to enhance service, One stop service (Single-Sign on, Sarawak ID and blockchain) Single Government Bill (SGB)

The transition towards Electronic Document Management System (EDMS) in

Sarawak reflects the broader trends and challenges observed globally and nationally. Sarawak, a state with unique administrative and cultural contexts, faces specific barriers to the adoption of digital document management within government agencies. Issues related to security, infrastructure, legal compliance, and organizational culture significantly influence the pace of implementation of this transition. Additionally, the state government's efforts to align with Malaysia's digital transformation agenda present both opportunities and challenges.

In Sarawak public sector, automating the capture of administrative records can minimize reliance on physical documents while ensuring seamless integration with existing workflows. However, limited access to advanced scanning infrastructure, particularly in rural areas, presents challenges in implementing this feature across all government agencies. Each government agency manages diverse records, ranging from land ownership documents to relocation project files. The ability to retrieve these records efficiently is crucial, especially when cross-referencing data from different departments, such as land administration and legal units. However, lack of usage in the EDMS in some agencies leads to inefficiencies, with staff having to manually locate physical records. Implementing federated search capabilities would streamline access to documents, reduce processing times, and support inter-agency collaboration. Collaborative tools within EDMS enable multiple users to work on documents simultaneously, track changes, and facilitate communication. In the Sarawak government agencies, these collaborative tools allow for communicating through EDMS.

However, some organizations resist to change and concerns about data security and sharing. Government agencies handle complex records, particularly before 1963, such as land titles, customary rights document. With hierarchical file indexing, it ensures efficient storage and retrieval. Essentially, inconsistent classification practices across departments create challenges in maintaining standardized file structure. Adopting EDMS with indexing functionalities would support consistency in records management, facilitating both digital and physical archiving efforts. Giving Sarawak's emphasis on preserving historical and legal records, a long-terms archival strategies are essential. The functionalities of storage and archival methods in EDMS determine how documents are securely stored, retained, and accessed over time. EDMS with advanced security features such as encryption, role-based access control, and audit trail can mitigate risks by ensuring that authorized users access specific document activities, such as edits and downloads, which is essential for transparency and compliance with legal requirements. Delayed in adoption of EDMS in some agencies, reinforcing a preference for physical documentations. In Sarawak, land registration and customary rights documentation are governed by strict legal frameworks that require the retention of original records. EDMS with support and administer compliance features can help government agencies align with these requirements by automating retention schedules and ensuring that records are maintained according to regulatory guidelines.

Hence, one major initiative of digital government in Sarawak is to increase transparency. A good implementation to Electronic Document Management System prevents the risk of corruption. Creation and management of records are essential to any organization's activities, processes and systems. It promotes business efficiency, accountability, risk management and business continuity (ISO, 2019) The implementation of this technology enhances government capacity, leading to more efficient information flow, expedited delivery of goods, and improved decision-making processes. According to Alsohybe (2007), effective e-government initiatives guided by strategic plans provide substantial benefits to individuals, businesses, and governments. Recent studies confirmed and extended these findings, showing that such initiatives improve public service efficiency (Savveli, Rigou, & Balaska, 2025); enhance transparency and accountability (Yaowanit, 2025); increase citizen trust and adoption (Hasan, Syed Zulkarnain, & Nordin, 2025); and facilitate business engagement and regulatory compliance (Alannsary, 2025). The benefits, such as improved efficiencies, greater access to services, greater accountability, transparency and citizen empowerment, are significant to the government if the system is used by the public service. This is supported by Ahmad et al. (2020) that the use of ICT by Civil Service in Sarawak has evidently contributed to the efficiency and productivity of the workforce in government. Nevertheless, without EDMS, which would be the result of modern ICT implementation, electronic public administration (e-Government) is impossible to be developed (Kelemen and Mekovec 2007). Hence, this study highlights the Electronic Document Management System service and effectiveness of the system by selected agencies in Sarawak government to produce efficient governance and commendable performance.

The screenshots of the EDMS in Sarawak Government are shown in Plate 2-1 until Plate 2-20 show the EDMS used by the civil services in the agencies. This is part of task by the "action officer" to react to the task given.

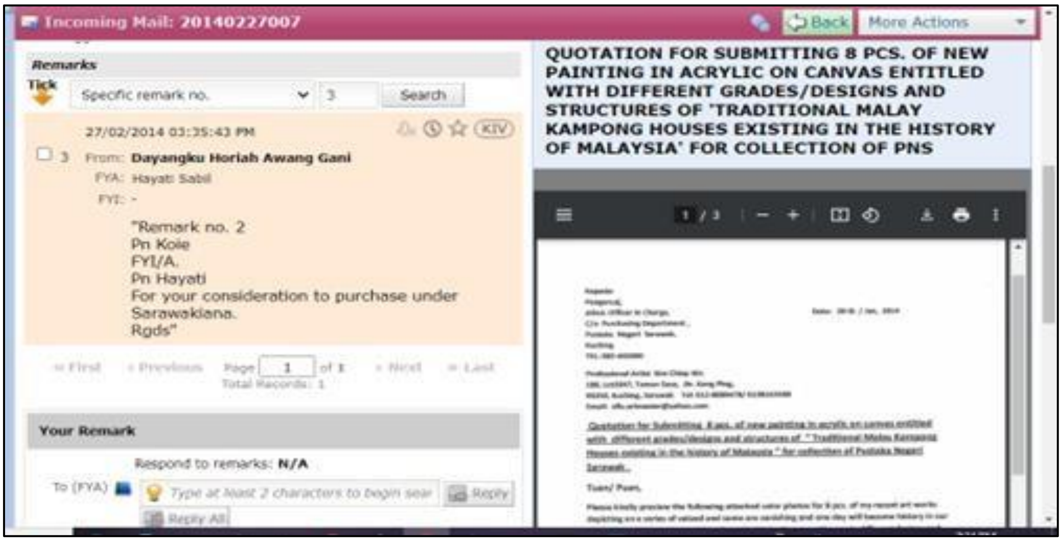

Plate 2.1 Automated Information Capture in EDMS

Once the document is captured, it is routed to the appropriate recipient based on predefined workflows or assigned by the Head of Department. This ensures that the recipient receives the document in a timely manner, along with any required contextual information or metadata, enabling them to take necessary actions such as reviewing, approving, or further processing the documents. This process minimizes manual handling, reduces errors, and streamlines task assignment for enhanced operational efficiency. This automated information capture refers to the systematic process incoming documents using advanced technologies such as optical character recognition (OCR), intelligent character recognition (ICR), and barcode or QR code scanning. This functionality ensures that documents are seamlessly ingested into the system with metadata automatically assigned for efficient classification and retrieval.

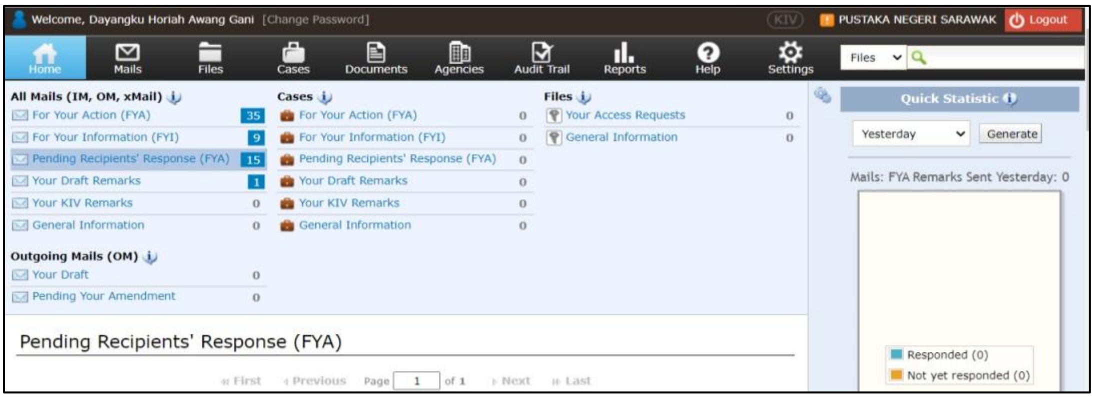

Plate 2.2 Federated Search and Retrieval in EDMS

Through federated search and retrieval, the recipient can efficiently locate documents necessary for their actions or information requirements by querying across diverse datasets simultaneously. Advanced indexing mechanisms, metadata integration, and full-text search capabilities further enhance the precision and relevance of search results. This feature not only improves accessibility and reduces the time spent on document retrieval but also supports decision making processes by ensuring that users have access to the most pertinent and comprehensive information available. Federated search and retrieval in EDMS functionalities are particularly critical for environments where documents are distributed across different storage locations or systems, as it eliminates the need for manual searches in multiple platforms.

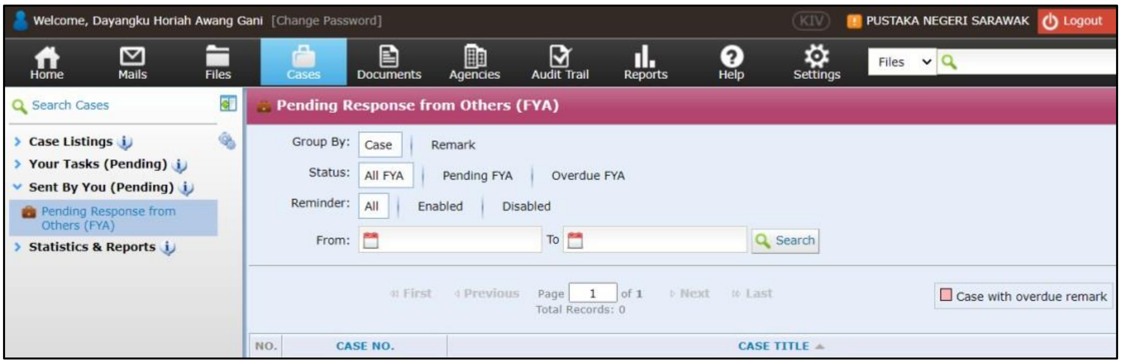

Plate 2.3 Collaboration Tools in EDMS

Key features often include shared document editing, version control, annotation capabilities, and integrated communication channels such as comments. These functionalities allow users to solicit feedback, track changes, and engages in discussions directly within the system, ensuring transparency and accountability throughout the review or vetting process. Collaborative tools provide a platform for multi-user engagement, fostering enhanced communication and teamwork in the management of documents and tasks. By having this functionality in EDMS, it reduces the risk of miscommunication and enhances the efficiency and accuracy of document-related decision-making processes.

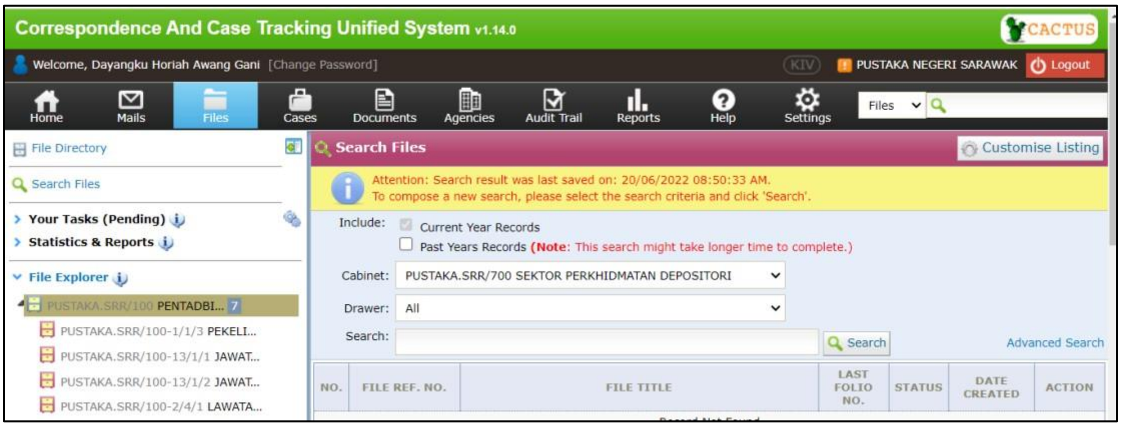

Plate 2.4 Hierarchical File Indexing and Classification in EDMS

The hierarchical structure facilitates intuitive navigation and retrieval by reflecting logical relationships between files, ensuring that each document is indexed and classified according to its contextual relevance. Users can efficiently categorize documents during or after upload, leveraging metadata, and manual input. This functionality not only enhances the accessibility and manageability of documents, but also supports compliance with regulatory and organizational standards for recordkeeping. Hierarchical file indexing and classification contribute to streamlined document management workflows. This functionality enables users to assign documents to specific categories, such as subject, department, date, or project.

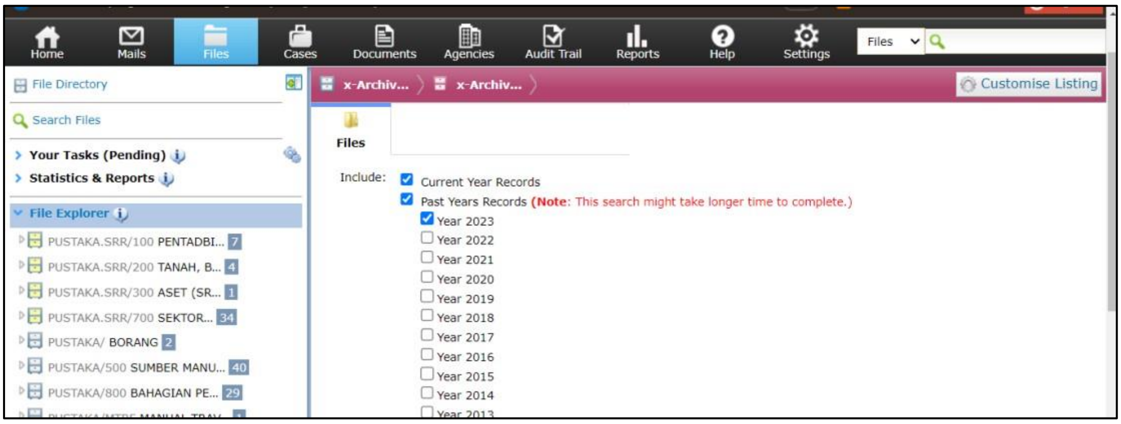

Plate 2.5 Storage and Archival Method in EDMS

This functionality provides users with the capability to classify and store records in compliance with archival principles, such as provenance, original order, and retention schedules. This functionality also incorporates robust security measures, such as access control, to protect records from unauthorized access alteration, or loss. It facilitates the accessibility and usability of documents, over time while adhering to regulatory requirements for records preservation.

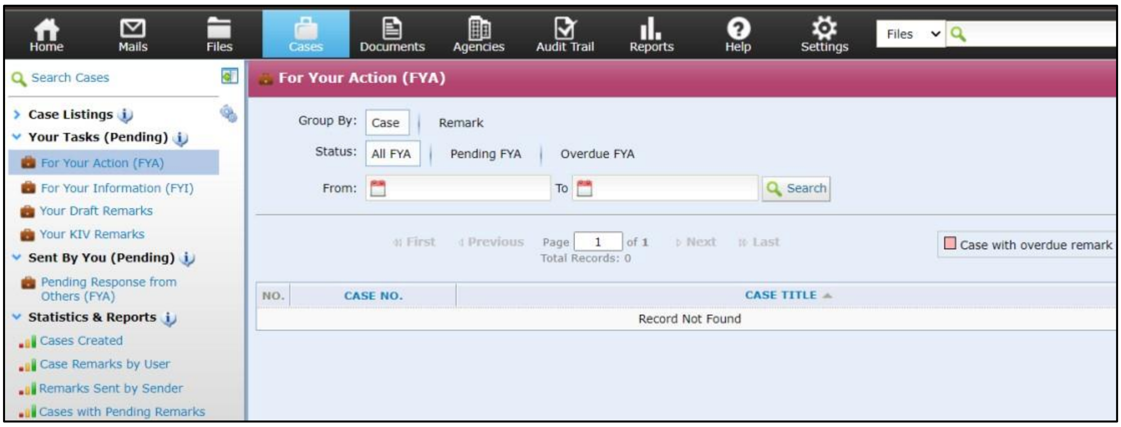

Plate 2.6 Automated Workflow in EDMS

This functionality allows users to view the workflow status of documents, including their current stage, responsible officers, and pending actions, through intuitive interfaces or dashboards. These automated workflows provide incorporate triggers, such as document submissions or deadlines, to initiate subsequent steps, ensuring efficiency and adherence to timelines. This functionality streamlines task assignments, approvals, and notifications by automating routine actions based on established business rules.

Plate 2.7 Security and Audit Trail in EDMS

The audit trail functionality in this EDMS enables users to view the complete history of a file, including progress updates, timestamps, and details of actions performed by specific users. It allows users to track the current status and the most recent updates effectively. It can be viewed by selecting year, month, or day and click search button to start searching. This functionality ensures that every action taken on a document, including viewing, editing, sharing, or deleting, is systematically recorded and accessible for review.

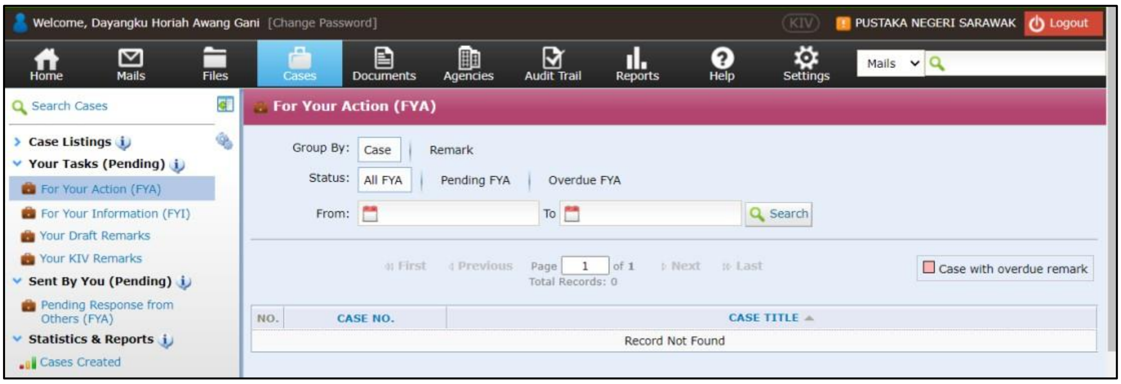

Plate 2.8 Support Administer Compliance in EDMS

This functionality includes automated enforcement of retention schedules, secure access controls, and comprehensive audit capabilities to track user actions and document activities. It also allows users to integrate compliance checklists, reporting, alert to notifications on deadlines or potential violations.

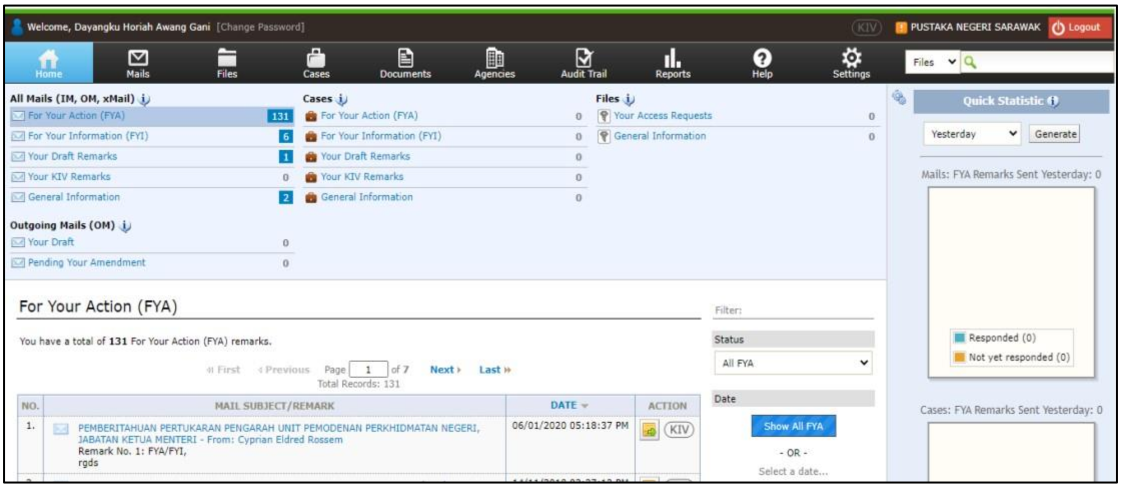

Plate 2.9 Homepage of EDMS used by selected agencies

This is a centralized interface that provides users with streamlined access to the system's core functionalities. It is designed to optimize user interaction, organize into incoming mails, outgoing mails, allowing for efficient navigation and task execution.

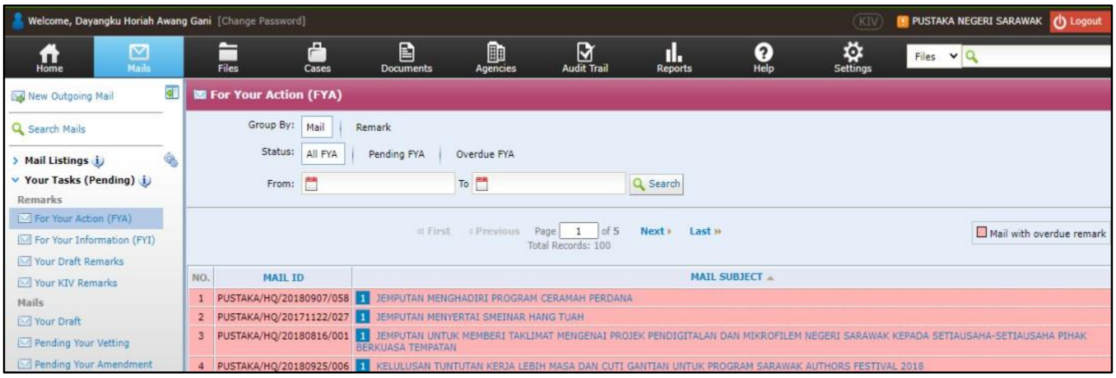

Plate 2.10 "For your action" by the officer concern

This feature serves as a dedicated tasks requiring immediate user attention and action. It provides detailed metadata for each document, including submission dates, deadlines, workflow statuses, and associated comments or instructions.

Plate 2.11 "For your Information" to inform the officer concern

"For your information" in this EDMS allows presenting a curated list of items, such as information of documents "for your action" by the subordinate, awaiting review, approval, or further processing, ensuring that critical tasks are not overlooked.

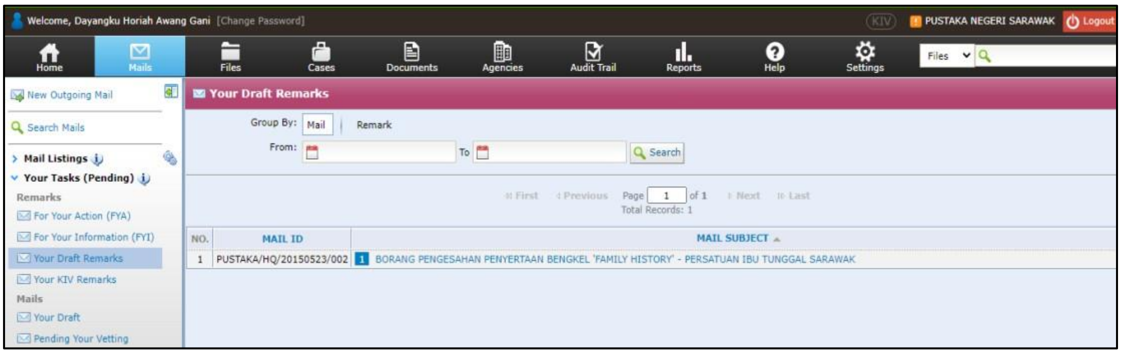

Plate 2.12 "Your draft remarks"

This feature in EDMS is associated with specific documents, indicating their draft status, the user responsible for the document, and any pending actions. It enables the user to track changes and revisions made to the document before it is officially routed.

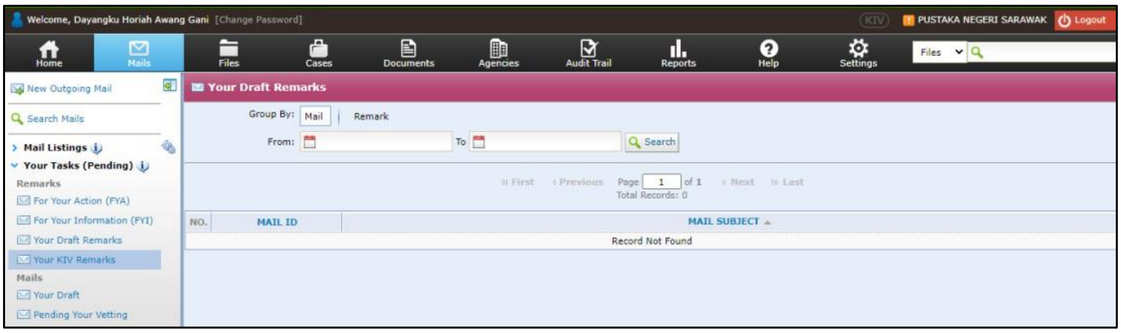

Plate 2.13 "Your KIV remarks" on any action that have not been taken by the designated officer

"Your KIV remarks" refers to where the documents are temporarily held for review or action at a later date. It may require further action, clarification, or follow-up but are not yet ready to finalization or action.

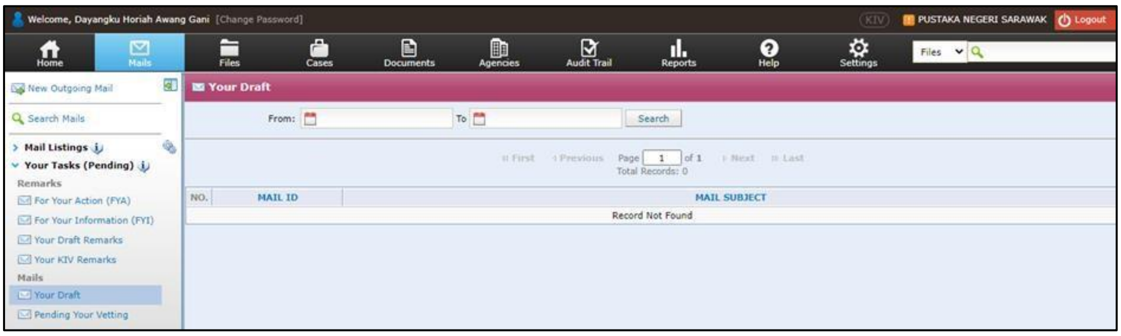

Plate 2.14 “Your draft” the letter drafted by the designated officer

“Your draft” provides users with a dedicated space to create, edit, and store documents in the preliminary stages before they are finalized, reviewed, or formally submitted for approval.

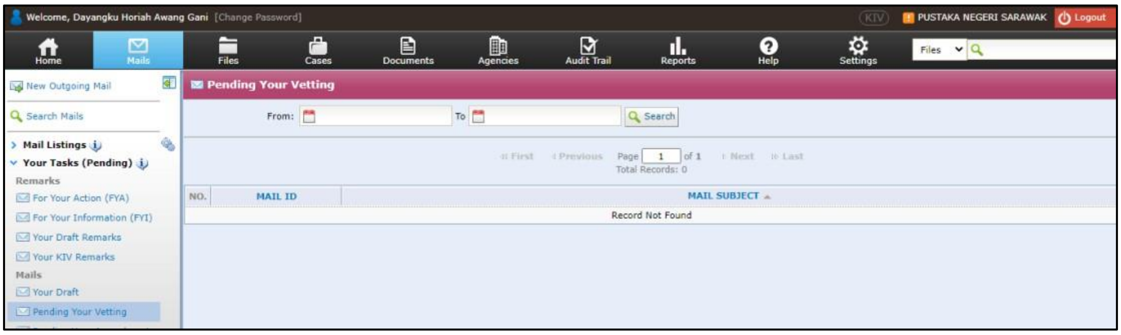

Plate 2.15 “Pending your vetting” is the drafted letter send for verification

“Pending your vetting” refers to where documents are placed for a superior officer to review and to approve before they are forwarded to the next stage of the workflow.

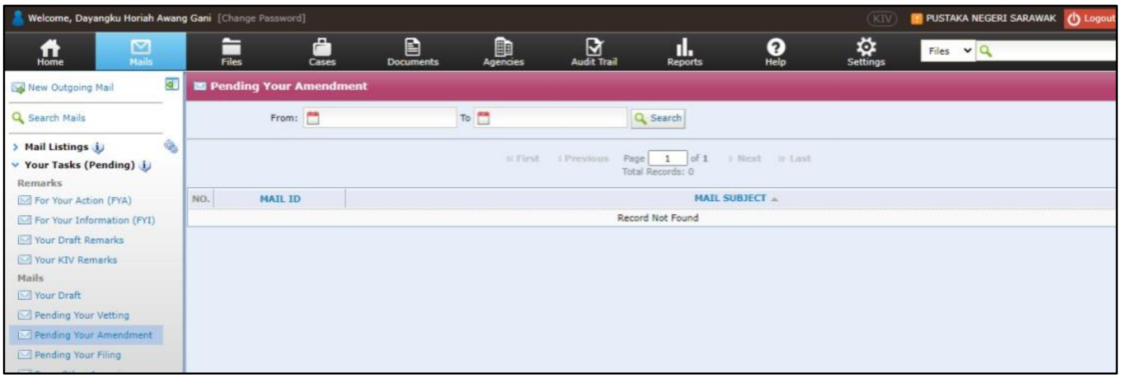

Plate 2.16 “Pending your amendment” is the draft send to the officer for further amendment

Pending your amendment refers to a specific status assigned to a document that requires revisions or modifications before they can proceed further.

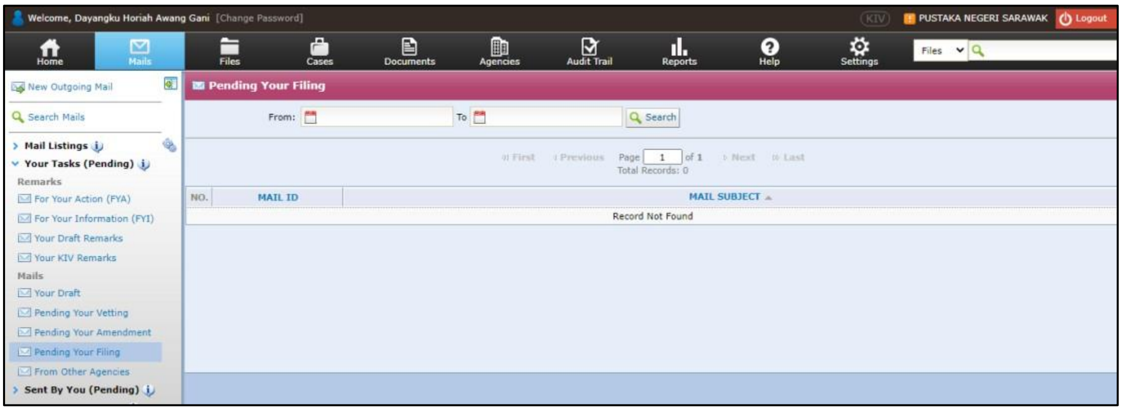

Plate 2.17 “Pending your finding”

Pending your filing refers to a specific task assigned to the register officer for final organization and categorization before they are officially stored in the system. This include selecting the appropriate classification codes, defining retention schedules, and determining access controls, folder placement, and archiving procedures.

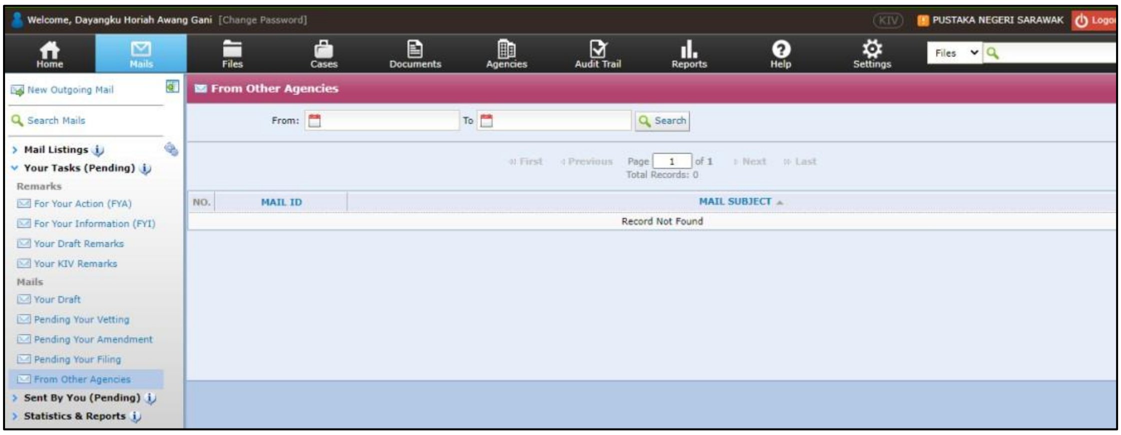

Plate 2.18 “From other agencies”

From other agencies refers to a document originating from external or inter-agency sources that are stored and managed with the system, that identifies the originating agency, the document type, the date of receipt, and any associated instructions or action items.

Plate 2.19 "Pending response from others (FYA)"

Pending response from others (FYA) indicates that the document has been circulated to the relevant officers for their input or decision.

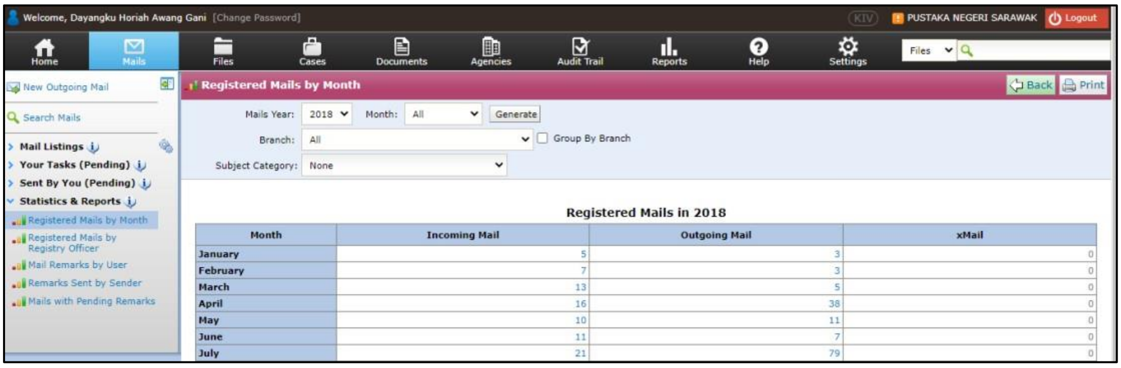

Plate 2.20 Statistics and Reports

Statistics and reports indicate system usage, document flow, user activity, and other operational metrics to generate reports that offer insight into efficiency, effectiveness, and compliance of document handling within the organization.

2.8 CACTUS (Correspondence and Case Tracking Unified System) and Functional Architecture

The Sarawak state government has implemented the Correspondence and Case Tracking Unified System (CACTUS) as its primary electronic document management system (EDMS) to manage official correspondence, track cases, and improve administrative workflows. While CACTUS provides functionalities such as document tracking, workflow automation, secure access, and report generation; several challenges have been observed in its practical application. These include inconsistencies in system performance across department, difficulties in retrieving and sharing information, gaps in user adoption, and limitations in evaluating overall system effectiveness.

Additionally, there is a lack of comprehensive frameworks to assess CACTUS's performance against organizational needs, leading to theoretical, practical, and empirical gaps in understanding its effectiveness. These issues collectively highlight the need for systematic research to evaluate CACTUS, identify areas for improvement, and ensure that its functionalities fully meet the operational requirements of Sarawak government agencies.

2.8.1 Automated Information Capture

The process of automated information capture in a Correspondence and Case Tracking Unified System (CACTUS) involves the methodical incorporation of technology to simplify the process of collecting, documenting, and overseeing information. This advanced system utilizes automation to extract and input pertinent data from diverse sources, such as emails, papers, or other types of communication, into a centralized platform specifically intended for tracking and managing cases.

The essential elements of this process comprise optical character recognition (OCR) technology, natural language processing (NLP), and other sophisticated data extraction techniques. These technologies cooperate to recognize, analyse, and classify information, enabling the effective conversion of papers and correspondence into digital format.

Practically, when the system receives new information or communication, it automatically scans and gathers relevant details with the assistance of registry staff. This ensures that the unified platform is populated with accurate and current data. This not only decreases the amount of work required for human data entry but also lessens the likelihood of errors that are typically connected with manual input.

Moreover, the implementation of automated information capture improves the overall efficiency of the Correspondence and Case Tracking Unified System by expediting the retrieval of pertinent information during case settlement or analysis. Consequently, there are better decision-making processes, heightened workflow productivity, and a more efficient and prompt method of managing correspondence and cases within the integrated system.

2.8.2 Federated Search and Retrieval

Federated search and retrieval in a Correspondence and Case Tracking Unified System (CACTUS) is an advanced method of retrieving information. This is generally accepted in the research by Diaz et al. (2010) that mentioned federated search and aggregated search techniques in EDMS are crucial for information retrieval, integrating non-web content into web search results, and addressing unique challenges and opportunities in diverse environments. This allows for a comprehensive perspective on pertinent data related to correspondence and case management. The federated search feature allows for immediate updates, ensuring that those using it obtain the most current and pertinent information. The federated search feature allows for real-time updates, ensuring that users may retrieve the most current and related information. The system facilitates advanced search queries, enabling users to customize their search criteria according to specific issues, keywords, or metadata linked to correspondence and case information.

However, the federated search ensures that users can only access information for which they obtain the required authorizations. This functionality has also been reported in the research by Casarosa et al. (2013) that the EDMS system utilizes federated search capabilities to access and retrieve information from all mails, files, and cases of all branches, but cannot add, edit, or delete information within each of the modules. The information that has been obtained is displayed in a cohesive manner within the Correspondence and Case Tracking system, offering a unified perspective of data from various sources. Prior to that, the user interface is designed to ensure a user-friendly experience, enabling users to easily explore and engage with the federated search functionalities.

2.8.3 Collaboration Tools

The utilization of collaboration tools inside a Correspondence and Case Tracking Unified System (CACTUS) is essential for effective communication, teamwork, and knowledge exchange among users engaged in correspondence and case management. These tools are designed to enhance collaboration by providing a centralized platform where participants can interact, share information, and collectively contribute to the resolution of cases. The real-time communication feature in CACTUS facilitates prompt and direct connection among team members, allowing for immediate sharing of information. Furthermore, the discussion on board's function offers dedicated areas for indepth discussions pertaining to certain correspondences or situations. This enables users to share relevant documents, ensures that all parties involved can have the most up-to-date information as well as tracks document versions to prevent conflicts and confusion among collaborators. Besides, it enables efficient task allocation for correspondence or case management to designated personnel or team members through the "For your action" indicator, while also automating routine tasks to ensure smooth case progression through predefined stages, accompanied by "For your information" notifications pertaining to the assigned task.

Collaboration tools include alerts for updates, which inform users about updates, or new information relevant to the cases they are involved in. They also have deadline reminders, which send timely notifications via email for upcoming deadlines and milestones within the correspondence or case lifecycle. The Permission Settings of collaboration tools enable administrators to control access levels, ensuring that users are only permitted access to document pertinent to their roles in correspondence and case management. By incorporating these collaboration tools functionalities, a Correspondence and Case Tracking Unified System can optimize teamwork, streamline processes, and enhance the overall effectiveness of managing correspondence and cases.

2.8.4 Hierarchical File Indexing and Classification

The Hierarchical File Indexing and Classification in a Correspondence and Case Tracking Unified System (CACTUS) encompasses several essential functionalities that contribute to effectiveness of the system. Hierarchical file indexing establishes a systematic and structured organization for documents, ensuring a clear hierarchy that reflects the relationships between different files and categories. Users gain advantages from the use of intuitive navigation systems that employ hierarchical structures of file indexing and classification. These structures enable effortless movement among folders, subfolders, and categories, hence simplifying swift access to pertinent information. Documents are organized in a hierarchical classification system, which improves the organization and clarity of information storage depending on the kind of correspondence and case-related characteristics. The hierarchical indexing system enhances search and retrieval procedures by restricting search parameters within specified categories and facilitating the location of relevant documents. Hierarchical classification facilitates the linking of metadata to files, which enables the inclusion of contextual details and improves the accuracy of document categorization.

The functionalities of Hierarchical File Indexing and Classification in the Correspondence and Case Tracking Unified System are crucial for maintaining an effective and systematic arrangement of files in the context of system quality. This structured framework not only enhances system performance, but also improves accessibility. Moreover, within the CACTUS framework, the system allows for the seamless association of metadata, a feature that significantly enriches information with contextual details, thereby contributing to the elevation of overall data quality. In terms of information quality, the classification mechanism organizes information in a systematic manner, creating a logical structure that improves the coherence and accuracy of information representation. Moreover, the system's ability to link metadata contributes to information quality by infusing contextual details, thereby enriching the overall quality of the stored information. The hierarchical structure of the classification system facilitates user-friendly navigation, streamlining the process for users to quickly find and access pertinent information. Furthermore, the system's hierarchical classification and indexing capabilities improve perceived usefulness by simplifying procedures and reducing the need for human work, resulting in a more efficient and user-friendly experience.

CACTUS also provides strong access control techniques to ensure that users are given appropriate permissions, hence enhancing User Satisfaction. This not only improves security, but also greatly helps to user satisfaction by offering a sense of control and ensuring data integrity. Furthermore, the system incorporates an intuitive and user-friendly interface, enhancing user satisfaction by improving the accessibility and usability of the platform. The synergistic impact of these functionalities yields a system that not only fulfils, but also goes beyond user expectations, cultivating a favourable and gratifying user experience

2.8.5 Storage and Archival Method

The functionalities embedded in the Storage and Archival Method within a Correspondence and Case Tracking Unified System are essential for improving the overall effectiveness of the information system in various aspects, including information quality, system quality, perceived usefulness, and user satisfaction. The storage and archival method's functionalities provide a systematic organization of documents, enhance coherence and facilitate accurate representation, enhance data and make a substantial contribution to the overall excellence of the stored data and link metadata, hence add to information quality in CACTUS. The functionalities of storage and archival method used in CACTUS enhances the system's effectiveness in terms of system quality. CACTUS ensures the protection of sensitive information by efficiently reducing the dangers of unauthorized access. It employs digital preservation strategies to preserve documents from deterioration over time. This ensures continuous accessibility of the documents that may require to use methods such as file format migration, emulation, or other techniques. Functionalities on storage and archival method also allows the system to adhere to relevant legal and regulatory requirements governing document retention, privacy, and security. The system also allows audits and inspections of the document storage system to ensure compliance with archival standards or method. CACTUS also implements duplicative storage systems and establishes routine backup protocols to minimize the potential for data loss resulting from hardware malfunctions, catastrophic incidents, or unanticipated circumstances.

The automated workflow functionalities within CACTUS contribute to improving the overall effectiveness of the information system across various dimensions, including information quality, system quality, perceived usefulness and user satisfaction. According to Pho and Tambo (2014), automated workflow in EDMS can contribute to organizational learning, precision of documentation, and cross-organizational collaboration, hence improving IMS effectiveness. In CACTUS, automated workflows enforce standardized and structured process for handling correspondence and case tracking. Consistency in handling data according to set criteria enhances information quality. Workflow automation frequently has integrated validation checks, which decrease the probability of errors and ensure the precision and dependability of the information within the system. Automated workflows improve the information quality by speeding up task processing, reducing the risk of obsolete or incorrect information in the system. The automated workflow optimizes operations, improving system quality by increasing efficiency and ensuring consistency in the performance of duties connected to communication and case tracking. The functionalities of automated workflow processes in CACTUS encompass the functions of monitoring and reporting. This feature offers immediate access to the current state of activities and processes, enabling users and administrators to take proactive action that contributes to the system quality. Automated workflows can be configured to enforce compliance with regulatory standards and organizational policies. This ensures that processes are consistently executed according to established guidelines, contributing to higher system quality and compliance with standards.

By providing real-time updates, a user-friendly interface, effective task prioritization, and a reduction in manual workload, the automated workflow functionalities in CACTUS improve perceived usefulness. This allow automated document workflow functionality or method improve efficiency and provide advantages in document management for various stages (Tursunaliogli, 2021). Therefore, implementing automated workflows often result in improved user satisfaction. Users benefit from a leaner, more efficient work environment that reduces the frustration associated with manual, timeconsuming tasks and increases overall satisfaction with the information system. Thus, high automated workflow can achieve high efficiency and accuracy and continuously find and improve problems in actual operation (Yu et al., 2021).

2.8.6 Security and Audit Trail

The Security and Audit Trail functionalities within CACTUS are essential in determining the system's information quality, system quality, perceived usefulness and user satisfaction. Security functionalities, such as access controls and encryption, contribute to maintaining the integrity of information within the system. Audit trail in database systems are crucial for identifying harmful actions and ensuring data integrity, with commercial tools offering various features to enhance security (Roratto & Dias, 2014). These measures ensure that only authorized users have access to sensitive data, preventing unauthorized modifications and safeguarding against data tampering. Meanwhile, audit trail functionalities in CACTUS provide a detailed record of user activity within the system. This traceability improves accountability, transparency, and the ability to identify unauthorized or suspicious actions.

CACTUS is also able to assist the organizations demonstrate compliance with data protection regulations through its security and audit trail functionalities. The detailed user activity logs can be presented as evidence in regulatory audits and demonstrate the system's commitment to secure and compliant data management. Through the provision of information about system access, actions taken, and when these actions occurred, this traceability fosters accountability. Early detection of unusual or suspicious activity within the system is made possible by CACTUS's Security and Audit Trail functionalities. Hence, Security and Audit Trail features to ensure that CACTUS aligns with industry standards and compliance requirements.

Nonetheless, security and audit trail functionalities in CACTUS contribute significantly to the perceived usefulness of the system as users trust that their data are wellprotected. Users also understand over their interactions with the system, enhancing its perceived usefulness. Knowing that their information is secure, it enhances user satisfaction with the system. Users benefit from CACTUS as it can identify and handle security incidents fast, which increases user satisfaction. By holding users accountable for their actions within the system, the Audit Trail functionalities empower users. User satisfaction is influenced by this sense of accountability. User satisfaction found that CACTUS prevents unauthorized access to sensitive information, thus contributing to a positive user experience and satisfaction within the system.

2.8.7 Support Administer Compliance

Supporting compliance within CACTUS significantly enhances the information quality of the Electronic Document Management System (EMDS). Support administer compliance within CACTUS ensures that the system aligns with relevant industry standards. Thus, this contributes to information quality by maintaining consistency with established guidelines and its functionalities. CACTUS with robust compliance administer support, facilitates the documentation of processes and procedures that contribute to information quality by providing standardized functionalities and structured approaches to handling documents in the system. The functionalities of version control and audit trails contribute to information quality by providing transparent records of documents changes, ensuring accuracy, and facilitating traceability.

Support administer compliance also involves implementing measures to ensure data integrity, preventing unauthorized modification, or tempering that supports safeguarding the accuracy and reliability of documents stored within the EDMS. Support administers compliance functionalities in CACTUS also incorporate automated workflows specifically designed to handle compliance-related processes. With support administers compliance, functionalities also have the features of monitoring and regular audits activities. This functionality ensures the EDMS consistently meets compliance standards.

Support and administer compliance within CACTUS also contributes to the system quality of the Electronic Document Management System (EDMS). The compliance within CACTUS ensures that the EDMS aligns with relevant regulatory requirements and industry standards by ensuring proficiency in managing controlling electronic documents up to the standards essential for legal admissibility and be capable of demonstrating this compliance. Compliance support involves the implementation of structured document management processes within CACTUS. This structured approach contributes to system quality by ensuring consistent and organized handling of documents, promoting efficiency and reliability.

Administering compliance also includes features such as version control and audit trails within CACTUS. These functionalities contribute to system quality by providing a transparent record of document changes, ensuring data accuracy, and facilitating traceability for system quality. Compliance administration incorporates measures to ensure data integrity, preventing unauthorized modifications or tampering. These measures contribute to system quality by safeguarding the reliability and accuracy of information stored within the EDMS. Compliance support in CACTUS also includes access controls. These measures contribute to system quality by protecting sensitive documents, controlling access, and preventing unauthorized users from compromising the security of the system. CACTUS also integrates automated workflows for compliance-related processes to system quality by ensuring that compliance tasks are executed consistently and timely.

Support and administer compliance within CACTUS greatly enhance the perceived usefulness of the Electronic Document Management System (EDMS). Users perceive the system as more useful when they can trust that it aligns with legal requirements, fostering a sense of reliability. CACTUS's structured approach enhances the perceived usefulness by providing users with a systematic and organized means of handling documents, improving efficiency and ease of use. The support and administer compliance functionalities contribute to perceived usefulness by offering users transparency into document changes, ensuring data accuracy, and facilitating traceability for quality assurance. Compliance administration ensures data integrity within CACTUS. Users perceive the system as more useful when they can rely on the accuracy and reliability of the information stored, supporting their decision-making processes. Users perceived the system more useful when it includes strong security measures access controls in CACTUS that access is restricted to authorized personnel only.

Support and administer compliance functionalities contribute to user satisfaction in CACTUS. CACTUS ensures strict adherence to regulatory standards. User can trust that the EDMS aligns with safeguarding information and ensuring legal compliance. Users find satisfaction in the system's efficiency, as it provides an organized and systematic approach to handling documents, reducing time and effort required for document-related tasks. CACTUS is offering transparency into document changes and providing a clear audit trail, which instils confidence in the accuracy and reliability of the stored information. Users can rely on the integrity of the information, contributing to their trust in this EDMS. User's satisfaction with CACTUS is further elevated by the commitment to continuous improvement, ensuring their contentment as the system undergoes regular evaluation and updates to align with evolving compliance standards.

Thus, support and administer compliance within CACTUS contributes to the information quality, system quality, perceived usefulness and user satisfaction of Electronic Document Management System. These elements contribute to enhancing the user experience, improving the functionality of the Electronic Document Management Systems (EDMS), and effectively addressing the needs of users within the Sarawak government.

2.9 Sarawak and the evolution of Electronic Document Management System

2.9.1 State of the Art in Sarawak's Digital Development

The concept of state-of-the-art refers to the most advanced stage in the development of products or systems, incorporating the latest technologies, ideas, and features available at a given time. In Sarawak, the state-of-the-art in digital development is evident in the government's strategic shift from basic digitisation towards innovation-driven, platform based, and future-ready systems. This shift is strongly aligned with the Post COVID-19 Development Strategy 2030 (PCDS2030), which emphasises on digital government, innovation, and data-driven decision-making (Government of Sarawak, 2021).

One of the most significant indicators of this transition is Sarawak's strategic positioning in AI and the digital economy. Platforms such as the International Digital Economy Conference Sarawak (IDEC25) have highlighted the state's emphasis on ethical AI, sustainable digital growth, and public sector innovation. The launch of SarawakPass, an AI-driven digital identity platform, provides a centralised gateway for secured government and public services, demonstrating a state-of-the-art approach to digital governance through integrated authentication and access management.

Cloud and digital infrastructure investment further reinforces Sarawak's readiness for advanced digital systems. Global technology firms such as Amazon Web Services (AWS) have invested in Sarawak's digital ecosystem to support public sector innovation and cloud services, strengthening the state's capacity to deploy scalable, resilient, and interoperable platforms. These developments are critical for enterprise systems that manage large volumes of digital information, including Electronic Document Management Systems (EDMS), requiring stable and reliable infrastructure to support government operations.

The next generation connectivity and smart networks also contribute to the stateof-the-art environment. Collaborations with technology providers such as ZTE and Sacofa have enabled the adoption of intelligent, sustainable, and high-capacity broadband and network infrastructures. Such networks support data-intensive digital services, crossagency workflows, and the integration of multiple government platforms, thereby facilitating the implementation of modern public sector information systems.

Simultaneously, Sarawak has advanced into AI hardware and semiconductor innovation. The development of locally designed AI-enabled chips and devices, including KETEQ AI, and strategic partnership to grow the semiconductor industry, reflect a shift from technology adoption to technology creation. This capability indicates Sarawak is building a robust technological ecosystem capable of supporting sophisticated digital systems and advanced public sector applications.

A central component of Sarawak's innovation ecosystem is the Sarawak AI Centre (SAIC). SAIC is a government-owned initiative established to drive AI adoption and position Sarawak as a regional leader in AI technology. It operates through strategic partnerships with academic institutions, industry leaders such as Sarawak Information System (SAINS), and other government entities. The centre supports AI research, talent development, and practical application across public sectors, including areas such as land management, predictive analytics, and smart infrastructure planning. SAIC exemplifies the state's commitment to systematic, institutionally governed digital innovation.

Recent developments, such as the introduction of AI-enabled technologies, digital identity platforms, and innovation ecosystems, indicate that Sarawak has entered a mature phase of digital transformation. At this stage, digital systems are no longer implemented merely to replace manual processes but are expected to create value, enhance governance, and support long-term sustainability. Within this broader digital ecosystem, enterprise systems deployed in the public sector, including Electronic Document Management Systems (EDMS), representing a critical yet often less visible dimension of state-of-the-art development.

Collectively, these developments demonstrate that Sarawak digital environment has progressed beyond basic digitisation towards a state-of-the-art phase characterised by integration, scalability, innovation readiness, and institutional support. This environment provides the contextual foundation within which government information systems, including EDMS, must operate and be evaluated.

2.9.2 EDMS as a State-of-the-Art Digital System in the Sarawak Public Sector

Traditionally, EDMS implementations in the public sector focused on document storage and retrieval. However, in the current phase of Sarawak's digital transformation, EDMS has evolved into a strategic information system that supports core government functions. This evolution reflects a shift from viewing EDMS as a supporting administrative tool to recognising it as a foundational digital platform for governance, accountability, and service delivery.

In Sarawak, EDMS is implemented as a mandatory system across government agencies, embedding digital records creation, workflow processing, and audit trails into daily operations. This mandatory and enterprise-wide deployment signals that EDMS in Sarawak has reached a mature and state-of-the-art stage of development, characterised by system integration, institutionalisation, and continuous enhancement. Such characteristics align with contemporary views that modern digital systems must function as platforms rather than isolated applications (Saba et al., 2025).

2.9.3 Incorporation of New Ideas and Features in EDMS

Although EDMS in Sarawak may not yet incorporate advanced technologies such as artificial intelligence at the same level as emerging hardware innovations, it embodies the state-of-the-art development through its design philosophy and functional capabilities. Modern EDMS incorporates automated workflows, structured metadata, access control, and compliance mechanisms that support efficient information governance. These features enable agencies to manage increasing volumes of digital records while maintaining accountability and regulatory compliance.

Furthermore, EDMS generates high-quality, structured organisational data that can potentially support future analytics and intelligent services. In this sense, EDMS serves as an enabling infrastructure for Sarawak's broader digital ambitions, including data-driven governance and AI-ready public administration. Without reliable and well managed digital records, advanced technologies risk operating without trustworthy informational foundations.

2.9.4 EDMS and Perceived Usefulness in a State-of-the-Art Context

In the context of mandatory government systems, success is increasingly evaluated not by voluntary adoption but by the system's perceived usefulness in supporting users' job performance. Seddon (1997) respecification of the DeLone and McLean model highlights perceived usefulness as a key outcome of system quality, and information quality. This perspective is particularly relevant in Sarawak, where EDMS usage is institutionally mandated.

For government officers, the usefulness of EDMS is reflected in its ability to facilitate daily work processes, reduce document handling time, support decision-making, and ensure accountability. As Sarawak advances towards a more sophisticated digital government environment, the perceived usefulness of EDMS becomes a critical indicator of whether the system genuinely contributes to effective governance rather than merely fulfilling compliance requirements.

2.9.5 Pending EDMS within Sarawak's State-of-the-Art Digital Ecosystem

While highly visible innovations such as AI-based products and digital platforms often dominate discussions of state-of-the-art development, foundational systems like EDMS play an equally important role. EDMS underpins the credibility and sustainability of digital government initiatives by ensuring that decisions, transactions and services are supported by reliable and authentic record.

Therefore, EDMS in Sarawak represents a state-of-the-art digital system within the governance domain, that has progressed beyond initial adoption to a stage of institutional integration and strategic importance. Its effectiveness and perceived usefulness directly influence the success of broader digital transformation efforts envisioned under Sarawak's development strategies.

2.9.6 Implication for Electronic Document Management System (EDMS)

Within Sarawak's state-of-the-art digital ecosystem, EDMS assumes increased strategic importance. Advanced technologies, AI-driven services, cloud infrastructure, and integrated connectivity depend on reliable, authentic, and well-managed digital records. EDMS functions as a core information platform that underpins trust, accountability, and continuity in government operations.

Furthermore, as digital government advances through institutions such as SAIC and cloud-enabled platforms, the perceived usefulness of EDMS becomes a critical success factor. Officers rely on EDMS not only for document storage, but also to support efficient workflows, decision-making, regulatory compliance, and governance. Therefore, EDMS is central to the success of Sarawak's broader digital transformation initiatives and reflects the integration of state-of-the-art technologies into public sector information management.

2.10 Synthesis of Literature and Research Gap

Despite Sarawak's rapid advancement in digital infrastructure, AI adoption, cloud services, and integrated platforms, remain limited in empirical research; examining how foundational government systems, particularly Electronic Document

Management Systems (EDMS), perform within this state-of-the-art environment. While initiatives such as SarawakPass, cloud-enabled services by AWS, intelligent networks with ZTE and Sacofa, and the establishment of the Sarawak AI Centre (SAIC) demonstrate the state's readiness for advanced digital transformation; the extent to which EDMS supports daily government operations, accountability, and decision-making remains underexplored.

Most existing studies focus on visible, high-profile innovation such as AI devices, smart infrastructure, or digital identity platforms, often neglecting the critical backbone role of EDMS in enabling these technologies. Without reliable, accessible, and efficiently managed records, the benefits of AI, cloud computing, and integrated networks cannot be fully realised, as digital services require trustworthy and structured information to operate effectively.

Furthermore, while the DeLone and McLean (2003) model dan Seddon's (1997) Information Systems Success Model emphasise perceived usefulness as a key indicator of system success, little research has examined how EDMS is perceived by government officers within the context of Sarawak's advanced digital ecosystem. Specifically, the interplay between system quality, information quality, and perceived usefulness of EDMS in a cloud-enabled, AI-supported, and highly connected government environment remains under-investigated.

This gap highlights the need for empirical study to assess EDMS effectiveness, not merely in terms of adoption or compliance, but through perceived usefulness, which captures the system's practical value in supporting work processes, governance, and strategic decision-making. Addressing this gap contributes to both theory and practice by validating information system success models in a state-of -the-art public sector context and informing the optimization of EDMS in Sarawak's ongoing digital transformation initiatives.

2.11 Chapter Summary

This chapter provides a review of the study. The overview of the Electronic Document Management System is presented in the early part of Chapter Two. The definition, purpose, function, component, advantage, and limitation were also discussed. Further discussion included in terms of evolution, development, the system development life cycle (SDLC), functional and non-functional requirements, its effectiveness and acceptance, as well as the use of EDMS in CACTUS. The last component of the literature review is a discussion of Sarawak state-of-the-art prior studies on the functionalities and effectiveness of EDMS functionalities of Electronic Document Management Systems, and also Information System Effectiveness.

CHAPTER 3
THEORETICAL FRAMEWORK

3.1 Introduction

The measurement of Information Systems (IS) success has been a subject of significant interest among researchers and has constituted a prominent area of study over the past three decades. Over the years, many theories and models were developed based on Information System Success Model in various fields of studies. However, not many have been done in regard to electronic document management system which is now being popular in the e-government initiatives. Thus, limited theories and models are used to guide the researcher in shaping the study and answering its objectives. The aim of this research is to investigate the perceived effectiveness of EDMS functionalities and their relationship with information quality, system quality, perceived usefulness, and satisfaction. With that, Chapter Three presents in details the underpinning theories and models, making sense of each dimension and the development of the proposed theoretical framework to accomplish this study.

3.2 Development of the Proposed Theoretical Framework

The theoretical framework serves as the structure that supports and anchors the theory underlying research (Swanson & Chermack, 2013). A theoretical framework consists of theories expressed by experts in the field in which they intend to conduct research, which to be used by researcher for a theoretical coat hanger for data analysis and findings interpretation. Commenting on Swanson and Chermack (2013), Kivunja (2018) added that the theoretical framework is a structure that summarizes concepts and theories that researcher has constructed from previously tested and published knowledge and has synthesized to provide a theoretical background, or foundation, for data analysis and interpretation of the meaning contained in the researcher's study data. A broader perspective has been adopted by Ravitch and Riggan (2016) who defined theoretical frameworks and the relationship between theoretical and conceptual frameworks as an argument which establishes the importance of an intended audience for the study and demonstrates alignment among research questions, data collection, and data analysis, as well as the use of rigorous procedures to conduct study.

The process of the development of the conceptual framework may involve several steps. In the context of this study, the researcher had adopted Sekaran (2013) and Adom et al. (2018) as a guide to develop the proposed framework. The summary of both experts' processes, include: 1) determining the proposed framework's definition of the concept or key variable; 2) constructing or drawing out a conceptual framework pertinent to the subject area; 3) considering the possibility of a dimension relating to the primary variable and 4) providing theories for the relationships contained within the proposed framework.

3.3 Underpinning Research Theories and Models

Internet growth, trade globalization, and rising information economies have highlighted the importance of information systems for organizations including government sector. In response to the growing interest in studies on information system success, numerous theories, models, and frameworks have been developed, all focusing on the success and effectiveness of information systems. However, according to Lowry, Karuga et al. (2007), Urbach and Müller (2011) as well as Urbach et al. (2009), a vast number of research publications use the D & M IS Success Model as their theoretical foundation. This is also supported by Seddon (1997) whose model elaborates and clarifies features of the Delone and Mclean model, so effectively integrating core theoretical relationship outlined in the IS success literature. This is also acknowledged by the model's creators, Delone and McLean (2003), that stated the model's widespread use is compelling proof of the need for a complete framework in order to integrate IS research findings. For decades, this theory has been considered one of the most reliable theories for information system success studies.

This study has adopted an integrated theoretical framework based on DeLone and McLean’s (2003) IS Success Model and Peter Seddons’ (1997) IS Success Theory to examine the effectiveness of the electronic document management system (EDMS) in the Sarawak state government. The DeLone and McLean model provides a comprehensive approach to assessing information system success through dimensions such as system quality, information quality, and user satisfaction. Seddon’s model complements by distinguishing between system use and system success, highlighting the importance of perceived usefulness, which is particularly relevant in government agencies where the use of systems is often mandatory. While these models offer robust ftrameworks, they have inherent limitations when applied to public sector EDMS. Both models are originally developed for general information systems contexts and may not fully capture the specific administrative processes, governance requirements, and compliance considerations inherent in government operation. Additionally, the models rely heavily on user perceptions, which can be influenced by experience, familiarity with the system, and resistance to change.

As for this study, the proposed conceptual framework focusses on the functionalities of electronic document management system and the variables such as information quality, system quality, and user satisfaction and perceived usefulness from the information system success models. Thus, in the context of this study, the underpinning model and theories for this study are an individual level of performance and should be aligned with the objective of the study. Modifications were made to meet the study's objectives and to ensure that the conceptual framework proposed can develop strong instruments for data collection. Drawing upon the theoretical explanations outlined above, Information System (IS) researchers have developed various models to examine the effectiveness of IS. The models referenced in the construction of the theoretical framework for this study include: the Information System Success Model by DeLone and McLean's Model (1997), the Updated DeLone and McLean Information System Success Model (2002), Gable et al.'s IS-Impact Model, and the Integrated Success Model (ISM). Although the six traditional dimensions of the Delone and McLean IS Success Model remain conceptually valid, their operational definitions and measurement indicator must be reinterpreted to reflect the characteristics of modern digital systems, including AI-enabled functionalities, big data environments, and platform-based architectures (Saba et al., 2025).

In Sarawak public sector, the state-of-the-art in EDMS implementation is therefore not defined by the adoption of digital technology alone, but by redefinition and measurement of IS Success dimensions in ways that reflect intelligent systems, platform integration, mandatory usage environments, and long-term governance objectives. While the six DeLone and McLean dimensions remain relevant, their evaluation must evolve to capture perceived usefulness, user satisfaction, system quality, information quality, consistent with contemporary IS Success theory and public sector digital transformation goals.

3.3.1 Information System Success by DeLone and McLean (1992)

Previous IS research has study different points of view on Information System Success. There have been numerous models and frameworks being recommended and tested in a variety of IS implementation settings, and DeLone and Mclean IS Success were among the first researchers to develop a comprehensive model for IS success. It is believed that this model was also understood as theory in information system success studies. The model was developed based on the work of Shannon and Weaver (1949) as well as Mason (1978). According to Delone and McLean (1992), the measurement of success is critical in order to understand the value of IS management actions and IS investments. However, IS success being a multi-dimensional concept, could be measured at multiple levels that diverse perspectives on the success of the same information system. A few examples are product developers may value technical success, end-users' easiness of use, managers increased revenues gained using IS or measure the functionalities of information system such as EDMS. This concept is also described by Shannon and Weaver (1949) in their Theory of Communication, where they defined the technical level of a communication system in terms of its accuracy and efficiency. This, in turn, produces the semantic level, which reflects the success of the system and the impact of the information-on-Information Systems (IS) Success. As a result of this, Delone and Mclean created a taxonomy of IS success. Thus, six dimensions of IS success measurement were identified as the following: (1) System Quality (technical level); (2) Information Quality (semantic level); and (3) Use, (4) User Satisfaction, (5) Individual Impact, and (6) Organizational Impact (influence level) with purpose, to be a framework for measuring different dependent variables in IS research.

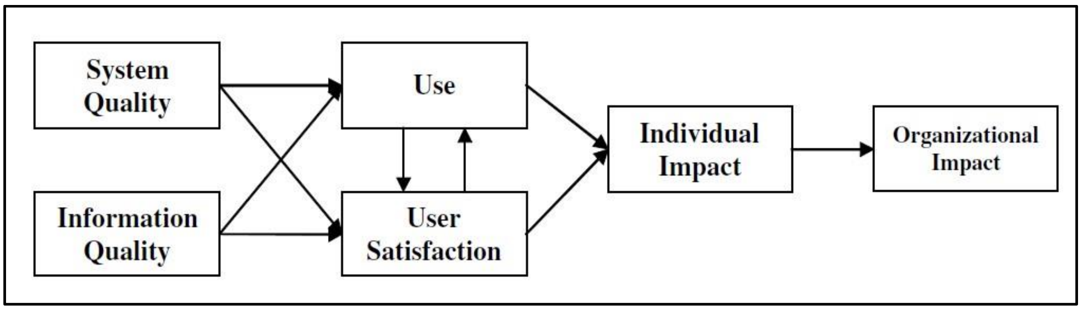

Figure 3.1 DeLone and McLean IS Success Model (1992)

3.3.2 The modified Seddon Information System Success Model (1997)

Seddon aimed to refine and extend the original model of DeLone and Mclean IS Success Model (1992) by doing some modifications in 1994 with Kew and another modification in 1997. Seddon and Kiew (1994) developed Respecified Version of DeLone and McLean (1992) Model of Information System Success which posits to indicate the user satisfaction and perceived usefulness to the notion of Net Benefits than other measures in this model. Seddon (1997) modified DeLone and Mclean Model in view of theoretical considerations. Seddon incorporated an extra construct of perceived usefulness from TAM (Davis, 1989) and constructed a modified model that contained three types of variables: assessments of information and system quality; system use as behaviour; and general measures of net benefits from system use.

According to Seddon and Kew (1994), having user involvement in an IS success model is critical. However, according to Seddon (1997), one of the model's variables, IS 'use,' has been mistakenly identified as success. The model was developed then with the consideration of IS ‘use’ could be the beginning of a process that leads to ‘user satisfaction’, ‘individual impact’, and finally, ‘organisational impact.’. The model emphasized that the use of the system is fundamental to its success. The model was created with the notion that the usage of information systems (IS) might be the beginning of a process that leads to 'user satisfaction,' 'individual impact,' and consequently, 'organisational effect.' Using the system effectively, the model highlighted, is critical to its success. Seddon then presented his respecified and extended model which eliminated the process element of the original model and divided its fundamental part into two models, as seen in Figure 3.2. Here the models are divided into two categories: a behavioural model and an IS success model, which are both linked by the concept of "effects of IS use." Both models of variance are unified by Partial Behavioural Model of “IS Use” (by the Individual, Organisational, and Societal Consequences of IS Use). This is followed by the IS Success Model by using the Partial Behavioural model of “IS Use” (from the User Satisfaction construct to the Expectations about the net benefits of future IS Use).

In the context of Electronic Document Management System (EDMS) effectiveness, Seddon (1997) conceptualized system use as a behaviour driven by the expectation of net benefits derived from using the system. Furthermore, user satisfaction is proposed to facilitate system use, which is defined as the behaviour of actively engaging with the system (Seddon, 1997). The model also illustrates that perceived usefulness is associated with individual impacts, as it is derived from several constructs that DeLone and McLean (1992) linked to individual outcomes, such as increased job productivity. Drawing on the modified Seddon Information System Success Model, this study conceptualized perceived usefulness as the primary indicator of system success rather than perceived net benefits. This approach is particularly suitable for the Sarawak public sector, where EDMS use is mandatory and organizational benefits are difficult to measure directly. In this context, a state-of-the-art EDMS is characterized by user's perceptions that the system meaningfully supports their work performance, compliance responsibilities, and records integrity.

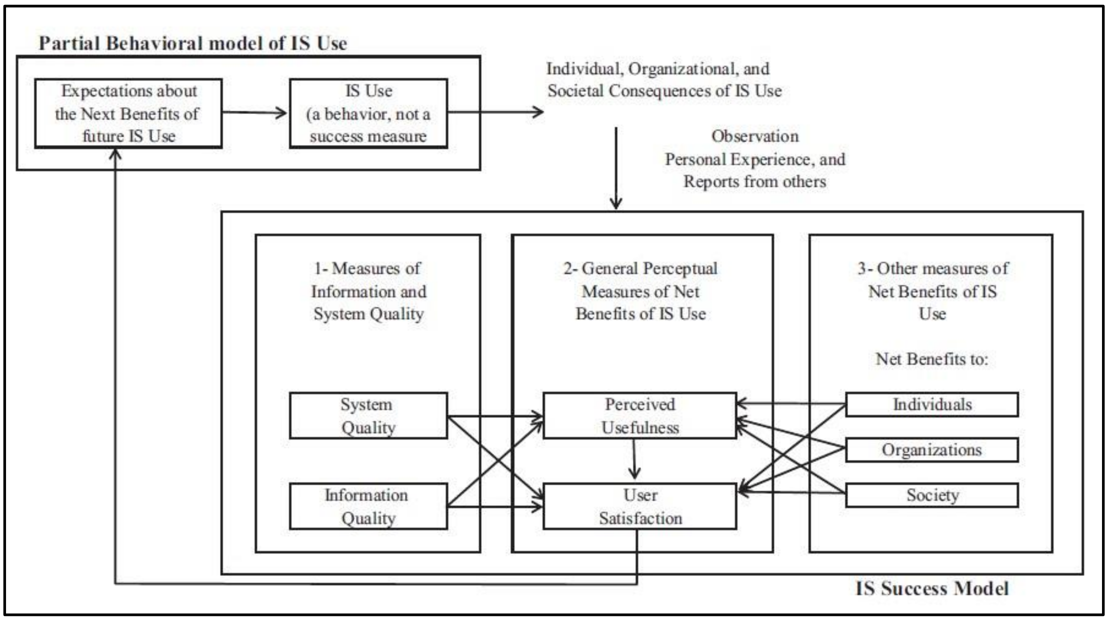

Figure 3.2 The Seddon IS Success Model (1997)

3.3.3 Information System Success DeLone and McLean (2002) – Updated Model

Since the development of the first IS Success by DeLone and McLean in 1992, various research referred to the model including that of Seddon and Kew (1997). Consequently, DeLone and Mclean decided to revise the D&M IS Success Model in 1992 (Figure 3.3) and evaluate its effectiveness considering the tremendous changes that have occurred in information technology practice, particularly the introduction and explosive expansion of e-business globally. To strengthen the dimension of information system effectiveness, this study has also adopted the updated model of IS Success by

DeLone and Mclean (2002). Based on both process and causal considerations, these six dimensions of success are proposed to be interrelated rather than independent (information quality; system quality; service quality; intent to use/use; user satisfaction; and net benefits). They proposed that the level of success achieved by an information system is determined by the quality of the system itself, the quality of its output information, that can be measured at three different levels: the technical level, the semantic level, and the effectiveness level.

Additionally, the level of usage achieved by the system, as the link between objectives concerning information are provided by the system. With this regard it integrates numerous criteria from users and provides the most useful assessment of system effectiveness, whether users are satisfied with the system, or the impact on individuals and organisations as a whole. In relation to the measuring of information system success studies, the Respecified version of DeLone and McLean (1992); as well as Model of IS Success by Seddon (1997) and Kiew (1994) had always been applied when assessing IS success in an organization and depends on the type of system that is evaluated (Urbach et al., 2009). Findings from discovered that this model was used to evaluate the effectiveness of existing EDMS which are new ways of handling business processes and serve as an information repository to facilitate knowledge management.

In addition, existing EDMSs are well-designed in terms of user satisfaction (Cho, 2008). DeLone and McLean (2016) then, published the second Information System Success in 2003, which includes arrows to show hypotheses of the study among success dimensions in a process sense but no positive or negative indicators for those associations in a causal sense. This is related to the outcome of quality of the system. Higher system quality is associated with increased user satisfaction, whereas lower system quality is correlated with dissatisfaciton (Dreheeb et al., 2016). This leads to either more users being satisfied or more user being dissatisfied with the information system assessed. In general, Information System Success had been used to assess the government systems such as electronic information exchange, electronic document management, and electronic taxation in China. The results of research by Hu and Wu (2016) revealed that the use of the system corresponds to both information quality and the system quality, and the system quality provided the greater contribution when it comes to the system's application.

In this DeLone and McLean updated model, it added a new dimension called "service quality". It also integrated the impact on individuals, organization and society

(Seddon, 1997; Tokzadeh & Doll, 1999; Delone & Mclean, 2003) into one measure "net benefit". Among the strengths of the ISSM are its parsimony and its explanation of both causal relationships and the process among the constructs and most of its propositions explaining the success of an IS are actually supported (Urbach & Müller, 2011). According to Urbach and Müller (2011), the primary differences between the original and the updated DeLone and McClean Information System Success Model are: (1) the inclusion of service quality to represent the significance of service and support in successful e-commerce systems; (2) the addition of intention to use as a measure of user attitude as an alternative measure of use; and (3) individual impact and organisational impact are combined into a more parsimonious net benefit construct. Drawing from this updated model of Information System Effectiveness by Delone and Mclean model which consists of these interrelated dimensions of IS success: information quality, system quality, and user satisfaction, were considered as measures for information system success for this study.

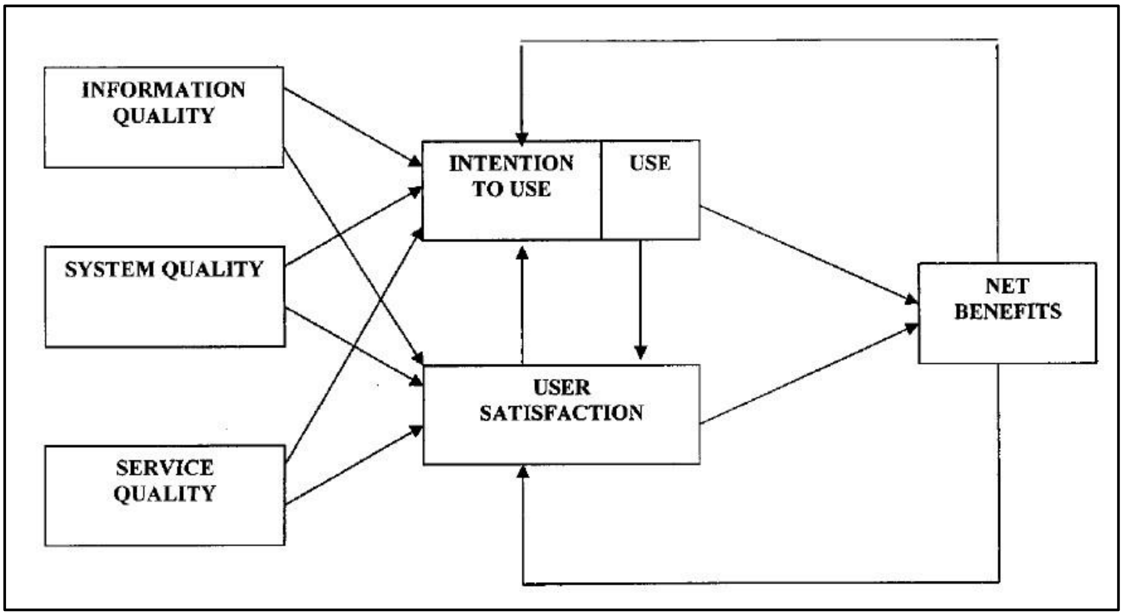

Figure 3.3 Updated Information System Success Model 4 DeLone and McLean, 2002

3.3.4 Gable et al's (IS-Impact) Model

In a recent model to measure IS success or impact is the IS-Impact Measurement Model introduced by Gable et al., (2008) who defined the IS-impact of an Information System (IS) as "a measure at a point in time, of the stream of net benefits from the IS to date and anticipated, as perceived by all key-user groups”. The IS-Impact Model, which is based on the work of Delone and McLean, has addressed many of the issues that have plagued previous IS Success models. According to Gable et al. (2003), the IS-Impact Model differs from the traditional DeLone and McLean model in several key aspects: (1) it presents a measurement model rather than a causal or process model of success; (2) it excludes the use of construct; (3) satisfaction is treated as an overall measure of success rather than a separate construct; (4) new measures were incorporated to reflect the contemporary IS context and organisational characteristics; and (5) additional measures were introduced to provide a more comprehensive understanding of organisational impacts.

The model was developed in two stages: exploratory and confirmatory. The model was created in two stages: exploratory and confirmatory. The exploratory phase included two surveys, the first of which was used to define success measures and the second of which was used to test a priory model. During the confirmatory phase, the model was validated for reliability and validity using several data sets (Rabaa'i, 2009). As for Alkhalaf et al. (2012), the IS-Impact Measuring Model has no financial implications for the success of the information system and has been used to find the issues that would be used to evaluate the IS success/impact as this model covers the maximum environment that may affect the quality of using any system. It has robust, economical, and simple dimensions and measures which produce results from several user perspectives, which are comparable across diverse systems and contexts (Gable et al., 2008). In this context, IS impact is viewed as belonging to the information system success that matches the functionalities of EDMS as the act of successful information system. The functionalities of EDMS may affect the quality of using the system and the robust usage of the system reflects the user satisfactions.

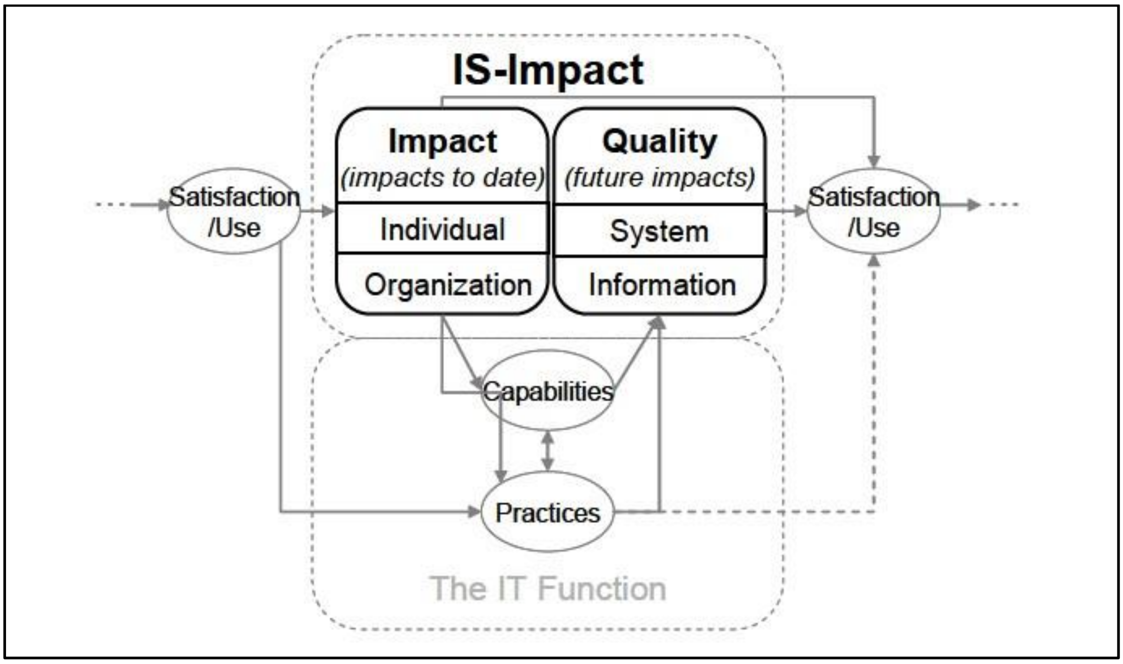

Figure 3.4 The IS-Impact Measurement Model by Gable et al., (2008)

3.3.5 Integrated Success Model (SSM)

Integrated success model (ISM) is an integrated model for assessing IS success that implies that information quality, system quality, and service quality are all tied to management support, training, and user involvement. Due to that, perceived usefulness and perceived ease of use have an impact on behaviour intention and user satisfaction. This model was created within accordance of the Technology Acceptance Model (TAM) as well as DeLone and McLean (2003) updated model. The constructs taken from DeLone and McLean model of IS success, which was originally created in 1992, then updated in 2003, are systems quality, information quality, service quality, use, user satisfaction, and net benefits. While constructs from TAM, which was introduced by Fred Davis in 1985 from his thesis at the MIT Sloan School of Management represented user acceptance of information systems. Out of these two models, ten different dimensions for measuring IS success were established. These dimensions were: information quality, behaviour intention, perceived ease of use, management support, perceived usefulness, system quality, service quality, user satisfaction, training and finally user involvement.

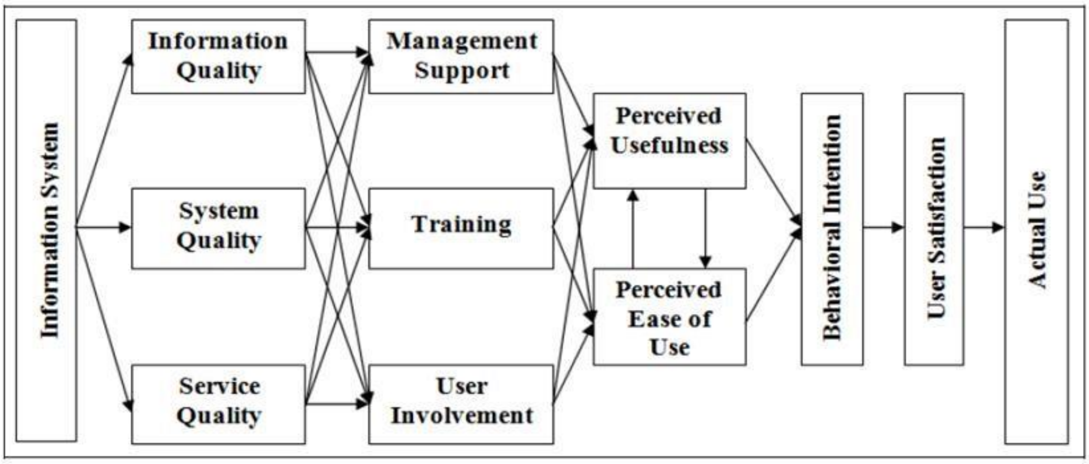

Figure 3.5 Integrated Success Model (ISM) by (Zaied, 2012)

The ISM (Integrated Success Model) assesses IS success by evaluating several key dimensions: System Quality, which focuses on the performance characteristics of the system under study; Information Quality (IQ), which is essential for the adoption of service; Service Quality, which measures how well the service delivery aligns with customer expectations; and Management Support, which refers to management approval and continuous support. The situation is not only during the IS project implementation, but also throughout the operational phase of the system. The level of training with respect to information systems has a positive relationship with implementation success; user involvement of importance and personal relevance that users attach to a given system; perceived usefulness involves an individual's perception that using the technology improves performance; perceived ease of use which an individual believes that learning to adopt a technology requires little effort, and satisfaction is the perceived discrepancy between prior expectations and perceived performance after use. In the context of this study, system quality focus on the performance characteristics of the EDMS, while the information quality for the adoption of services by EDMS, and perceived usefulness involves the user's perception towards EDMS.

3.4 The Theoretical Framework

Based on the literature, Sarawak's state-of-the-art digital ecosystem, and the modified Seddon (1997) IS Success Model, this study examined how various functionalities and quality dimensions of EDMS influence perceived usefulness, satisfaction, and overall information systems effectiveness. The research framework integrates system quality, information quality, automated functionalities, and supportive governance as antecedents of system success in the context of Sarawak's advanced digital environment.

Drawing upon the theories, framework and models discussed above, this study developed a theoretical framework as shown in Figure 3.7. The support theories are DeLone and McLean Information System Success (Information Quality; System Quality; Satisfaction) and perceived usefulness from Seddon's IS Success Model (Seddon, 1997) which represented the Information System Effectiveness. The framework is also based on the Electronic Document Management System Functionalities which cover Automated Information Capture; Federated Search and Retrieval; Collaborative Tools; Hierarchical File Indexing and Classification; Storage and Archival Method; Automated Workflow; Security and Audit Trail; as well as Support and Administer Compliance.

Studies on EDMS success exist although only few academic studies with theoretical views and empirical evidence which have focused on describing the constructs or technical components of EDMSs instead of evaluating them (Alshibly et al., 2016). However, by looking from different perspectives this study proposed a new dimension to study the relationship between Electronic Document Management System Functionalities with Information System Effectiveness to investigate the perceived effectiveness of EDMS functionalities and their relationship with information quality, system quality, perceived usefulness, and satisfaction. The proposed theoretical framework is developed based on underpinning theories and models presented in previous subtopics. A total of twelve hypothesis was established and tested in the research. Figure 3.6 shows EDMS functionalities and their relationship with Information System Effectiveness as the dimensions of information systems success measured in terms of information quality, systems quality, perceived usefulness, and user satisfaction. The details description on each dimension has been described in the following sub-topics onwards.

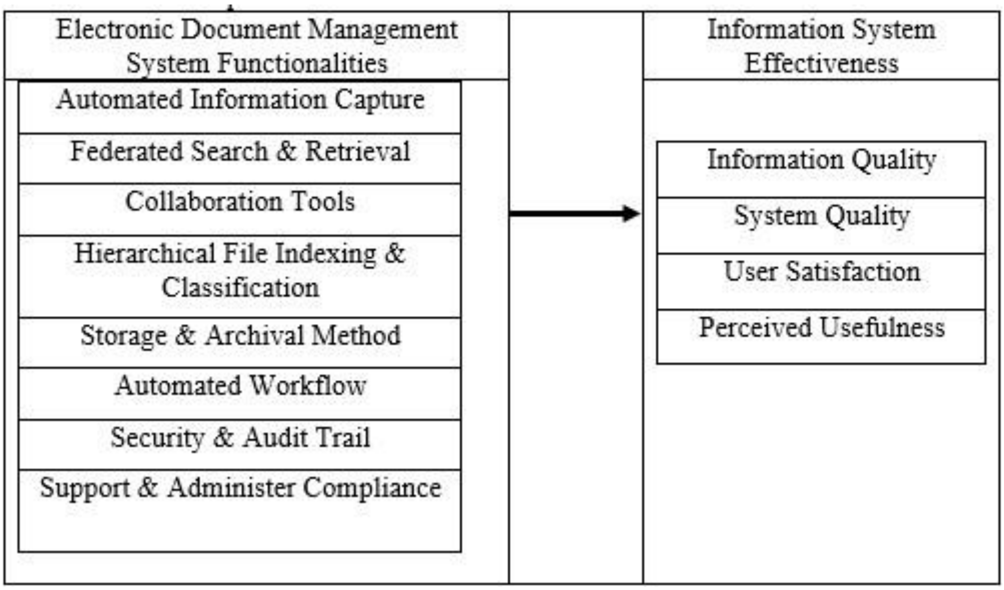

Figure 3.6 Initial of Draft Proposal of Theoretical Framework Derivation

Based on the framework derivation above, researcher developed a theoretical framework as shown in Figure 3.7. The theoretical framework for this study integrates the DeLone and McLean IS Success Model (2003) and Seddon's Success Model (1997) to conceptualize the relationship between Electronic Document Management System (EDMS) functionalities and IS effectiveness. The DeLone and McLean IS Success Model provides a comprehensive view of IS Success through its multidimensional approach, which includes system quality, and information quality. Seddon's model complements this by offering a causal and process-oriented perspective, emphasizing the interaction between user satisfaction and perceived usefulness. By operationalizing EDMS functionalities such as automated information capture, federated search and retrieval, collaboration tools, automated workflow, hierarchical indexing and classification, security and audit trail, storage and archival method, and support and administer compliance; this study aims to empirically validate their impact on key IS success metrics.

This framework contributes to both theory and practice by contextualizing IS success (effectiveness) in the domain of EDMS and addressing gaps in existing literature regarding their specific functionalities. As previously stated by Delone and McLean (2003), D&M IS Success is measured by the value and efficacy of IS management actions and IS investments. They believe that when assessing information system effectiveness, researchers should use a systematic approach that incorporates measurements from each of their six information system success categories. They also emphasise the necessity for more research to test the model and to determine which IS success dimensions should be considered. However, in this study, perceived effectiveness of information system was examined, namely, information quality, system quality, user satisfaction, and perceived usefulness. Based on the modified Seddon information systems success modelSeddon (1997), in this study, the perceived usefulness and user satisfaction were related to the benefit of IS use, while information quality is concerned with relevance, timeliness and accuracy of information generated by an information system.

System quality was to measure the consistency of the user interface, ease of use, quality of documentation, quality of the program code of the system. While EDMS functionalities (automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; and support and administer compliance) are the new potential to measure the information success of an EDMS used by government agencies' public service. Information quality and system quality are also linked to system satisfaction (Wixom & Todd, 2005). The higher the quality of the information and system, the more likely the user would be satisfied with the system. When it comes to EDMS functionalities, the better quality of the system's functionalities, higher user utilisation of the system, and better quality of information contained within the EDMS functionalities, the more satisfied a user is with the system. This leads to the perceived usefulness of the system by the users, who believe that the more they use the system because of its functionalities, the better the job done by the users is regarded to be. Other supporting models that were referred for connecting EDMS functionalities and Information system effectiveness are Respecified Version of DeLone and McLean's (1997); Updated DeLone and McLean Information System Success Model (2002), Gable et al's (IS-Impact) Model and Integrated Success Model (ISM).

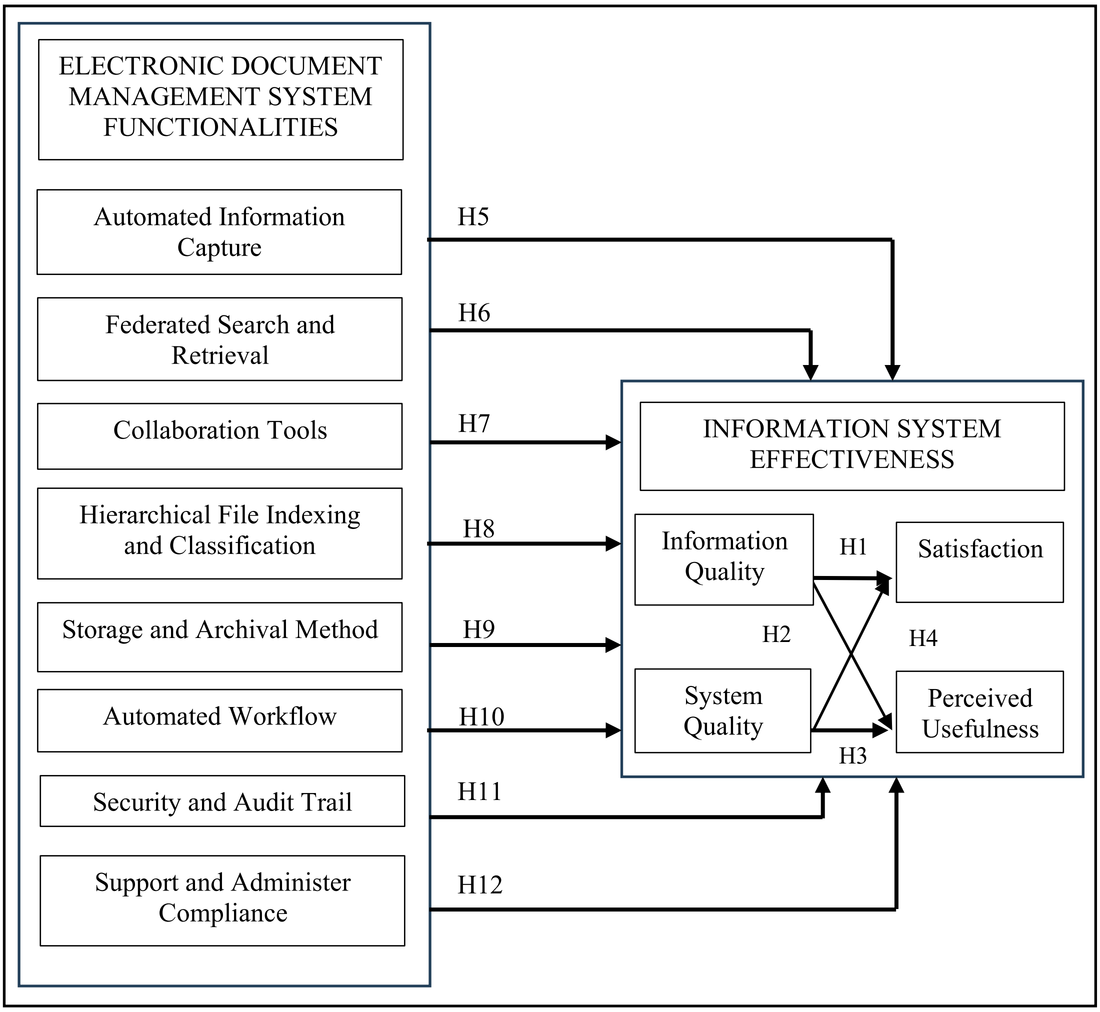

Figure 3.7 Proposed Theoretical Framework of the Study

3.4.1 Information System Effectiveness

The information system is a user-machine system that supports the organization's management, operations, and decision-making processes. When it comes to information systems (IS), there are many types of information technologies (IT) that can be used to perform specific tasks, interact with and inform various actors in different organisational or social contexts. Information systems (IS) include a wide range of information technologies (IT) that can include computers, software, databases, communication systems, the Internet, mobile devices and much more. As a result, all aspects of the development, deployment, implementation, usage, and effect of information technology in businesses and society are of general interest to the discipline of information technology. An Information System is also defined as a collection of interconnected components designed to store, process, retrieve, and distribute information. Its primary purpose is to support the control and managerial functions of an organization, including decision-making processes. On the other hand, what matters in information systems, is how technology is appropriated and instantiated in order to enable the realisation of IS that meets the information needs and requirements of various actors, such as individuals, groups, or organisations in relation to specific goals and practices (Boell & Cecez-Kecmanovic 2015).

The Information System (IS) effectiveness is defined as the extent to which the system adds value to the organization and is deemed effective when it contributes to the achievement of organizational goals (Hamilton & Chervany 1981; Malik 2001). In the context of this study, it is practically measuring the IS success based on four dimensions including, information quality, system quality, perceived usefulness and user satisfaction that are considered as success dimensions of D&M 1992, 2002, Respecified version of DeLone and McLean (1992), Model of IS Success by (Seddon, 1997) and Kiew (1994) and Integrated Success Model (ISM) by Zaied (2012). In IS studies that adopt DeLone and McLean Model, suggested that the success of E-government system should be examined in order to check the effectiveness of the electronic services for instant usage of EDMS in government agencies (Alhendawi & Baharudin, 2017).

A significant portion of research on User Information Satisfaction has focused on users' satisfaction with system and information quality. DeLone and McLean (1992) defined system quality as the desired characteristics of the information system itself, while information quality refers to the desired characteristics of the information products. Specifically, their model incorporates four dimensions from the Bailey and Pearson (1983) instrument into system quality: convenience of access, system flexibility, system integration, and response time. Additionally, nine dimensions are included under information quality: accuracy, precision, currency, timeliness, reliability, completeness, conciseness, format, and relevance.

Research on information system success has predominantly focused on users' satisfaction with specific system features rather than overall satisfaction (Doll & Torkzadeh, 1988; Iivari & Koskela, 1987) or the broader IS function (Bailey and Pearson, 1983; Baroudi and Orlikowski, 1988). These studies encompassed aspects of both system quality and information quality. The inclusion of service quality in the updated DeLone and McLean Model (1992), user satisfaction is conceptualized as overall user satisfaction (Seddon & Kiew, 1994), measured independently of system quality and information quality.

3.4.1.1 Information Quality

Information quality refers to the degree to which the output of the EDMS is accurate, relevant, timely, and complete. High-quality information ensures that the users can rely on the data for decision making and operational tasks. It also defined as the quality of the output of the IS refers to the information characteristics of IS, that are accurate, precise, current, reliable, complete, succinct, relevant, understandable, meaningful, timely, comparable, and formatted (Delone & McLean, 1992). Seddon (1997) emphasized on Information Quality (IQ) as concerning with such issue as timeliness, accuracy, relevance, and format of information generated by an information system. While Cho (2007) refers information quality to relevancy, timeliness, and understandability of a report (on-line or print-out), related to the functionality of an information system, for example EDMS. This shows information quality in EDMS is relevant to user's work. Drawing upon this, the researcher also argued that information quality significantly affects satisfaction and perceived usefulness of EDMS. For example, Ilias and Razak (2011) found the users are satisfied with output and information produced by the computerised accounting system as the output meets their needs, provides sufficient information, and gives right amount of information and is tailored to their requirements and needs. This shows how information quality in the system is related to the satisfaction of users. Information quality also represents a user's reaction to the characteristics of EDMS functionalities as one of the IS. Information quality of EDMS also represents the contents provided by system (Alshibly, 2014).

From the user's perspective, satisfaction with an EDMS is attained when the data or information of documents or files saved from EDMS is accurate (Johnston & Bowen, 2005). The user reaction includes its easy-to-understand information from EDMS, information presented in a useful format, and the information from EDMS available on time for its intended use. On the other hand, Laumer et al. (2017) identified key attributes of information quality within a system, emphasizing its alignment with task requirements. These attributes include completeness, relevance, timeliness, and usability. Completeness refers to the extent to which the specific information is required for a given task that meets the stated requirements. Moreover, relevance pertains to the degree to which the information can be effectively utilized to perform a task. Timeliness addresses whether the information is available in a timely manner to complete a specific task, while usability reflects the applicability and practical value of the information to the task at hand.

Thus, the information quality, which suggested directly affects the use of IS, is one of the most important variables influencing the information system success in the utilisation of EDMS of information systems. Mat Yatin et al. (2015) have shown that information quality is a crucial determinant users' satisfaction with EDMS functionalities. As mentioned by Cho (2007), information quality refers to relevancy, timeliness, and understandability of a report (on-line or print-out) which related to the functionality of an information system, for example EDMS. Drawing upon this, the researcher also argued that information quality significantly affects satisfaction and perceived usefulness of EDMS.

3.4.1.2 System Quality

System quality encompasses the technical performance of the EDMS, including reliability, usability, responsiveness, and functionality. It reflects how well the system supports user needs in terms of performance and technical adequacy. According to DeLone and McLean (2016), system quality is defined as the desirable characteristics of an information system such as ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times. In the context of this study, system quality is to be crucial in EDMS effectiveness based on the EDMS functionalities. Rai et al. (2002) claimed that system quality is seen as a critical component of all interactive computer systems by researchers in the conventional Information Systems (IS) field. Meanwhile, Kulkarni et al. (2006) noted that user satisfaction was also found to be correlated with system quality. Alshibly (2014) also stated that system quality is independent of the specific application the system was designed to support. Wahyudi et al. (2017) argued that system quality is a characteristic feature of the desired quality of the information system itself that may be assessed differently by each person on the quality of the system, however similar the product is.

In this study, the critical attributes of measuring the system quality of EDMS effectiveness are the EDMS functionalities (automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; and support and administer compliance). Andriansyah and Elmi (2020) found that system quality in EDMS makes it easy for employees to obtain information data quickly and precisely. With this, the EDMS is easy to use and to learn; EDMS is useful; EDMS requires little effort to be used; retrieval of information in EDMS that users need is easy; and response to an instruction of the EDMS is fast. Drawing upon this, the study found that the system quality has a significantly positive relationship with satisfaction and perceived usefulness.

3.4.1.3 Perceived Usefulness

According to Davis (1989), perceived ease of use is defined as an individual's subjective perception of the effortless association with using a computer system, which directly influences their perception of its usefulness. Perceived usefulness, in turn, reflects the user's belief regarding the extent to which the technology enhances their workplace performance. Wang and Liao (2008) demonstrated that the information quality of egovernment system is positively associated with the perceived usefulness of these systems. Similarly, Lin (2010) found that information quality significantly impacts perceived usefulness, particularly in enhancing professional performance. Consequently, it is crucial to examine the relationship between information quality and system effectiveness to validate and ensure the significance of this positive correlation.

The ISS model showed that perceived usefulness contains a direct path leading from System Quality and Information Quality (Seddon 1997; Lin 2010). This implies that the users perceive the usefulness of system quality and information quality within an information system in relation to their ability to effectively perform job tasks. This encompasses reducing the time required to capture information within the system and streamlining search processes through federated search functionality, automated workflow, more efficient in using collaborative tools, having effective hierarchical file indexing and classification, and well-organized storage and archival method in the system; and accuracy of security and audit trail; as well as support and administer compliance in the information system. Thus, the functionalities of the Electronic Document Management Systems (EDMS) enable users to complete their tasks more efficiently, enhance job performance, boost productivity, improve overall effectiveness in the workplace, and simplify the execution of job-related responsibilities, and useful to users' job. Hence, functional requirement of EDMS that users think are useful has significance in terms of information quality and system quality.

3.4.1.4 User Satisfaction

Doll and Torkzadeh (1988) stated that measurement of success with regard to information system has to be the end-user satisfaction. User satisfaction can be described as the amount to which users believe the information system accessible to them meets their requirements, and it is believed to be a useful indicator of system effectiveness (Delone & McLean, 2003). According to Cho (2007), user satisfaction is frequently used as criteria for both system quality and user acceptance as the satisfaction of users with their information systems is potentially measurable. In addition, several studies on information system success mentioned, greater user satisfaction with E-Government users is correlated with higher information quality, and that both information quality and service quality have a significant impact on user satisfaction (Nripendra et al., 2013). Considering the importance of user satisfaction in the measurement of information system effectiveness, and given the fact that it has emerged as the most commonly used dependent variable of the performance of the information system, user satisfaction based on individual perceptions has been regarded as a substitute measure of the success of information systems (Leclercq-Vandelannoitte, 2007).

Furthermore, according to DeLone and McLean (1992), individual evaluations of user satisfaction are recognised as a legitimate, yet incomplete, measure of information system effectiveness in the context of information systems. Doll and Torkzadeh (1988) asserted that the measurement of end-user satisfaction with an EDMS is determined by several factors: users' overall satisfaction with the system, the extent to which the system meets the information processing requirements of their tasks, and the users' satisfaction with the ease of task completion facilitated by the system; and using the system is not a frustrating experience. Musman et al., (2014) also added in their finding that accuracy of EDMS has significant influence on user's satisfactory level where format of information system has significant influence on satisfactory level among the end user. In this study, it is to assess the satisfaction among EDMS users which support the information quality and service quality of EDMS functionalities. Based on the above justification, the researcher claimed that the significance of EDMS functionalities enhance overall effectiveness, and the following hypothesis is postulated:

H1: Information quality has a significant positive relationship with satisfaction.

Users value systems that produce high-quality information simplifies tasks and minimizes errors. When users perceive the output as accurate and complete, they are more likely to experience satisfaction with the system. For instance, an EDMS that consistently provides well-structured, error-free reports enhances users' confidence and satisfaction. DeLone and McLean's model identifies information quality as a primary determinant of user satisfaction.

H2: Information quality has a significant positive relationship with perceived usefulness.

If the information provided by the EDMS is perceived high-quality, users are more likely to see the system as beneficial to their tasks. Timely and relevant information fosters a perception that the system improves their productivity. An instance of this is a system that provides real-time, up-to-date documents for legal or compliance purposes which are likely deemed useful by users. The Technology Acceptance Model (TAM) suggests that quality of output directly influences perceived usefulness.

H3: Systems quality has a significant positive relationship with satisfaction.

A system that is easy to use, responsive, and reliable ensures a positive user experience. Satisfied users are more likely to adopt the system and recommend its use within their organization. As seen in a system with intuitive navigation and minimal downtime, it leads to higher satisfaction among users. The DeLone and McLean Information System Success Model emphasizes that system quality significantly impacts user satisfaction.

H4: Systems quality has a significant positive relationship with perceived usefulness.

High system quality ensures seamless user interaction, enhancing the system's perceived utility. Users are more likely to find a system useful if it functions reliably and is easy to operate. Consider an EDMS with advanced search functionalities and efficient document indexing make retrieving critical files faster, increasing its perceived usefulness. Thus, system quality is linked to perceived usefulness in IS Success studies and TAM, as users view reliable and efficient systems as valuable tools for achieving tasks.

Both information quality and system quality serve as critical antecedents to satisfaction and perceived usefulness, bridging user perceptions of the EDMS.To provide a clear and systematic overview of the proposed relationships, Table X summarizes the hypotheses developed in this study, including the key constructs, supporting theories, and relevant prior studies.unctionalities with its actual effectiveness.

Table 3.1
Summary of Hypotheses Development

No.	Independent Variable	Dependent Variable	Supporting Theory	Key Reference	Hypothesis
H1	Information Quality	User Satisfaction	IS Success Model	DeLone & McLean (2003)	Information quality has a significant positive relationship with user satisfaction
H2	Information Quality	Perceived Usefulness	TAM	Davis (1989); Venkatesh & Davis (2000)	Information quality has significant positive relationship with perceived usefulness
H3	System Quality	User Satisfaction	IS Success Model	DeLone & McLean (2003)	System quality has a significant positive relationship with user satisfaction
H4	System Quality	Perceived Usefulness	IS Success Model: TAM	DeLone & McLean (2003); Davis (1989)	System quality has a significant positive relationship with perceived usefulness

3.4.2 Electronic Document Management System Functionalities

Electronic Document Management Systems (EDMSs) are becoming an increasingly important part of the technological infrastructure. However, EDMSs functionalities are not well understood, in part due to a lack of systematic research into the factors that contribute to EDMS success. There are many definitions of EDMS found from the government literature including the following interpretations: 1) electronic - the application of current information technology; 2) document - a set of information pertaining to a topic, structured for human comprehension, represented by a variety of symbols, stored and handled as a unit; and 3) management - creation, storage, organization, transmission, retrieval, manipulation, update, and eventual disposition of documents to fulfil an organizational purpose (Abdulkadhim et al., 2015). The most significant functionalities of a DMS, according to Zantout and Marir (1999), are: (a) document manipulation; (b) indexing and storing in order to retrieve documents; (c) communicating via document exchanging; (d) document collaboration; and (e) modelling and automating the flow of documents. In this study, the EDMS functionalities consist of Automated Information Capture; Federated Search and Retrieval; Collaborative Tools; Hierarchical File Indexing and Classification; Storage and Archival Method; Automated Workflow; Security and Audit Trail; as well as Support and Administer Compliance.

3.4.2.1 Automated Information Capture

The ability of the system is to automatically capture data from various sources, such as scanned documents, emails, or digital forms, and to integrate data into the EDMS. A document management system (DMS) converts paper archives into digital records through high-volume filtering and OCR. Thence, it can capture and store advanced documents at the point of creation from organised envelopes and drives, Microsoft Office and other incorporated frameworks, mobile phones as well as digital cameras. EDMS also enables user to transform paper documents into digital files through high-volume scanning and Optical Character Recognition (OCR) as mentioned by Phan Việt et al. (2020). When optical character recognition (OCR) is used to convert scanned images of typed, handwritten, or scanned text into machine-encoded text, the quality of the output text allows a system to be built that can efficiently store and search for documents.

Besides, the EDMS also enables users to organize (capture and store) digital files at the point of creation. Information capture instruments, as a result, offer configuration and enhancements around imported documents, such as record arrangement (Ade Tutty Rokhayati et al. 2019). The EDMS also allows user to create document from network folders, Microsoft-office and/or other integrated system(s) as it is integrated into office applications such as the Microsoft Office suite of Word, Excel, PowerPoint and Outlook (Joseph, 2008). Moreover, EDMS enables users to capture details of document automatically such as file classification, which enables the creation, use, and preservation of paper or electronic documents and records for the purposes of an organization's workflow and processes (Hamzah et al., 2018). These functions are also supported by Maican et al. (2016), in terms of image-processing applications, where document capture (scanning hardware and software, optical and intelligent character recognition technologies and form-processing technology) with the ability to store image of scanned documents in the repository as a regular content type in a folder and to route them through an electronic process (Maican et al., 2016). EDMS with its functionality of automated information capture has transformed the way documents are being created, speeding, and automating the process. In terms of impact on information system effectiveness, automated information captures are able to reduce manual data entry errors; ensure data accuracy; enhance data capture efficiency; enable quicker access to information; and improve workflow by integrating real-time information into the system.

3.4.2.2 Federated Search & Retrieval

A unified search capability allows users to query multiple repositories and sources simultaneously to retrieve relevant information. Federated search and retrieval are carried out by the search engines of separate information sources in EDMS, reflecting the scattered location and control of information among hidden information sources. It selects relevant information sources for user queries, as does the information source recommendation system. Furthermore, user queries in EDMS are forwarded to search function which selected information sources. Finally, the returned individual ranked lists are merged into a single list to present to the users. Therefore, federated document retrieval provides a more complete search solution by combining all the three components of federated search, namely resource representation, resource selection and results merging. Federated search provides support for discovering items in EDMS that are dispersed throughout a distributed collection of information sources or services. These often entail sending queries to a number of servers and then merging the results to show in an integrated, consistent, and coordinated style. Baeza-Yates et al. (1999) gave their definition of the concept.

In addition, the work by Ade Tutty Rokhayati et al. (2019) has been built conceptually on the approach of retrieval and federated search in EDMS, enabling user to search files or documents easily and to locate files/documents from across folders and repositories. It empowers the ability to search across archive envelopes and warehouses for documents. In general work to date in this area supports EDMS empower access of the full content including document name, metadata and report substance. Moreover, this renders for easily accessible environment, enabling users to easily store, access, and modify information (Zdraveski et al., 2020). Studies have shown that a project specific web site, for instance can build project system. Besides, the basic EDM functionality enables user to upload the documents to the system or to the server (Björk, 2003).

Federated search and retrieval functionality in EDMS enables users to efficiently locate documents without requiring knowledge of their exact location. Its impact on information system effectiveness includes streamlining access to distributed information, thereby reducing search time. By consolidating search results from multiple sources, it enhances productivity and facilitates seamless information retrieval. Additionally, it ensures comprehensive access to relevant data, empowering users to make informed decisions and improving overall system utility.

3.4.2.3 Collaboration Tools

Features that enable team collaboration within the EDMS, such as having the ability to change reports to facilitate more efficient collaboration. EDMS assist users to do modification of document from bottom to top and vice versa. The users of EDMS in the government agencies share and seek for verification from their superior prior to get the final copy of the document created. As mentioned by Ade Tutty Rokhayati et al., (2019), comments, redaction options for sensitive documents, feature apparatuses, stamps, content boxes, and other markup instruments provide easily accessible setting and choice that focuses on the content contained in documents, rather than the format of the document. It has also been experimentally demonstrated that collaboration has been defined as the degree to which individuals in the group of EDMS system actively help and support one another for the smooth performance of the task. By allowing all users to concurrently locate and use the most recent version of an electronic document, it makes collaboration more efficient and effective. Additionally, the system supports a wide variety of document and data formats.

The emergence of collaboration tools in EDM systems enable all project-related electronic documents to be stored, updated, and shared through a common web server and can be accessed to project documents real-time. This provides user with the ability to work faster on document changes and easy to create and edit documents directly within the system (Zdraveski et al., 2020). With EDMS, loss or misplacement of files is rare, and the web server provides a means for transmitting files, thus providing further advantages over other means of sharing documents. This shows that users involved in the workflow be notified as tasks are completed by each stage (Pho & Tambo, 2014).

In addition, project tasks can be performed in an efficient manner when using EDMS as all project documents are accessible through a single platform (Guo et al., 2019). EDMS can interact with other electronic document management systems and has the ability to manage documents and data regardless of originating system or format (Sun & Aouad, 1999; Zdraveski et al., 2020). Furthermore, EDMS is also able to the create, upload and categorize new documents without leaving certain interface as EDMS stores centrally by web browser and user interact through web browser, accordingly (Björk, 2003).

Thus, the impact of collaborative tools on information system effectiveness is substantial. These tools facilitate seamless teamwork and communication, enhancing overall operational efficiency. They promote shared knowledge creation while minimizing duplication of effort, ensuring resources are utilized effectively. Additionally, collaborative tools provide transparency in document handling and decision-making processes, fostering trust and accountability among users and stakeholders.

3.4.2.4 Hierarchical File Indexing & Classification

Organizing documents and files uses a structured hierarchy and metadata for easy retrieval and management. EDMS indexes and classifies documents or records according to an automatically generated hierarchical structure. EDMS provides user-friendly browse and search functionalities of the multilevel document classification. Nowadays, Electronic Document Classification is a well-known reality that businesses and institutions must have both written and electronic documents. Functional classification schemes are usually hierarchical and enumerative, the functions can be created from a hierarchical classification that enables users to use the same terminology in organizing the document (Robinson, 1999; Gibbons & Shenton, 2003).

Meanwhile, Zantout and Marir (1999) highlighted that EDMS offers a unified hierarchical folder structure, wherein each document is stored within a unique and distinct folder. Thus, classification and indexing of hierarchical file digital documents are sorted out into a focal store based on envelope structures that keep reports consequently composed by office, creation date or other data administration parameters (Ade Tutty Rokhayati et al., 2019). Indexing makes the document searchable and indexing is the key component for Document management system to determine the location of a file or document (Zantout & Marir, 1999). Better indexing and classification in information architecture, improve user satisfaction and records management, ultimately leading to better records management (Araghi, 2005). Electronic Document Management Systems (EDMS) support dynamic, multidimensional hierarchies, enabling a single document to be accessed through multiple hierarchical pathways (Alshibly, 2014) which also enable user to index large documents at several levels of EDMS process. The EDMS organises documents into classes based on business functions that are further segmented based on a group of record being defined by the user. It is necessary to designate a record type as a mandatory characteristic when users save a document to the system. It provides a means to manage groups of documents that comprise records when combined with other document information in a searchable database of document. This enables users to identify the management responsibility for a group of records, as three primary indexing methods in document management systems are indexing by associated document groups (folder/file structure), metadata indexing, and fulltext indexing (Valkonen, 2015).

The classification of documents is essential for facilitating seamless access to both electronic and paper-based records within the system. Effective classification enables documents to be individually accessed, categorized according to their type, systematically stored, efficiently managed, and appropriately disposed of when no longer needed. Thus, hierarchical file indexing and classification enhance system usability by providing clear file organization, reduce time spent locating records, improve operational efficiency, and ensure compliance with classification standards and records management policies.

3.4.2.5 Storage & Archival Method

Storage and archival method are a mechanism for storing and archiving records securely while ensuring their long-term accessibility. Document or record life cycle management is a vital part of an electronic document management system (EDMS). It is a feature of the EDMS's storage and archival method functionality. This type of technology allows for the reduction of paper consumption, the acceleration of communication, and the rise in the productivity of organization processes. It has been accomplished to provide each user as well as the potential of storing the whole history of its operations that enable user to save the document into archival folder in EDMS (Burtylev et al., 2013).

EDMS allows user to manage the life cycle of documents from creation to sharing, where the document is created on the system, Hence, the status can be changed from open file/document to closed file/document distribution, storing and archiving or disposal (Groenewald, 2004). This enables user to include the file/document into the retention schedules and to do documents/records inventories. EDMS also has the ability to manage documents and data regardless of originating system or format (Zdraveski et al., 2020) which enables user to copy the document/file to another medium. According to Zdraveski et al. (2020), EDMS helps users more easily to perform their work and ensure data security and confidentiality, as well as managing business processes such as document/record inventories.

Groenewald (2004) noted that the document is created on the system, stored on the system, and archived according to specified retention schedules. The impact of the storage and archival method functionality on information system effectiveness is significant. For the EDMS users to efficiently manage document and records inventories, they incorporate them into retention schedules for systematic lifecycle management. This functionality safeguards data integrity and prevents information loss, as well as ensures the long-term reliability of stored records. Additionally, it facilitates compliance with legal and regulatory requirements, enhancing organizational accountability. Furthermore, the storage and archival method support scalability, accommodate future data growth and ensure the system remains robust and adaptable to evolving needs.

3.4.2.6 Automated Workflow

Automated workflow is used to control the approval and distributions tasks in the document lifecycle that transmits electronically in EDMS. It can be defined as the use of predefined processes within the EDMS to automate routine tasks, such as approvals or notifications. The authorization of a workflow may comprise the following activities: document activation, tracking, status monitoring, messaging, queue handling, and document routing, among others. This allow EDMS to track and route the papers related with the management process, as well as to monitor the management process in real time (Zantout & Marir, 1999). Hence, EDMS enables user to establish ownership /responsibility for each step in the EDMS system process. Furthermore, automated workflow as functional of EDMS offers process-oriented with a clear differentiation of levels of processes. It shows each process visually with links to relevant documents that are stored in the EDMS (Pho & Tambo, 2014). Thus, this allows users to easily see the active step, who is responsible for completing it, and how much time it is taking.

Under the workflow functionalities, EDMS enables users to capture and manage records as part of their daily work (Minnesota State Archives, 2012), reducing process errors as all files or documents are scanned, ensuring that necessary information is captured, responding to prompted task, and submitting the latest version of documents via EDMS. The targeted benefit of applying workflow to the authoring process is exercising tighter control over the process and ensuring compliance with filing requirements. Furthermore, because the workflow system has the ability of keeping an audit trail; staff, editors, staff could monitor the document pipeline, predict their incoming workloads, and schedule their time accordingly.

Most EDMS systems also allow users to save searches and rerun them with a single click (Groenewald, 2004) which enables users to respond to their prompted task and click submit immediately. The impact of automated workflow functionality on information system success is significant. By reducing manual intervention, it minimizes errors and delays, thereby enhancing operational accuracy and timelines. Additionally, it fosters process consistency and ensures strict adherence to organizational workflows, promoting standardized practices. Furthermore, automated workflows streamline operations, increase overall system efficiency and enable users to focus on more strategic tasks. This functionality ultimately contributes to a more reliable, effective, and user-friendly information system.

3.4.2.7 Security & Audit Trail

Security and audit trails are important considerations in EDMS. It measures to secure access to documents and maintains an auditable record of all user actions within the EDMS. The record is delivered to be designed by a representative task or division, which ensures that data is in the correct hands. Audit trails consequently track precisely how data is being retrieved for progressive administrative consistency and function controls which users have access to which information (Ade Tutty Rokhayati et al., 2019). EDMS enable user to check-in/check-out content creation. Simultaneously, editing documents are ‘checked-out’ while they are being edited so that only one person at a time can work on a document.

Apart from that, in terms of security, EDMS control access to the system, control access to the documents and control various types of access to documents (view profile, read only, modify, change security) to control over the various and previous repetitions of a file, track the creation and editing of file, to rollback to previous versions of a document (Groenewald, 2004; Pho & Tambo, 2014). Hence, security and audit trail functionalities in an Electronic Document Management Systems (EDMS) are designed to ensure that information is safeguarded against unauthorized access, confidentiality is maintained, data integrity and accuracy are preserved, and information remains accessible at all times.

Furthermore, EDMSs guarantee document integrity by providing audit trails that can be used to prove that a document is still the authorised copy; security ensures that no unauthorised access can occur; and version control ensures that the latest, most current, or approved version is clearly distinguishable from earlier versions (Abaci, 2015). System metadata in EDMS also are captured automatically by the system that enable user to assign unique serial numbers (Groenewald, 2004). The security and audit trail functionality significantly enhance information system effectiveness by ensuring data confidentiality, integrity, and availability, thereby safeguarding sensitive information. It builds user trust through transparent document handling, as the audit trail provides a clear record of all actions taken within the system. Additionally, this functionality supports compliance with data protection regulations, reinforcing organizational accountability and mitigating risks associated with data breaches or unauthorized access.

3.4.2.8 Support & Administer Compliance

The functionality of support and administer compliance is the EDMS's capability to support adherence to organizational policies, standards, and regulatory requirements. Functionality enables team collaboration within the EDMS, such as document sharing, version control, and real-time co-editing. Support and administer compliance is described as compliance with the external rules and internal system of control. EDMS provides secure backup and disaster recovery compliance since much data is stored on susceptible media that would not survive a disaster. However, if all is stored electronically, it can be readily backed up, allowing users to detect and manage regulatory risk (Zdraveski et al., 2020).

EDMS implementation also provides better security measures in government document processing procedures. Besides, it delivers accountability and transparency which are main requirements for effective corporate governance that enables user to design and implement controls to protect an organization from regulatory risks (Abdulkadhim et al., 2015). The organisation manages data and documents by controlling the documentary cycle and administrative procedures. This includes monitoring procedures and ensuring their secure implementation, as well as providing backup and disaster recovery compliance (Kassab et al., 2019). In order to monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks, there have to be resolve compliance difficulties as they occur or impose on rules and controls of risks.

Furthermore, to comply with the external rules and internal system of control, organizations need to employ effective EDMS solutions for controlling documents. This EMDS framework must have the advantages of a common EDMS while demonstrating the compliance with document control principles. The support and administer compliance functionality significantly impact information system effectiveness by ensuring alignment with legal and operational mandates, thereby promoting adherence to regulatory requirements. It minimizes the risk of penalties or non-compliance issues, safeguarding the organisation from legal and financial repercussions. Moreover, this functionality enhances the credibility and reliability of the organisation's record-keeping processes, fostering trust among stakeholders and reinforcing the system's role as a secure and dependable tool for managing critical information.

Based on the above justification, the researcher claimed that the significance of EDMS functionalities enhance overall effectiveness, and the following hypotheses are postulated:

i) H5: Automated information capture has a significant positive relationship with information systems effectiveness.

Automated process improves the overall quality and timeliness of information, directly contributing to the effectiveness of the system.

ii) H6: Federated search and retrieval have a significant positive relationship with information systems effectiveness.

Enhanced search capabilities improve user satisfaction and perception of the system's utility.

iii) H7: Collaborative tools have a significant positive relationship with information systems effectiveness.

Collaboration functionalities directly enhance the system's perceived usefulness and user satisfaction.

iv) H8: Hierarchical file indexing and classification have a significant positive relationship with information systems effectiveness.

Proper indexing ensures the system remain user-friendly and effective for long-term information management.

v) H9: Storage and archival methods have a significant positive relationship with information systems effectiveness.

Reliable storage and archival systems enhance trust in the EDMS and ensure sustainable effectiveness.

vi) H10: Automated workflow has a significant positive relationship with information systems effectiveness.

Automation drives higher system productivity and user satisfaction, improving overall effectiveness.

vii) H11: Security and audit trail have a significant positive relationship with information systems effectiveness.

Robust security features are essential for maintaining system effectiveness in sensitive environments.

viii) H12: Support and administer compliance have a significant positive relationship with information systems effectiveness.

Compliance features increase the system's reliability and perceived utility, enhancing its effectiveness.

According to Petter et al. (2013), the dependent variable in information systems research is IS success, which is influenced by factors such as system quality, information quality, and user satisfaction. In this study, the utilization of information quality, system quality, user satisfaction, and perceived usefulness as dependent variables aims to elucidate that the effectiveness of this information system is engendered by the presence of functionalities of an electronic document management system, which impacts information system effectiveness in terms of information quality, system quality, user satisfaction, and perceived usefulness. Thus, instead of independent variables, researcher has chosen the Information System Effectiveness, theory from Delone and McLean (2003) and Seddon (1997) as Dependent Variable and not Independent Variable.

To provide a structured overview of the proposed relationships between EDMS functionalities and information systems effectiveness, Table 3.3 summarizes the hypotheses developed in this study along with their theoretical foundations and supporting literature.

Table 3.2.
Summary of Hypotheses Development for EDMS Functionalities

No.	EDMS Functionality	Dependent Variable	Supporting Theory	Key References	Hypothesis
H5	Automated Information Capture	IS Effectiveness	IS Success Model	Ismael & Okumus (2017); Kiplie et al. (2018)	Automated Information Capture has a significant positive relationship with IS effectiveness
H6	Federated Search & Retrieval	IS Effectiveness	IS Success Model	DeLone & McLean (2003); Ismael & Okumus (2017)	Federated search and retrieval have a significant positive relationship with IS effectiveness
H7	Collaborative Tools	IS Effectiveness	IS Success Model	DeLone & McLean (2003); Kiplie et al. (2018)	Collaborative tools have a significant positive relationship with IS effectiveness
H8	File Indexing & Classification	IS Effectiveness	IS Success Model	Ismael & Okumus (2017)	Hierarchical file indexing and classification have a significant positive relationship with IS effectivenes
H9	Storage & Archival Method	IS Effectiveness	IS Success Model	Kiplie et al. (2018); DeLone & McLean (2003)	Storage and archival methods have a significant positive relationship with IS effectiveness
H10	Automated Workflow	IS Effectiveness	IS Success Model	DeLone & McLean (2003); Ismael & Okumus (2017)	Automated workflow has a significant positive relationship with IS effectiveness

H11	Security & Audit Trail	IS Effectiveness	IS Success Model	DeLone & McLean (2003); Kiplie et al. (2018)	Security and audit trail have a significant positive relationship with IS effectiveness
H12	Support & Administrative Compliance	IS Effectiveness	IS Success Model	DeLone & McLean (2003); Ismael & Okumus (2017)	Support and administrative compliance have a significant positive relationship with IS effectiveness

Table 3.3
Electronic Document Management System Variable Analysis

Variable	Definition	Framework / Model / Theory Applied	Relevance
Automated Information Capture	content during the document creation or ingestion process.	Deliver Model (AIIM Framework).	Reduces manual effort, improves data quality, ensures consistency.
Federated Search and Retrieval	Unified search across multiple repositories for relevant documents and data.	Information Retrieval (IR) model	Selects or ranks the set of documents with respect to a user query. Enhances user experience by providing quick access to disperse information.
Collaborative Tools	Features that allow users to communicate, share, and work on documents in realtime.	The Collaboration Model	Enhances teamwork, ensures document version control, and fosters collaboration. People in the user's world communicate and coordinate to get activities done, often using technology.
Hierarchical File Indexing and Classification	Organizing documents using a structured hierarchy to facilitate easy navigation and retrieval.	Ranganathan's theory of classification and indexing.	Ensures logical organization, accessibility, and compliance with classification standards. Based on Facet Analysis Approach in EDMS, these facets can inform metadata standards and hierarchical file indexing and classification.

Storage and Archival Method	Processes and systems used to securely store and archive documents for longterm preservation	Records Continuum Model (RCM)	Records deemed as having continuing value are retained and managed as an archive. Facilitates long-term accessibility and compliance with regulatory requirements.
Automated Workflow	Predefined sequences for document routing, approval, and processing automated by the system.	Workflow Management System Frameworks	A standard framework developed by the Workflow Management Coalition (WIMC) provides a convenient platform for describing the capabilities of a workflow management system
Security and Audit Trail	Functionality that ensures document confidentiality, integrity, and traceability of user actions.	Information Security Management System (ISMS) framework	Protects sensitive information, ensures accountability through traceable actions.
Support Administer Compliance	Tools and features that help organizations adhere to legal and regulatory requirements.	Information Security Management System (ISMS) Framework (ISO/IEC 27001)	Ensures that all information security practices align with national and international data protection regulations Ensures legal and regulatory compliance through robust recordkeeping and audit readiness.

3.5 Mapping of Research Objectives and Hypothesis

Table 3.4 showcases the mapping between the research objectives and the research variables; research hypothesis; and the supporting theories/models for the development of hypotheses. Altogether, a total of 12 hypotheses was established, supported by three models of previous research.

Table 3.4

Mapping of Research Objectives, Variables Involved, Hypotheses and Supporting Theories/Models

Research Objectives	Variables Involved	Hypothesis	Supporting Theories/Models
To examine the effectiveness of the document management systems used in Sarawak State Government	Information System Effectiveness Information quality System quality User satisfaction Perceived usefulness	H1: Information quality has a significant positive relationship with satisfaction. H2: Information quality has a significant positive relationship with perceived usefulness. H3: Systems quality has a significant positive	DeLone and McLean IS Success Model (1992) Updated DeLone and McLean Information System Success Model (2002) Seddon's IS success model (Seddon,

Research Objectives	Variables Involved	Hypothesis	Supporting Theories/Models
		relationship with satisfaction. H4: Systems quality has a significant positive relationship with perceived usefulness.	1997)
To assess the performance of electronic document management system functionalities used in Sarawak State Government.	EDMS Functionalities Automated Information Capture. Federated Search & Retrieval. Collaborative Tools. Hierarchical File Indexing & Classification. Storage & Archival Method. Automated Workflow. Security & Audit Trail. Support & Administer Compliance	H5: Automated information capture has a significant positive relationship with information systems effectiveness H6: Federated search and retrieval has a significant positive relationship with information systems effectiveness H7: Collaborative Tools has a significant positive relationship with information systems effectiveness H8: Hierarchical file indexing and classification has a significant positive relationship with	DeLone and McLean IS Success Model (1992) Updated DeLone and McLean Information System Success Model (2002) Seddon's IS success model (Seddon, 1997)
		information systems effectiveness H9: Storage & archival method has a significant positive relationship with information systems effectiveness H10: Automated Workflow has a significant positive relationship with information systems effectiveness H11: Security & Audit Trail has a significant positive relationship with information systems effectiveness H12: Support & Administer Compliance has a significant positive relationship with information systems effectiveness	

To assess the influence of the functionalities' performance on the effectiveness of the electronic document management system.	Not Applicable	Not Applicable

3.6 Critical Reflection on the Theoretical Model

The present study builds on the DeLone and McLean framework and the Technology Acceptance Model (TAM) to analyse the effectiveness of the functionalities of Electronic Document Management System (EDMS) in the public sector. These models have been widely cited and empirically tested in the field of information systems in general and in specific studies on the quality of systems, information, and user satisfaction, and the perceived usefulness of the systems

The DeLone and McLean model of IS success offers valuable insight on the effectiveness of information systems and the interrelations of system quality, information quality, service quality, user satisfaction, and net benefit. Accordingly, the model offers specific relevance to this study as the effectiveness of EDMS systems is directly correlated to the quality system functionalities, and the quality of information produced. The same is true for the TAM model as it also adds to the depth of the analysis by positioning the usefulness of the system as a key driver to the acceptance of an information system by users. Moreover, it involves evaluating the effectiveness of the system in an organisation, particularly in situations where the performance of the organisation is impacted by the adoption of the system.

Both models have some imperfections. One of the flaws in the DeLone and McLean model is that its framework lacks too much specificity. It is too generalised to include certain EDMS-centric system functions such as automated workflows, federated search, system security, and compliance mechanisms. It also includes regulatory and organisational process aspects that are important, especially in the public sector, which is one of the shortcomings of the TAM model.

To amend these shortcomings, the present study augments the DeLone and McLean and TAM models to include EDMS tailored functionalities such as automated information capture, collaborative frameworks, hierarchical indexing, workflows, security supervision and audit trails, and compliance mechanisms. With these features included, the proposed and more nuanced research model fills the gap of context and practicality that is required to assess public sector EDMS.

In addition, the study recognises that there are organisational impacts of system effectiveness that are long-term, such as improving governance, compliance, and transparency, while there are some organisational impacts that are short-term. To some extent, these impacts are not felt, and user satisfaction and perceived system usefulness are important indicators of system effectiveness. Given the context of this research and the focus on system effectiveness as perceived by users, these are still relevant and defendable theoretical points.

The theoretical model utilised for analysis in the study is properly structured and versatile. Informed by accepted information systems theory, the model is normatively extended to incorporate current EDMS systems and the workings of the public sector. This model construct is then applied to enhance the clarity, accuracy and reliability of the model which assists in meeting the intended goals of the research.

3.7 Chapter Summary

This chapter discusses the interaction between the information system effectiveness and the EDMS functionalities to perform the automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; as well as support and administer compliance, to the electronic environment through the EDMS. A total of six theories and research models of previous studies were referred. Accompanying the theoretical framework is the research hypothesis. Building on the findings of previous studies, a total of twelves hypotheses was postulated and systematically tested in the study. The conceptual framework visually represents the relationships outlined in the hypotheses, integrating system quality, information quality, and EDMS functional capabilities as key determinants of user satisfaction, perceived usefulness, and information system effectiveness. In the diagram, Information Quality and System Quality influence both user satisfaction and perceived usefulness, reflecting the modified Seddon (1997) model. Simultaneously, functional capabilities, including automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; as well as support and administer compliance; directly contribute to information system effectiveness. This diagram also contextualizes these relationships within Sarawak's stateof-the-art digital ecosystem. This alignment ensures that the conceptual model not only represents theoretical relationships but also reflects the practical environment in which EDMS operates, bridging theory, technology, and public sector practice.

CHAPTER 4
RESEARCH METHODOLOGY

4.1 Introduction

This chapter provides a detailed account of the research methods employed in the study, specifically focusing on the hypothesized links between EDMS functionalities and information systems effectiveness (H1–H12) as derived from the theoretical framework presented in Chapter 3. The chapter is organized into ten sections: research approach; research methodology; research design; questionnaire development; measurement of variables; population; sampling and data collection; data analysis strategy; mapping of research objectives and research method; and finally, the chapter summary.

4.2 Research Approach

The research approach consists of a plan and procedure encompassing large assumption steps for systematic data collection, analysis and interpretation methods (Creswell, 2009). Therefore, it is focused on the nature of the research issue being addressed. In principle, the research methodology is divided into two categories which are the approach of data collection and the approach of data analysis or reasoning. Figure 4.1 presents the components of the research approach.

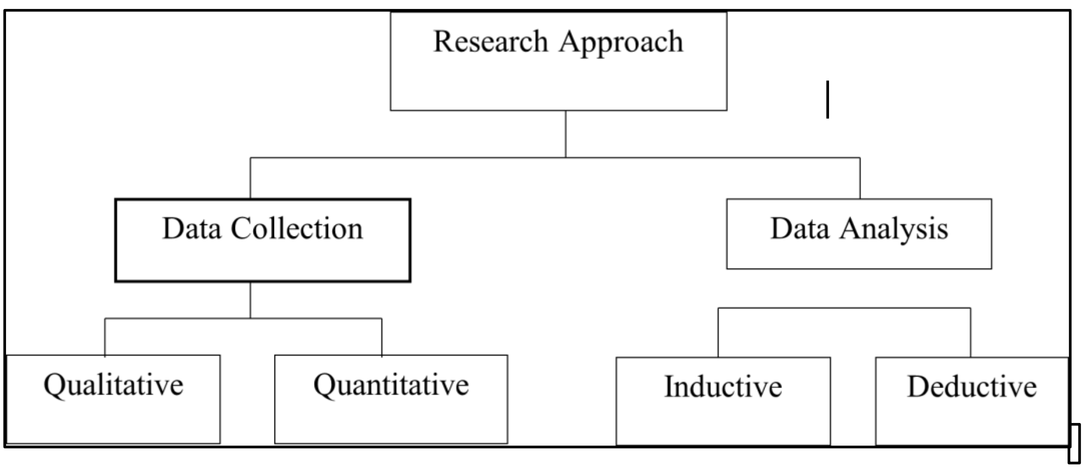

Figure 4.1 Component of research approach

The three common approaches to conducting research are quantitative, qualitative, and mixed methods. The researcher anticipated the type of data needed to answer the research questions. One of the three methods was selected by the researcher to perform research. Usually, researchers choose a quantitative approach to answer research questions that require numerical data, a qualitative approach to research questions that require textual data, and a mixed methods approach to research questions that require both numerical and textual data. For this study, a **quantitative approach** is adopted, as it allows the measurement of relationships between EDMS functionalities and information systems effectiveness (H1–H12) using numerical data. Quantitative research is particularly suitable for testing hypothesized relationships and examining the impact of independent variables on dependent variables in a systematic and replicable manner. Table 4.1 shows Creswell (2013), Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, Sage Publications.

Table 4.1
Cresswell (2013), Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, Sage Publications.

Tend to or typically	Qualitative Approaches	Quantitative Approach	Mixed Methods Approaches
Use these philosophical assumptions	Constructivist / transformative knowledge claims. Phenomenology, grounded theory, ethnography, case study, and narrative analysis.	Post-positivist knowledge claims Surveys and experiments	Pragmatic knowledge claims Sequential, concurrent, and transformative.
Employ these methods	Opened-ended questions, emerging approaches, text or image data	Closed-ended questions, predetermined approaches, and numeric data.	Both opened and closed-ended questions, both emerging and pre-determined approaches, and both quantitative and qualitative data and analysis.

Use these practices of research as the researcher	Position him or herself. Collect participant meanings. Focuses on a single concept phenomenon.	or	Test or verifies theories or explanations. Identities variables to study. Relates variables in questions or hypotheses. Uses standards of validity and reliability Observes and measures information numerically. Use unbiased approaches. Employs statistical procedures.	Collects both quantitative and qualitative data. Develops a rationale for mixing. Integrates the data at different stages of inquiry. Presents visual pictures of the procedures in the study. Employ the practices of both quantitative and qualitative research.

Quantitative research is specific as it builds on existing theories in its survey and experimentation (Leedy & Ormrod, 2001). The research itself is independent of the researcher. Consequently, data is used to objectively measure reality. Quantitative research creates meaning through objectivity uncovered in the collected data. In contrast, qualitative research is a holistic approach that involves discovery. Qualitative research is often defined as an unfolding model that takes place in a natural setting that allows the researcher to establish a level of detail from a high-level participation in actual experiences (Creswell, 2009). The quantitative data collection methods rely on random sampling and structured data collection instruments that fit diverse experiences into predetermined response categories. They produce results that are easy to summarize, compare, and generalize (Singh et al., 2009).

According to Creswell (2009), the researcher uses a quantitative approach if the problem is to identify factors that influence or best predict an outcome or to determine the utility of an intervention. The quantitative research is an approach to testing objective theories by analysing the relationship between variables. Therefore, it can in turn, measure these variables, usually on instruments, so that numbered data can be analysed using statistical procedure. In the context of this study, the researcher would position this study under positivism paradigm and subscribed to the quantitative approach. As stated by Creswell (2014), by using the research questionnaire and hypothesis, the problem in the research is reduced.

4.3 Research Methodology

This study adopted a quantitative research design informed by a Systematic Literature Review (SLR). The SLR establishes the theoretical foundation, identifies research gaps, and guides the development of the conceptual framework, research variables, and survey instrument. This empirical quantitative survey examined the effectiveness of Electronic Document Management System (EDMS) functionalities within selected government agencies in Sarawak. As mentioned in the research approach, the quantitative method is an effective research methodology for this study to address the research questions. In quantitative research approach, there are several different types of research methodology, namely (1) experimental; (2) observation; (3) case studies; (4) action research; (5) grounded theory; (6) survey; and (7) mixed methods (Sekaran and Bougie, 2016). In this study, due to its suitability for answering research questions and achieving research objectives, the survey research approach was adopted. According to Pinsonneault and Kraemer (1993), survey method has several distinct characteristics: first, the purpose of survey is (1) to generate quantitative descriptions of certain elements of the sample population; (2) the analysis of the survey may concentrate primarily on relationships between variables or on projecting findings descriptively to a predefined population; (3) survey research is a quantitative methodology that involves the collection of standardized data from, or about, the subjects under investigation or study; (4) the subjects of study may include individuals, groups, organizations or communities; as well as projects, applications, or systems. Secondly, the primary method for data collection involves posing structured and predefined questions to participants. Their responses, which may pertain to themselves or another analytical unit, form the data to be analysed. Thirdly, information is typically collected from a subset of the study population referred to as a sample and is gathered in a manner that allows for the generalization of the findings to the broader population.

In addition, the survey research is the process of gathering the respondent's details to explain, compare and describe. Survey research is defined as “the collection of information from a sample of individuals through their answers to questions” (Check & Schutt, 2012). Sekaran and Bougie (2016) found that survey is used in descriptive, exploratory, or even in casual research to collect data about the situations, events, or people. Subsequently, Pinsonneault and Kraemer (1993) stated that survey research is the most suitable when: (1) the central interest or concern is about the phenomena relating to questions like “what is happening?” and “how and why is it happening?”; (2) answering research questions relating to what, how much and how many; (3) control of the independent and dependent variables is not possible or not desirable; (4) the phenomena of interest must be studied in its natural setting, and (5) the phenomena of interest occur in current time or the recent past.

In order to outline the design and subsequent execution of a survey, researchers typically follow a flow plan or chart. The flow plan begins with the objectives of the survey, lists each step to be taken and ends with the final report (Mathiyazhagan & Nandan, 2010). Sekaran and Bougie (2016) stated that identifying a broad problem area, defining the problem statement, developing hypotheses, evaluating measures, collecting data, analysing data and interpreting data are the typical steps in a survey report.

Cooper and Schindler (2006) defined the process of research which leads to researcher to plan and succeed in the whole project. Researchers have to follow those series of steps, and they are: to identify the problem, to explore research questions and management questions; if required, to conduct exploratory study, to develop a research proposal, to draw a research design, purpose, scope, time and background of research, to outline research instrument for data collection, testing validity and reliability, to collect data by ways of observation, surveys and experiments, to analyze collected data systematically, and to report the finding results.

In the context of this study, the researcher has adopted survey research as a research methodology. The survey would provide a consistent response from the respondent. There are few choices available for the administration of a survey, including by mail, collective administration, online and administration in a public place (Sekaran & Bougie, 2016). Survey research is useful in describing the characteristics of a large population. This broad capacity can be provided by no other research method, which ensures a more accurate sample to gather targeted results in which to draw conclusions and make important decisions without bias.

4.4 Research Design

A research design is the strategic framework developed to address the research questions or test the hypotheses that initially prompted the study. According to Sekaran and Bougie, once the theoretical framework of the research is finalized, the subsequent step is to develop the research design. They further outlined the key components of research design, which include the purpose of the study, unit of analysis, types of investigation, sampling design, extent of researcher interference, time horizon, study setting, measurement and measures, as well as data collection and data analysis. Additionally, Edmonds and Kennedy (2017) added that the research design is the actual structure or framework that indicates (a) the time frame(s) in which data are collected, (b) when the intervention is implemented (or not), and (c) how many groups are involved. The following flow chart outlines the key steps followed in the research process, from the development of the theory and hypotheses to data collection, analysis, and testing

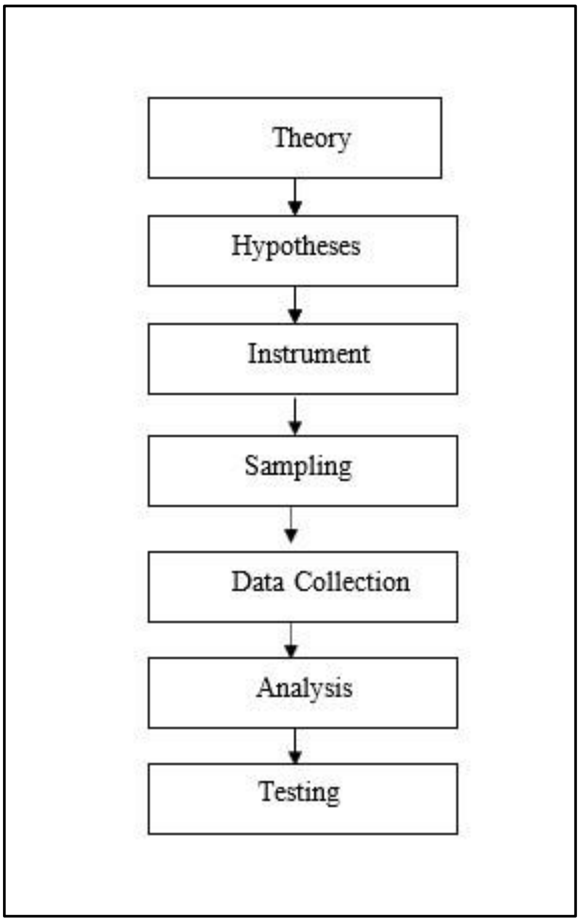

Figure 4.2 Research Design Roadmap

Research design can be considered as the rationale or master plan of a study that sheds light on how to conduct the study. This shows how all the main components of the research study, samples or groups, measures, treatments or services work together to resolve the research issues. On the other hand, Pinsonneault and Kraemer (1993) stated that the survey designs may be distinguished as cross-sectional or longitudinal, depending upon whether they exclude or include explicit attention to the time dimension. Therefore, effective research design depends on the issue or question addressed by the researcher. The cross-sectional design is possibly the most appropriate when the researcher's goal is to identify a population or document and test differences in a subset of the population at one point in time. Henceforth, the classic cross-sectional design collects data from a sample identified to represent the population of interest during that period.

In the context of this study, the researcher used the approach of Sekaran and Bougie (2013) as a research design for this study. The research design is comprehensive and suitable for the social science study. Under this research design, there are ten elements proposed consisting of the purpose of the study, extent of research interference, study setting, research strategies, measurement and measures, unit of analysis, sampling design, time horizon, data collection and data analysis. Figure 4.3 depicts the building blocks of the research design that had been used.

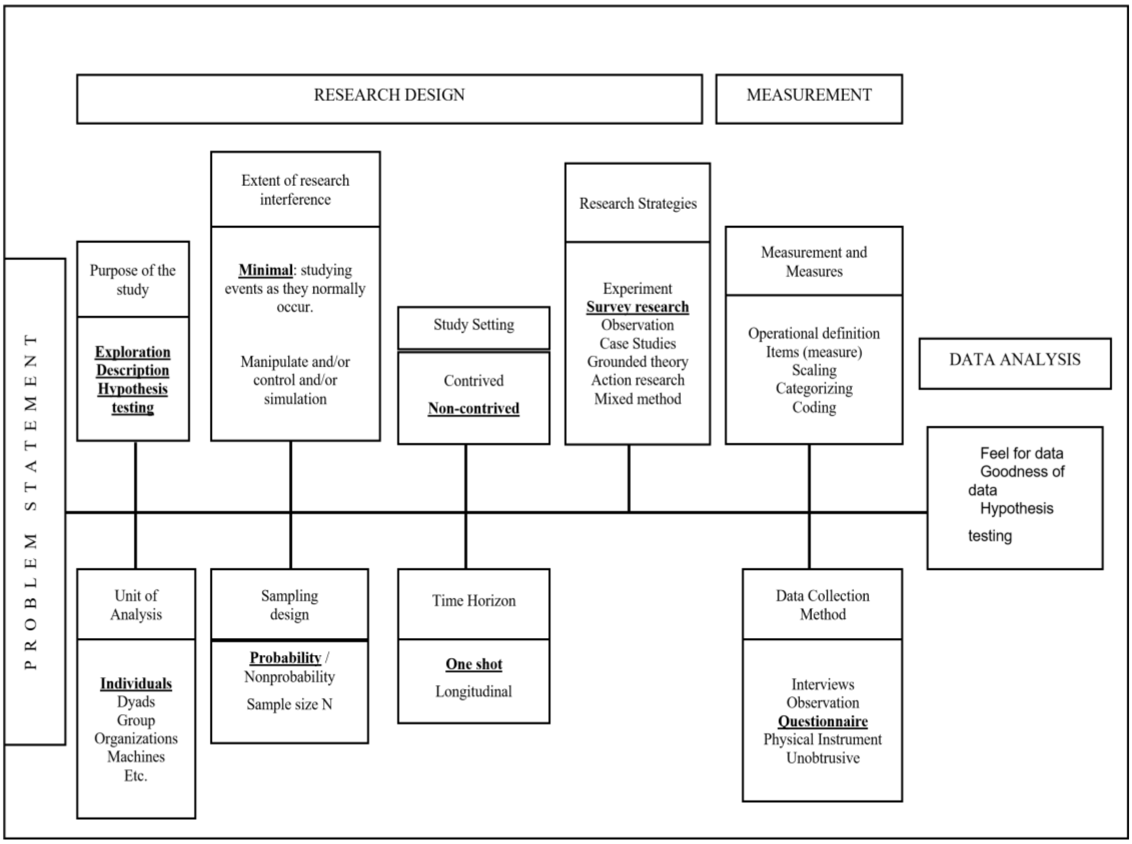

Figure 4.3 Research Design by Sekaran Bougie (2013)

According to Sekaran and Bougie (2013), the purpose of study can be classified into exploration, description and hypothesis testing. The nature of the study depends on the stage to which knowledge of the study topic has developed, whether it is exploratory, descriptive, or hypothesis testing. As far as this study is concerned, the purpose from the research design perspective, it is a combination of ***exploration, description, and hypotheses testing***. It is exploratory because in this study, based on the previous chapters, a study on electronic document management service in the government of Sarawak is still unavailable. Moreover, there is no framework available which consists of the whole dimension. Besides, the exploratory study is performed when not much is known about the situation or there is no information available on how similar issues or research problems have been solved in the past (Sekaran and Bougie , 2013). Therefore, exploratory research aims to clarify unclear problems. Typically, this type of study is carried out in the hope that subsequent research is carried out to provide further definitive evidence.

Furthermore, according to Cooper et al. (2003), exploration is particularly useful when the study field is new or so unclear that researchers only need to do an exploration to learn more about the issues at hand. It is also descriptive when the study also described the information system effectiveness of electronic document management system among the civil service in selected government agencies. In addition, the study also conducted a descriptive study to answer this study's research question as stated by Cooper et al. (2003) to address questions about who, what, why, where and sometimes how and understanding the characteristics of organisations following such common practises (Sekaran & Bougie, 2013). This study is categorised as a descriptive study when the researcher attempted to describe or identify a topic or when the study might include data collection known as the research variable (Cooper et al., 2003). Finally, this study is also categorized as hypothesis testing because twelves hypotheses were posited and tested to examine their validity or to determine the efficacy of something previously untried.

According to Sekaran and Bougie (2013), the three degrees of interference are namely minimal, moderate, and excessive. However, in this study, the researcher conducted the study in a natural environment in the Sarawak government agencies, that is considered as ***minimal interference***. In other words, the researcher did not disrupt the routine functioning of the government service. This study collected data using online questionnaire, while respondents were given ample time to answer the questionnaire. The questionnaire could be accessed via google form questionnaire in any devices, any time without specific condition involved during answering the survey. Hence, this research design for this study can be classified as minimal interference.

The study setting for any organizational research is normally divided into contrived or non-contrived (Sekaran & Bougie, 2013). Non-contrived setting relates to the natural environment while contrived setting is about artificial setting. Although Sekaran and Bougie (2013) found that business study can be done both ways either contrived or noncontrived setting, in a survey research, the setting is normally non-contrived. Normally, non-contrived setting involves in a study that required establishing of the correlation study. On the other hand, for the action research, field experiment and lab experiment are examples of studies that usually employ contrived or artificial setting.

As for this study, the setting used was considered ***non-contrived*** as the natural environment is preferred to analyse the assessment of the electronic document management system. In designing the methodology, sustainable practices have been incorporated to ensure environmental, operational, economic, and social responsibility. This includes the use of digital data collection and management to minimize paper use. Quantitative methods were selected to enable systematic measurement of relationships among variables and to generate objective, generalisable findings within the context of Sarawak's government sector.

The systematic literature review (SLR) was undertaken using publications from 2015 to 2025 to capture the most recent developments relevant to the research topic. Databases such as Scopus and Web of Science were used, within all references exported in RIS format for use in VOSviewer. The SLR informed (1) identification of constructs and variables (2) questionnaire design (3) hypothesis development (4) understanding of context-specific issues in Sarawak. The SLR process involves identification, screening, eligibility checks, and inclusion of studies.

Next, the categories of research strategies comprise seven research strategies suggested by Sekaran and Bougie (2013) in the research design, namely experiment, survey research, observation, case studies, grounded theory, action research, and mixed methods. In general, experiments are related to deductive research and a scientific or hypotheticaldeductive approach to research. Experimental designs are less useful for many researches, for instance social science field (Sekaran & Bougie, 2013). Survey research is a method for collecting information from or about individuals in order to describe, compare, or explain their knowledge, attitudes, and behaviors. The survey system involves the setting of data collection objectives, the design of the study, the preparation of a reliable and valid survey tool, the administration, management and analysis of survey data and the reporting of results.

In social science studies, the method is popular as it allows the researcher to collect quantitative or qualitative data on many types of research questions. On the other hand, observation is a research strategy to collect data on actions and behaviours of people. It involves observing natural setting of people, watching, describing and analyzing what people are doing and interpreting what one has seen. Normally, this research strategy is adapted by qualitative research. Subsequently, the case studies focus on collecting information about a specific object, event or activity, such as a particular business unit or organization. In case studies, the case is the individual, group, organisation, event, or situation in which the researcher is interested in. The next research strategy is the grounded theory. It is a systematic set of procedures to be developed, and a theory derived from data inductively. According to Sekaran and Bougie, theoretical sampling, coding, and constant contrast are important instruments of grounded theory. Usually, grounded theory is adapted by qualitative study with regard to the behaviour of the research setting.

The last two research strategies, action research and mixed methods are both equally important. Studies using action research aim to address a practical problem in the research setting while also contributing to the knowledge of the phenomenon. Action research is a reflective process of progressive problem solving led by individuals working with others in teams or as part of a "community of practice". Action research is sometimes carried out by consultants who want to initiate organisational change processes. The most important is that action research is always relevant to the participants. Sagor (2000) listed seven steps of action research including (1) selecting a focus; (2) clarifying theories; (3) identifying research questions; (4) collecting data; (5) analyzing data; (6) reporting results; and (7) taking informed action.

The last research strategies proposed in the research design is a mixed method. Mixed methodologies are used when it is appropriate to conduct both comparative analysis and the development of aspects of the research comprehensively and in depth. Using mixed approaches, the limitations of quantitative and qualitative methodologies can be overcome, enabling the researcher to obtain rich information that cannot be obtained using either method alone. Creswell (2009) has more complete and exhaustive definition stating "mixed methods research is a research design (or methodology) in which the researcher collects, analyzes, and mixes (integrates or connects) both quantitative and qualitative data in a single study or a multiphase program of inquiry". However, in this research context, the researcher is completely using ***survey research*** as the centre of the research strategies.

In general, the unit of analysis refers to "the level of aggregation of the data collected during the subsequent data analysis stage" (Cavana et al., 2001). In this study the unit of analysis is the individual employees of the selected Sarawak State Government agencies. In other words, the unit of analysis is ***individual level***. This study has been focused on assessment of the performance of services and effectiveness of

Electronic Document Management System at the Sarawak State Government agencies. The target respondents in the study were employees who have used Electronic Document Management System.

In general, sampling techniques are generally categorised into two types: 1) probability sampling, also known as random sampling, and 2) probability sampling means that every item in the population has an equal chance of being included in sample. Probability or random sampling has the greatest freedom from bias but may represent the costliest sample in terms of time and energy for a given level of sampling error (Brown, 1947). In contrast, the non-probability sampling is often associated with case study research design and qualitative research. With regards to the above, case studies tend to concentrate on small samples and are intended to investigate a real-life phenomenon, not to draw statistical inferences with respect to the broader population (Yin, 2014). In the context of this study, probability sampling was the sample design. The center of population for this study is the Sarawak State government service in selected government agencies.

Time horizons are needed for the research design independent of the research methodology used (Saunders et al., 2000). There are two types of time horizons namely longitudinal and cross-sectional. Longitudinal studies are repeated over an extended period while cross sectional studies are limited to a specific time frame. This research is also limited to a specific time frame, hence the ***cross-sectional or one-shot time*** horizon is used.

4.5 Questionnaire Development

In terms of methodological approach, the main research strategy that contributes to the study is questionnaire development, in which the output from the literature review and second preliminary study previously carried out forms the basis for constructing each item, sub-dimension, and dimension in the entire conceptual framework. In the context of quantitative research methodologies, the utilization of questionnaires represents one of the most prevalent and extensively employed methods for data collection. The majority of researchers adopting a positivist paradigm predominantly rely on questionnaires as a primary instrument for data collection. The questionnaire contained questions relating to all variables that have been included in the conceptual framework of this study. Basically, a questionnaire is a structured technique for gathering primary data. It is often composed of a series of written questions that the respondents must respond to in writing (Bell, 2005). While authors, such as Kabir (2016) provide a fairly restrictive definition of questionnaires, which is a list of questions that are either open-ended or closed, to which the respondents must provide answers, while other authors offer a more expansive definition such as any text-based instrument that provides survey participants with a series of questions or statements to respond to, either by marking the pages, writing numbers or checking boxes on paper or by responding online (Brown, 2001).

Among other reasons, the merits of adopting questionnaire in research are (i) cheap to administer especially on printing, designing, postage or electronic distribution; (ii) allow for greater geographical coverage without incurring additional cost of time and travel; (iii) reduces biasing error caused by the characteristics of the interviewer and their skills; (iv) provides greater anonymity for the respondent (Wright, 2005). This was also mentioned by Kothari (2004) that questionnaire in research indicates: (i) low cost; (ii) free from bias; (iii) adequate time; (iv) can be reached conveniently; and (v) large samples can be made use of with reliable results. Apart from that, a good questionnaire should be comparatively short and simple; and logical sequence moving from easy to more difficult questions. Questions using ambiguous language, such as technical terms and vague expressions can be interpreted differently should be avoided.

However, in this study, the researcher adopted the guidelines for questionnaire design listed by Nemoto and Beglar that (2014) listing five steps for developing questionnaire: (i) understanding the construct, (ii) developing the items, (iii) determining the outcome space, (iv) specifying the measurement model, and (v) gathering feedback and piloting the questionnaire. They also claimed that Likert scale (measurers individual differences) are the examples of such scales used widely in the social science research. The Liker scale is easy to construct and is likely to yield a scale that is reliable. Furthermore, from the viewpoint of the participants, it is easy to read and complete the questionnaire. The advantages of using Likert scale questionnaire are:

(i) data can be gathered relatively quickly from large numbers of respondents;
(ii) can provide highly reliable person ability estimates;
(iii) validity of the interpretations made from the data they provide can be established through a variety of means; and

(iv) data provided can be profitably compared, contrasted, and combined with qualitative data-gathering techniques, such as open-ended questions, participant observation, and interviews (Nemoto and Beglar, 2014).

This study used measurement instruments created from previously established project scales. The constructs measured included EDMS functionalities and the effectiveness of an information system. These constructs had well-established instruments created from the literature ensuring validity and reliability. The validity of the instruments was chosen and reported on due to the level of content validity and construct validity they had. For instance, the scales measuring EDMS functionalities were derived from the studies of Hamzah et al. (2018), who ensured that measurement items accurately represented the EDMS functionalities.

For reliability, the values of Cronbach alpha were measured for each of the scales at the pilot level, and they ranged from 0.82 to 0.98. Hence, all constructs were termed as being high in reliability. The values were above the threshold of 0.7, therefore the instruments were consistent and reliable. Observed to be relevant, the instruments used led to the study context, which was on the functionalities of Electronic Document Management Systems (EDMS) in the government sector. The items were contextualised to the government of Sarawak carrying specific processes and practices in those agencies.

Thus, this study also used Likert scale approach for measuring all the variables. The structure and contents of the questionnaire are shown in Table 4.2. The process for developing the questionnaire is discussed in subsequent sections.

Table 4.2
Structure and contents of the questionnaire

Part	Contents
	Definition of EDMS
Part	Contents

Part A	Demographic Information Gender Age Educational Level Year of Service Level of Employment EDMS use experience
Part B	Questions related to EDMS Functionalities Automated Information Capture. Federated Search & Retrieval Collaboration Tools. Hierarchical File Indexing & Classification. Storage and Archival Method. Automated Workflow. Security and Audit Trail. Support Administer Compliance. Questions related to Information System Success Information Quality. System Quality. Satisfaction. Perceived Usefulness.
Part C	Other Questions related to Electronic Document Management System (EDMS) in organization. EDMS being used Comment and suggestion

4.5.1 Likert Scale

Various types of rating scales have been produced in previous studies. In information system studies, the use of perceptual evaluation of the performance of information systems (IS) is quite common. Due to the difficulties in measuring certain construct such as satisfaction and effectiveness, the perceptual measures with corresponding Likert scale are adopted. The original Likert scale, developed by American social scientist, Dr. Rensis Likert in 1932 stated that Likert scale is a collection of statements (items) that are presented in response to a real or hypothetical situation under study (Bhattacherjee, 2012). Participants are requested to indicate their level of agreement with the provided statements (items) using a metric scale, typically ranging from “strongly disagree” to “strongly agree” (McLeod, 2008). Each surveyed subject was asked to evaluate each variable based on a 7-point Likert-type scale ranging from (strongly disagree) to (strongly agree). The justification of using seven points instead of five was due to the high degree of accuracy that can be obtained, hence leading to a sensitive and robust measure (Finstad, 2010). Likewise, Preston and Colman (2000) added that 7-point scale provides more varieties of options which in turn increase the probability of meeting the objective reality of people.

In this study, all variables appearing in the framework were namely EDMS functionalities (automated information capture; federated search and retrieval; collaboration tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; and support administer compliance) and Information System Effectiveness (information quality; system quality; satisfaction; and perceived usefulness). A survey instrument was designed based on the revised research model drew upon established frameworks and findings from prior studies (DeLone & McLean, 2002). Despite an extensive review of existing literature, no established models for measuring EDMS functionalities were identified. Consequently, new measurement items were developed, and their validity and reliability were rigorously evaluated to ensure the utilization of robust and credible instruments.

4.5.2 Pretesting of Questionnaire

Pre-testing of the questionnaire implies the stage of questionnaire’s development that determines its potential effectiveness. Questionnaire may have to be designed with only a modicum of knowledge about the subject which mistakes are bound to occur unless the questionnaire is tested (Hague, 1987). Thus, before distributing the questionnaire to the target demographic, a pre-test is undertaken to ensure validity of the instrument as mentioned by Sekaran and Bougie (2013). Pre-testing is one of the techniques to improve the instruments and a test of the appropriateness and understanding of the question in the survey. Another reason for conducting pre-testing is to evaluate the individual questions and to ascertain whether they form a cohesive, smoothly flowing questionnaire (Oksenberg & Kalton, 1991). Furthermore, it is critical to perform a pre-testing exercise because there are no other alternatives that can substitute for the amount of intellectual exercise required other than feedback from possible participants. Hence, pre-testing the questionnaire is a critical step to validate the identified problem areas, minimize measurement error, reduce respondent burden, ascertain that respondents interpret the questions accurately, and ensure that the sequence of questions is not bias or does not influence the responses provided (Collins, 2003).

Although there is unclear standard number of pre-testing evaluators, Babonea and Voicu (2008) suggested three to eight evaluators for the pre-testing. However, in practice, they are people who can use their theoretical knowledge of, and considerable expertise in, survey construction to critique questionnaires (Ikart, 2019). The process of pre-testing the questionnaire in this study involved several experts and prospective respondents to engage in the pre-testing exercise (Burton & Mazerolle, 2011) which four experts from the Faculty of Information Management, Universiti of Teknologi MARA participated in the pre-testing exercise and another four were the prospective respondents from the field of study that involved expert from the agencies of Sarawak Government.

To approach the evaluators, a formal letter from the Faculty of Information Management was sent to seek permissions to conduct the pre-testing of the questionnaire. Personal meetings were made with each of these professional academicians, while the experts from the field were contacted via email due to geographical distancing as researcher was in Shah Alam while the experts from the field were in Sarawak. Two weeks to one month were given to the evaluators to read, understand and review the questionnaire before meeting up face-to-face with the professional academicians and telephone conversation with the expert from the field. Table 4.3 shows the list of evaluators involved in this study.

Table 4.3
List of Evaluation

No.	Panel Experts	The time frame to study the instrument	Date of appointment
	University of Technology MARA:		
1	Senior Lecturer, PhD 1	One week	25 February 2020
2	Senior Lecturer, PhD 2	One week	19 February 2020
3	Senior Lecturer, PhD 3	One week	19 February 2020

4	Senior Lecturer, PhD 4	One week	26 February 2020
	Sarawak Government Agencies:		
5	Chief Executive Officer, (VK7) Pustaka Negeri Sarawak	Two weeks	20 February 2020
6	Chief Assistant Director, (N48) Chief Minister Department	Two weeks	20 February 2020
7	Assistant Director, (N44)	Two weeks	20 February 2020
8	Administrative Officer, (N44)	Two weeks	20 February 2020

The validity of a survey instrument can be evaluated using a variety of techniques and tools, including instrument validity, internal validity, content validity, and construct validity. Thus, content validity indexes were frequently computed by previous researchers as proof of their findings' validity (CVI) (Polit and Beck, 2006). In the context of this study, labels for the four points were 1 = No relevance at all, 2 = Items need some revision, 3 = Relevant but need minor revision, and 4 = Very relevant. Then, for each item, the content validity index for items (I-CVI) was computed as the number of experts giving a rating of either 3 or 4 (thus dichotomising the ordinal scale into relevant and not relevant) divided by the total number of experts in this study being 6. Lynn (1986) suggested I-CVIs of no lower than 0.83 if there were 6 experts in total. Content validity index for scales (SCVI) was another type of content validity analysis that was conducted to measure the content validity of the overall scale including Universal Agreement (UA) and Ave (Average). Table 4.4 until Table 4.17 show the results for the content validity, while Table 4.18 shows the summarised results.

Table 4.4
I-CVI and S CVI/AVE for Automated Information Capture (AIC)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
AIC1	X	X	X	X	X	X	X	X	8	1.00
AIC2	X	X	X	X	X	X	X	X	8	1.00
AIC3	X	X	X	X	X	X	X	X	8	1.00
AIC4	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.5
I-CVI and S-CVI/AVE for Federated Search & Retrieval (SFR)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
FSR1	X	X	X	X	X	X	X	X	8	1.00
FSR2	X	X	X	X	X	X	X	X	8	1.00
FSR3	X	X	X	X	X	X	X	X	8	1.00
FSR4	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.6
I-CVI and S-CVI /AVE for Collaborative Tools (CT)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
CT1	X	X	X	X	-	X	X	X	7	0.88
CT2	X	X	X	X	-	X	X	X	7	0.88
CT3	X	X	X	X	-	X	X	X	7	0.88
CT4	X	X	X	X	-	X	X	X	7	0.88
CT5	X	X	X	X	-	X	X	X	7	0.88
Proportion Relevant:	1.00	1.00	1.00	1.00	0	1.00	1.00	1.00	Mean I-CVI:	**0.88**
									S-CVI/UA:	**0**
									S-CVI/AVE:	**0.88**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.7
I-CVI and S-CVI/AVE for Hierarchical File Indexing and Classification (HFIC)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
HFIC1	X	X	-	X	-	X	X	X	6	0.75
HFIC2	X	X	X	X	-	X	X	X	7	0.88
HFIC3	X	X	X	X	-	X	X	X	7	0.88
HFIC4	X	-	X	X	-	X	X	X	6	0.75
HFIC5	X	X	-	X	-	X	X	X	6	0.75
Proportion Relevant:	1.00	0.80	0.60	1.00	0	1.00	1.00	1.00	Mean I-CVI:	**0.80**
									S-CVI/UA:	**0**
									S-CVI/AVE:	**0.80**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.8
I-CVI and S-CVI/AVE for Storage and Archival Method (SAM)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
SAM1	X	X	X	X	X	X	X	X	8	1.00
SAM2	X	X	X	X	X	X	X	X	8	1.00
SAM3	X	X	X	X	X	X	X	X	8	1.00
SAM4	X	X	X	X	X	X	X	X	8	1.00
SAM5	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.9
I-CVI and S-CVI/AVE for Automated Workflow (AW)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
AW1	X	X	X	X	X	X	X	X	8	1.00
AW2	X	X	X	X	X	X	X	X	8	1.00
AW3	X	X	X	X	X	X	X	X	8	1.00
AW4	X	X	X	X	X	X	X	X	8	1.00
AW5	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.10
I-CVI and S-CVI/AVE for Security and Audit Trail (SAT)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
SAT1	X	X	X	X	X	X	X	X	8	1.00
SAT2	X	X	X	X	X	X	X	-	7	0.88
SAT3	X	X	X	X	X	X	X	X	8	1.00
SAT4	X	X	X	X	X	X	X	X	8	1.00
SAT5	X	X	X	X	X	X	X	X	8	1.00
SAT6	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	Mean I-CVI:	**0.98**
									S-CVI/UA:	**0.83**

S-CVI/AVE:	**0.98**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.11
I-CVI and S-CVI/AVE for Support Administer Compliance (SAC)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
SAC1	X	-	X	X	X	X	X	X	7	0.88
SAC2	X	-	X	X	X	X	X	X	7	0.88
SAC3	X	-	X	X	X	X	X	X	7	0.88
SAC4	X	-	X	X	X	X	X	X	7	0.88
SAC5	X	-	X	X	X	X	X	X	7	0.88
Proportion Relevant:	1.00	0	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**0.88**
									S-CVI/UA:	**0**
									S-CVI/AVE:	**0.88**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.12

I-CVI and S-CVI/AVE for Information Quality (IQ)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
IQ1	X	X	X	X	X	X	X	X	8	1.00
IQ2	X	X	X	X	X	X	X	X	8	1.00
IQ3	X	X	X	X	X	X	X	X	8	1.00
IQ4	X	X	X	X	X	X	X	X	8	1.00
IQ5	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.13

I-CVI and S-CVI/AVE for System Quality (SQ)

Item	**Expert 1**	**Expert 2**	**Expert 3**	**Expert 4**	**Expert 5**	**Expert 6**	**Expert 7**	**Expert 8**	**Number of Agreement**	**Item CVI**
SQ1	X	X	X	X	X	X	X	X	8	1.00
SQ2	X	X	X	X	X	X	X	X	8	1.00
SQ3	X	X	X	X	X	X	X	X	8	1.00
SQ4	X	X	X	X	X	X	X	X	8	1.00

SQ5	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.14
I-CVI and S-CVI/AVE for User Satisfaction (S)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
S1	X	X	X	X	X	X	X	X	8	1.00
S2	X	X	X	X	X	X	X	-	7	0.88
S3	X	X	X	X	X	X	X	X	8	1.00
S4	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	Mean I-CVI:	**0.97**
									S-CVI/UA:	**0.75**
									S-CVI/AVE:	**0.97**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.15
I-CVI and S-CVI /AVE for Perceived Usefulness (PU)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
PU1	X	X	X	X	X	X	X	X	8	1.00
PU2	X	X	X	X	X	X	X	X	8	1.00
PU3	X	X	X	X	X	X	X	X	8	1.00
PU4	X	X	X	X	X	X	X	X	8	1.00
PU5	X	X	X	X	X	X	X	X	8	1.00
PU6	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	**1.00**
									S-CVI/UA:	**1.00**
									S-CVI/AVE:	**1.00**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.16
I-CVI and S-CVI/AVE for Demographic Information (DI)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Number of Agreement	Item CVI
DI1	X	X	X	X	X	X	X	X	8	1.00
DI2	X	X	X	X	X	X	X	X	8	1.00

DI3	X	X	X	X	X	X	X	X	8	1.00
DI4	X	X	X	X	X	X	X	X	8	1.00
DI5	X	-	X	X	X	X	X	X	7	0.88
DI6	X	X	X	X	X	X	X	-	7	0.88
DI7	X	X	X	X	X	X	X	X	8	1.00
DI8	X	X	X	X	X	X	X	X	8	1.00
DI9A1	X	X	X	X	X	X	X	X	8	1.00
DI9A2	X	X	X	X	X	X	X	X	8	1.00
DI9B	X	X	X	X	X	X	X	X	8	1.00
DI9C	X	X	X	X	X	X	X	X	8	1.00
Proportion Relevant:	1.00	0.92	1.00	1.00	1.00	1.00	1.00	0.92	Mean I-CVI:	**0.98**
									S-CVI/UA:	**0.92**
									S-CVI/AVE:	**0.98**

Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.78 and S-CVI/AVE is 0.90 for 8 experts

Table 4.17
Summary of Content Validity

Construct	No. of Items	I-CVI (>=0.83)	S-CVI/Ave (>=0.90)
Automated Information Capture	4	1.00	1.00
Federated Search and Retrieval	4	1.00	1.00
Collaboration Tools	5	0.88	0.88
Hierarchical File Indexing and Classification	5	0.80	0.80
Storage and Archival Method	5	1.00	1.00
Automated Workflow	5	1.00	1.00
Security and Audit Trail	6	0.98	0.98
Support Administer Compliance	5	0.88	0.88
Information Quality	5	1.00	1.00
System Quality	5	1.00	1.00
Satisfaction	4	0.97	0.97
Perceived Usefulness	6	1.00	1.00
Demographic Information	12	0.98	0.98

Item-level computations (I-CV) and scale-level computations (S-CV) were calculated based on mean value calculation to get extensive results of the content validity. I-CV was calculated based on accumulated expert rated either value 3 or 4 only in each item and divided by total number of validators. The I-CVI for all the items of the dimensions ranged from 0.80 to 1.00. The S-CVI (Average) for dimensions of automated information capture; federated search and retrieval; collaboration tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; support administer compliance; information quality; system quality; satisfaction; perceived usefulness and demographic information also ranged from 0.93 to 1.00. The overall S-CVI for each relevancy and clarity rating were 1.00 and met the guideline of content validity index's S-CVI value (Lynn, 1986) which indicated high content validity of the items for the construct of EDMS functionalities and IS effectiveness. All constructs were maintained because they had a relatively high level of consensus among the experts. It can be concluded that the scores obtained for pre-testing were higher than the suggested threshold and that the constructs selected for the research instrument were reliable and valid.

Table 4.18 shows details of I-CVI and S-CVI calculation for relevancy and clarity scale in content validation as rated by the expert, which summarises the feedback gained from the pre-testing session. There were several issues identified including errors like spelling mistakes and double-barrelled questions. Apart from that, grammar and some vague terms were found in the proposed questionnaire. The length of the questionnaire was also highlighted. Some changes and updates were made to the questionnaire based on validators' feedback throughout the development of the instrument. The researcher conducted a pilot study to evaluate the questionnaire and determine its Cronbach's Alpha values, following the experts' recommendation that no more adjustments be made during the preliminary testing.

Table 4.18
Pretesting Comments Provided by the Experts

Expertise	Dimension	Question	Comments / Feedback	Action Taken
Senior Lecturer 1 **Senior Lecturer 3** **Senior Lecturer 4**	Automated Information Capture	2. enable me to capture and store digital files through high-volume scanning and OCR	Double barrel questions. Put one word that represent "to capture and store" so it can be placed in a bracket as an example. Split into two questions as this is a double barrel question.	The researcher has made changes according to the feedback from the expert.
Senior Lecturer 1		4. enable me to capture details of document automatically such file classification	Put the word "such file classification" in a bracket.	The researcher has made changes and put "such file classification" in bracket.
Senior Lecturer 2		2. enable me to capture and store digital files through high-volume scanning and OCR	To change question number 2 to number 1	The researcher has made changes and put "such file classification" in bracket.
Senior Lecturer 2		3. allow me to create document from network folders, Microsoft-office and other integrated systems	to add word "computer" before "network"	The researcher has made changes and put "such file classification" in bracket.
Senior Lecturer 2		4. enable me to capture details of document automatically such file classification	To put more example apart from file classification	The researcher has made changes and put "such file classification" in bracket.
Professional 1		EDMS and OCR	To write in full	The researcher has made changes according to the feedback from the expert
Professional 1		3 allow me to create documents from network folders, Microsoft office and other integrated systems.	allow me to create documents from network folders, Microsoft office and/or other integrated system(s).	The researcher has made changes according to the feedback from the expert
Professional 3		The EDMS that I use:	The EDMS that I use enables:	The researcher has made changes according to the feedback from the expert

Expertise	Dimension	Question	Comments / Feedback	Action Taken
Professional 3		enable me to transform paper documents into digital files through high-volume scanning and OCR.	~~enable~~ me to transform paper documents into digital files through high-volume scanning and OCR.	The researcher has made changes according to the feedback from the expert
Senior Lecturer 1	Federated Search & Retrieval	1. To search 2. To locate 3. To access 4. To upload	Consider adding one more question on "to store"	
Senior Lecturer 2 Senior Lecturer 3 Senior Lecturer 4		3. enable me to access the full content.	to complete the sentences after full content (full content of…?) (…of file or document) to change the question into "enable me to access any files or documents	
Professional 1	Federated Search & Retrieval	The EDMS that I use:	The use of acronyms must be used first with its full wordings. The Electronic Document Management System that I use enables:	The researcher has made changes according to the feedback from the expert
		4. enable me to upload the documents to the system	to replace "to the system" to be "into the system"	The researcher has made changes according to the feedback from the expert
Senior Lecturer 1 Senior Lecturer 3		3. allow me to the create, upload and categorize new documents without leaving certain interface	To rearrange the question and put one word to represent "create, upload and categorize" to avoid double barrel question.	The researcher has made changes based on the feedback from the expert

Senior Lecturer 2	Collaboration Tools	1. provide me with the ability to quickly work together on document changes	To omit word “quickly”	The researcher has made changes according to the feedback from the expert
		4. enable all users involved in the workflow be notified as tasks are completed by each stage	To replace word “as’ to “when” and word “by” to “at”	The researcher has made changes according to the feedback from the expert
Senior Lecturer 4		4. enable all users involved in the workflow be notified as tasks are completed by each stage	Change the sentences to “enable to notify all users as tasks are completed at each stage”	The researcher has made changes according to the feedback from the expert
Professional 1		1. provide me with the ability to quickly work together on document changes	work together with who? Or with what?	

Senior Lecturer 4		**4. enable all users involved in the workflow be notified as tasks are completed by each stage**	**Change the sentences to “enable to notify all users as tasks are completed at each stage”**	**The researcher has made changes according to the feedback from the expert**
Professional 1		1. provide me with the ability to quickly work together on document changes	work together with who? Or with what?	

Professional 1	Collaboration Tools	2. easy for me to create and edit documents directly within the system.	is easy for me to create and edit documents directly within the system	The researcher has made changes according to the feedback from the expert
Professional 1		3. allow me to the create, upload and categorize new documents without leaving certain interface	allows me to the create, upload and categorize new documents without leaving certain interface	The researcher has made changes according to the feedback from the expert
Professional 1		4. enable all users involved in the workflow be notified as tasks are completed by each stage.	enables all users involved in the workflow be notified as tasks are completed by each stage.	The researcher has made changes according to the feedback from the expert

Senior Lecturer 1	Hierarchical File Indexing & Classification	enable me to refer to an index to determine the location of a file or document	To rearrange the sentences as: "enable me to determine the location of a file or document through index"	The researcher has made changes based on the feedback from the expert
Senior Lecturer 4		enable me to refer to an index to determine the location of a file or document.	To change the sentences to "enable me to refer an index in determining the location of a file or document"	The researcher has made changes according to the feedback from the expert
		enable me to index large documents at several levels of structure	Enable me to index large documents at several levels of EDMS process	The researcher has made changes based on the feedback from the expert
Senior Lecturer 3		Questions 1 – 5	The phrase of questions seems too technical for layman to understand	The researcher has made changes according to the feedback from the expert
Senior Lecturer 2		enable me to identify the management responsibility for a group of records	to replace "management responsibility" to "ownership responsibility"	
Professional 1		The existing EDMS that I use:	The existing EDMS that I use enables:	The researcher has made changes according to the feedback from the expert
Expert	**Dimension**	**Question**	**Comments / Feedback**	**Action Taken**
		enable me to refer to an index to determine the location of a file or document (and for all questions under this section)	enable me to refer to an index to determine the location of a file or document	The researcher has made changes according to the feedback from the expert
Senior Lecturer 1	Storage and Archival Methods	enable me to change the status from open file/document to closed file/document	To choose either "open file" or "open document" and "close file" or "close document"	The researcher has made changes based on the feedback from the expert
		4 enable me to do documents/records inventories	To be consistent in using file/ document or documents/records	The researcher has made changes based on the feedback from the expert

Expert	Dimension	Question	Comments / Feedback	Action Taken
Professional 1		The existing EDMS that I use:	The existing EDMS that I use enables:	The researcher has made changes according to the feedback from the expert
Professional 1		enable me to save the document into archival folder	enable me to save the document into archival folder	The researcher has made changes according to the feedback from the expert
Senior Lecturer 1	Automated Workflows	The existing EDMS that I use enable me	To add “to” at the end of the question	The researcher has made changes based on the feedback from the expert
Senior Lecturer 2		5. To respond to my prompted task and clicks submit.	To omit “and clicks submit”	The researcher has made changes according to the feedback from the expert
Senior Lecturer 2		Questions 2 – 4	Questions are too long and ambiguous	
Professional 1		The existing EDMS that I use enable me	The existing EDMS that I use enables me	The researcher has made changes according to the feedback from the expert
Senior Lecturer 1	Security & Audit Trails	The existing EDMS that I use enable me	To add “to” at the end of the question	The researcher has made changes based on the feedback from the expert
Senior Lecturer 1 Senior Lecturer 2		To lock to allow simultaneous editing	to omit “to lock” and to start with “to allow simultaneous editing”	The researcher has made changes based on the feedback from the expert
Senior Lecturer 4		3 To lock to allow simultaneous editing	to change the sentences “To lock in allowing simultaneous editing”	The researcher has made changes according to the feedback from the expert
Senior Lecturer 2		5. To track the creation and editing – i.e., who did what to which file	to omit example	The researcher has made changes according to the feedback from the expert

Professional 1		1. To check-in/check-out of content creation and editing	To check-in/check-out ~~of~~ content creation and editing	The researcher has made changes according to the feedback from the expert
Professional 3		The existing EDMS that I use enable me to:	The existing EDMS that I use enable me ~~to~~:	The researcher has made changes according to the feedback from the expert
		2. To check-in/check-out of content creation and editing	2. To check-in/ or check-out of content creation and editing	The researcher has made changes according to the feedback from the expert
Senior Lecturer 1	Support and administer compliance	2. design and implement controls to protect an organization from those risks	to refine the question and to add as below" "..design and implement internal system of control…"	The researcher has made changes based on the feedback from the expert
Senior Lecturer 1		3. monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks	double barrel "monitor and report" to omit "and the organization's exposure to risks"	The researcher has made changes based on the feedback from the expert
Senior Lecturer 2		EDMS that I use enable me to:	is administrator / person responsibility and not EDMS	Misunderstanding on the statement by Senior Lecturer 2. The researcher decided to retain the question as other 7 experts agreed with this construct questions.
Senior Lecturer 3		Questions 1 – 3	Double barrel questions, too long and ambiguous phrases too.	
Senior Lecturer 4		1. identify and manage regulatory risk. 5. impose on rules and controls of risks	identify the regulatory risk (manage is cater in item 5)	
Senior Lecturer 4			How about revision of regulation? Suggest adding another 1 item to measure on this.	

Professional 1		EDMS that I use enable me to	EDMS that I use enables me to	The researcher has made changes according to the feedback from the expert

Expert	Dimension	Question	Comments / Feedback	Action Taken
Senior Lecturer 4	Information System Success	1. Information Quality 1.5 Available on time for its intended use	Please change the sentences to "The information is available on time for its intended"	The researcher has made changes according to the feedback from the expert
		2. System Quality 2.5 Response to an instruction of the EDMS is fast.	Change the sentences to "Response to the system features of the EDMS is fast"	The researcher has made changes according to the feedback from the expert
		4. Perceived Usefulness 4.5 makes it easier to do my jo	Spelling: jo (Correction: job)	The researcher has made changes according to the feedback from the expert
Senior Lecturer 2	Satisfaction	a. I am satisfied with the system b. Meets the information processing needs of my task c. I am satisfied with the ease of completing the task in this system d. Using the systems not a frustrating experience	to change "system" to "EDMS"	The researcher has made changes based on the feedback from the expert
Senior Lecturer 1 Senior Lecturer 2 Professional 1 Professional 2	Demographic Information	6. Which EDMS are you using? (You can select more than one and write any unlisted EDMS) CACTUS ER&DO SCS-GEMS e-Prestasi e-Recruitment	To add "Others" To add Electronic Meeting System (EMS)	The researcher has made changes based on the feedback from the expert

Expert	Dimension	Question	Comments / Feedback	Action Taken
Senior Lecturer 2		5. Level of Employment a) Top Management b) Middle Management Operational	Suggestion: a) Top Management b) Managers c) Executive d) Operational	The researcher has made changes based on the feedback from the expert
Senior Lecturer 4		2. Age a) 18 - 25 years b) 26 – 35 years c) 36 – 45 years d) 46 – 55 years e) Above 55 years	The gap should consistent, i.e. 18 – 25 years 26 – 33 years 34 – 41 years 42 – 49 years 50 – 57 years Above 57 years	The researcher has made changes according to the feedback from the expert
Overall Comments:				
Senior Lecturer 4	Research Framework	Suggest items for DV to be in the first section and followed by IV		
Professional 1	Research Framework	IV: Document Management Service Quality Does this refer to Electronic or Digital Document Management Service?		

4.5.3 Pilot-testing of Questionnaire

The pilot test was conducted after the preliminary testing process revealed that a satisfactory level of performance had been attained. A pilot study is a process of "trying out" of a particular research instrument to ensure whether the instruments are inappropriate or too complicated (Van Teijlingen & Hundley, 2001). This was a crucial stage since it allowed us to verify the reliability of each item for all variables. According to Hair et al., (2010), other terms for reliability include dependability, stability, consistency, reproducibility, predictability, and the absence of distortion. The pilot study has three aims, namely (i) to evaluate whether or if the differences across a group of items truly reflect a particular construct; (ii) to determine the questions' internal consistency; and (iii) to quantify the level of understanding of respondents to the questionnaire.

Zikmund (2013) opined the sample size for pilot study should be between 1 and 1.5% of the sample size to be used in study while (Cooper et al., 2003) suggested 25 and 100 subjects. For the purpose of doing the pilot testing, the questionnaires were self-administered to 30 Sarawak government staff who use the system from selected agencies. These participants were chosen at random and in a convenient manner based on their desire to participate when the researcher invited them. These responses were then entered into SPSS software for the Cronbach's Alpha analysis.

Based on the analysis of 30 responses, the result of Cronbach's Alpha analysis is shown in Table 4.19. The value of the Cronbach's Alpha ranged between 0.821 and 0.979, surpassed the recommended value of 0.6 as stated by Hair et al. (2006). Consequently, it can be concluded.

Table 4.19
Result of reliability analysis during pilot study

Variable	Item	Cronbach Alpha Value
AIC	4	0.835
FSR	4	0.823
Variable	Item	Cronbach Alpha Value
CT	5	0.821
HFIC	5	0.866
SAM	5	0.845

AW	5	0.864
SAT	6	0.911
SAC	5	0.973
ISC_IQ	5	0.969
ISC_SQ	5	0.915
ISC_SAT	4	0.951
ISC_PU	6	0.979

4.6 Measurement of Variables

The concept of automated information capture has been extensively studied in prior research (Hamzah et al., 2018). However, recent studies have expanded on this concept by incorporating new technological advancements and improved systems. For instance, Zdraveski et al. (2022) explored new methods in document scanning and Optical Character Recognition (OCR) both increase the efficiency and accuracy of automated information capture. Their findings provide a current perspective on how automated systems enhance data entry and classification in electronic document management systems (EDMS). Moreover, Abdulkadhim et al. (2021) examined the integration of AI-driven document capture systems, which provide better organizational benefits and user experience. These updates provide a more contemporary understanding of how automated information capture systems function within modern EDMS.

4.6.1 Federated Search & Retrieval

The concept of federated search and retrieval has evolved significantly since the early works of Björk (2003), who initially introduced the challenges and methodologies surrounding federated search. The recent literature provides updated insights into the enhancements and refinements of federated search technologies. Meanwhile, Shokouhi and Si (2021) presented a modern approach to federated search that integrates deep learning techniques to improve search accuracy and relevance. Their study highlighted how federated search systems have evolved to include more complex algorithms that allow for real-time, multi-repository data retrieval. Additionally, Ade Tutty Rokhayati et al. (2021) expanded on the idea of federated search by implementing cloud-based solutions, which significantly enhance the speed and flexibility of search functions across various data sources. These updates reflect the current trends and innovations in federated search within the context of EDMS.

4.6.2 Collaboration Tools

Collaboration tools within EDMS have also evolved over the years, with newer studies examining the integration of cloud-based and real-time collaborative functionalities. The previous research in this area, such as Björk (2003), was foundational but has been further developed by more recent studies. Pho and Tambo (2021) explored the role of collaboration tools in enhancing teamwork and document management processes within organizations. Their study emphasized how cloud-based platforms enable users to work collaboratively on documents, enhancing efficiency in document editing, sharing, and version control in EDMS. Moreover, Groenewald (2020) highlighted the increasing importance of real-time collaboration and integration with third-party tools like Microsoft Teams and Google Workspace, which provide greater flexibility for users across different locations. These advancements have led to improved functionality in collaborative environments within EDMS.

4.6.3 Demographic or Background Information

Ten demographic information were collected in the study, namely email, gender, age, educational level, year of service, level of employment, EDMS name, EDMS duration used, EDMS frequency used, as well as level of competency in using EDMS. All respondents were subject to provide their email address for the analysis purposes. The gender used two options of answers, male or female. The age question used five options of answers: 18 – 25 years old, 26 – 33 years old, 34 – 41 years old, 42 – 49 years old, and 50 – 57 years old. The educational level of study used six options: SPM, STPM, Diploma, Bachelor's Degree, Master's Degree, and Doctorate degree (Doctor of Philosophy (PhD)). Year of service used seven options: < 5 years, 5 to 10 years, 11 to 15 years, 16 to 20 years, 21 to 25 years, 26 to 30 years, and above 30 years. Level of employment used three options: top management, middle management, and operational management. EDMS name used seven options: CACTUS, ER&DO, SCS-

GEMS, e-Prestasi, e-Recruitment, EMS, and Other (for EDMS which is not listed in the options). EDMS duration used six options: < 5 years, 5 to 10 years, 11 to 15 years, 16 to 20 years, 21 to 25 years, and above 25 years. EDMS frequency used seven options: less than once a month, at least once a month, at least once a week, more than once a week, more than once a month, every hour in a day, and at least once a day. The level of competency in using EDMS used four options: novice (can perform this activity but not without constant supervision and assistance), novice (can perform this activity with a basic understanding of theory and practice principles, but requires some supervision and assistance), competent practitioner (can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision), and expert (can perform this activity with understanding of theory and practice principles without assistance and/or direct supervision, at an appropriate pace and adhering to evidence-based practice).

4.6.4 EDMS Functionalities

EDMS functionalities was defined as a software program that manages the creation, storage and control of documents electronically with primary function to manage electronic document within an organization's workflow (Minnesota State Archives, 2012). EDMS functionalities included automated information capture, federated search and retrieval, collaboration tools, hierarchical file indexing and classification, storage and archival methods, automated workflows, security and audit trails, as well as support and administer compliance. However, past studies have paid little attention on EDMS functionalities to be measured with dimensions from Delone and Mclean model. Thus, to develop the question for the EDMS functionalities, the researcher adopted the items from the literature review and findings of research (Zantout & Marir, 1999; Björk, 2003; Gibbons & Shenton, 2003; Groenewald, 2004; Al Shibly et al., 2007; Kunis et al., 2007; Burtylev et al., 2013; Pho & Tambo, 2014; Abdulkadhim et al., 2015; Valkonen, 2015; Hamzah et al., 2018; Ade Tutty Rokhayati et al., 2019; Zdraveski et al., 2020). This study highlighted the significance of EDMS functionalities in enhancing the overall effectiveness of the system, as well as making a theoretical contribution to the IS effectiveness construct. Table 4.20 displays the operational definition for the Electronic Document Management System Effectiveness and Table 4.22 shows 39 questions of the measurement for Electronic Document Management System Effectiveness.

Table 4.20
The Operational Definition for Electronic Document Management System Effectiveness

Variables	Definition	Sources
Automated Information Capture	To put a document into an electronic format to automatically identify and classify information and make the information available within particular systems.	Hamzah, Mat Yatin et al., 2018
Federated Search and Retrieval	Federated search (federated information retrieval or distributed information retrieval) is a method of simultaneously searching numerous text collections and to retrieve relevant answers where its function is to search a bunch of distinct collections and effectively blend the results they produce for queries.	(Shokouhi & Si, 2011)
Federated Search and Retrieval	Federated search (federated information retrieval or distributed information retrieval) is a method of simultaneously searching numerous text	(Björk, 2003)

	collections and to retrieve relevant answers where its function is to search a bunch of distinct collections and effectively blend the results they produce for queries.	
Hierarchical File Indexing and Classification	Hierarchical folder structure built into computer operating system that enables users to arrange files into a structure of a tree	(Ma, 2010)
Storage And Archival Methods	Storage can be defined as a way of protecting archival holdings in a secure manner while archival method is a method of retaining information outside of the internal memory of a computer	(Zhang, 2010)
Automated Workflows	A workflow-based document management mechanism by assigning task and tracking its progress of different people who involved in the lifecycle of document to make sure that the document is aligned with the corresponding processes	(Pho & Tambo, 2014)

Security & Audit Trails	Able to detect and prevent illegal and fraudulent user practices, collecting data about them in the database. The information gathered is analyzed to determine security problems and their origin, to ensure that log records are stored securely and permanently, so that they can be detected when a security breach occurs	(Roratto & Dias, 2014)
Support and Administer Compliance	Compliance with legal requirements relating to the preservation of the authenticity and integrity of electronic documents throughout the entire electronic document life cycle	(Hamidovic & Hamidovic, 2014)

Table 4.21
Measurement for Electronic Document Management System Effectiveness

Automated Information Capture							
Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The EDMS that I use enable me to transform paper documents into digital files through high-volume scanning and Optical Character Recognition (OCR).	1	2	3	4	5	6	7

The EDMS that I use enable me to organize (e.g: capture and store) digital files at the point of creation.	1	2	3	4	5	6	7
The EDMS that I use allow me to create document from network folders, Microsoft-office and/or other integrated system(s).	1	2	3	4	5	6	7
The EDMS that I use enable me to capture details of document automatically such as file classification.	1	2	3	4	5	6	7

Federated Search & Retrieval

Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The Electronic Document Management System (EDMS) that I use enable me to search files/documents easily.	1	2	3	4	5	6	7
The Electronic Document Management System (EDMS) that I use enable me to locate files/documents from across folders and repositories.	1	2	3	4	5	6	7
The Electronic Document Management System (EDMS) that I use enable me to access the full content.	1	2	3	4	5	6	7
The Electronic Document Management System (EDMS) that I use enable me to upload the documents to the system.	1	2	3	4	5	6	7

Collaboration Tools

Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The Electronic Document Management System (EDMS) that I use provides me with the ability to work faster on document changes.	1	2	3	4	5	6	7
The Electronic Document Management System (EDMS) that I use is easy for me to create and edit documents directly within the system.	1	2	3	4	5	6	7
The Electronic Document Management System (EDMS) that I use allows me to the create, upload and categorize new documents without leaving certain interface.	1	2	3	4	5	6	7
The Electronic Document Management System (EDMS) that I use enables all users involved in the workflow be notified as tasks are completed by each stage.	1	2	3	4	5	6	7

The Electronic Document Management System (EDMS) that I use can interact with other electronic document management systems.	1	2	3	4	5	6	7
Hierarchical File Indexing & Classification							
Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The existing Electronic Document Management System (EDMS) that I use enable me to refer to an index to determine the location of a file or document.	1	2	3	4	5	6	7
The existing Electronic Document Management System (EDMS) that I use enable me to use the same terminology in organizing the document.	1	2	3	4	5	6	7
The existing Electronic Document Management System (EDMS) that I use enable me to index large documents at several levels of EDMS process.	1	2	3	4	5	6	7
The existing Electronic Document Management System (EDMS) that I use enable me to identify the management responsibility for a group of records.	1	2	3	4	5	6	7
The existing Electronic Document Management System (EDMS) that I use enable me to provide context for individual documents and records.	1	2	3	4	5	6	7
Storage and Archival Methods							
Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The existing EDMS that I use enable me to save the document into archival folder.	1	2	3	4	5	6	7
The existing EDMS that I use enable me to change the status from open file/document to closed file/document.	1	2	3	4	5	6	7
The existing EDMS that I use enable me to copy the document/file to another medium (move a file or folder from one folder to another).	1	2	3	4	5	6	7
The existing EDMS that I use enable me to do documents/records inventories.	1	2	3	4	5	6	7
The existing EDMS that I use enable me to include the file/document into the retention schedules.	1	2	3	4	5	6	7
Automated Workflows							

Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The existing EDMS that I use enable me to establish ownership /responsibility for each step in the EDMS system process.	1	2	3	4	5	6	7
The existing EDMS that I use enable me to streamline processes and keep them moving forward with little human effort.	1	2	3	4	5	6	7
The existing EDMS that I use enable me to easily see the active step, who is responsible for completing it, and how much time it is taking	1	2	3	4	5	6	7
The existing EDMS that I use enable me to reduce process error as all file/document are scanned to ensure that all necessary information is captured	1	2	3	4	5	6	7
The existing EDMS that I use enable me to respond to my prompted task and clicks submit.	1	2	3	4	5	6	7

Security & Audit Trails

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The existing EDMS that I use enable me to store the transactions of documents by unique serial numbers	1	2	3	4	5	6	7
The existing EDMS that I use enable me to check-in/check-out content creation and editing	1	2	3	4	5	6	7
The existing EDMS that I use enable me to allow simultaneous editing	1	2	3	4	5	6	7
The existing EDMS that I use enable me to control over the various and previous repetitions of a file	1	2	3	4	5	6	7
The existing EDMS that I use enable me to track the creation and editing of file.	1	2	3	4	5	6	7
The existing EDMS that I use enable me to rollback to previous versions of a document.	1	2	3	4	5	6	7

Support and administer compliance

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Electronic Document Management System (EDMS) that I use enables me to identify and manage regulatory risk.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) that I use enables me to design and implement controls to protect an organization from those risks.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) that I use enables me to monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) that I use enables me to resolve compliance difficulties as they occur.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) that I use enables me to impose on rules and controls of risks.	1	2	3	4	5	6	7

4.6.4.1 Automated Information Capture

Hamzah et al. (2018) defined automated information capture as the method of putting a document into an electronic format which takes documents content, in any format, and converts it into something that a computer can contrive either manually or automated. Drawing upon the definition of Hamzah et al. (2018), this study defined the functionality of automated information capture in the EDMS use by the user at government agencies in Sarawak. For measuring the functionality of automated information capture in EDMS, the researcher made some amendments to the four items measure developed based on research by Hamzah et al. (2018). The measures were in terms of transform paper documents into digital files; organize digital files at the point of creation; create document from network folders, Microsoft-office and/or other integrated system; and capture details of document automatically such as file classification to reflect nature of work in the Sarawak government agencies that make use of electronic document management system. Thus, the four items were formulated as shown in Table 4.22.

Table 4.22
Operational definition and measurement for Automated Information Capture

Operational Definition	Measurement
To put a document into an electronic format to automatically identify and classify information	The EDMS that I use enable me to transform paper documents into digital files through high-

and make the information available within particular systems	volume scanning and Optical Character Recognition (OCR). The EDMS that I use enable me to organize (capture and store) digital files at the point of creation The EDMS that I use allow me to create document from network folders, Microsoft-office and/or other integrated system(s). The EDMS that I use enable me to capture details of document automatically such as file classification

4.6.4.2 Federated Search & Retrieval

Federated search and retrieval in EDMS enable user to search files or documents easily, to locate files/documents from across folders and repositories and to provide parallel search over multiple collections (Ade Tutty Rokhayati et al., 2019). Building upon this definition, the present study defined the effectiveness of functionality of federated search and retrieval in electronic document management system implemented by user at the agencies of Sarawak government. The items for measuring this construct were adopted and amended (Björk, 2003; Abdulkadhim et al., 2015; Ade Tutty Rokhayati et al., 2019; Zdraveski et al., 2020). Table 4.23 presents four items for measuring the functionalities of federated search and retrieval in electronic document management system.

Table 4.23
Operational Definition and Measurement for Federated Search & Retrieval

Operational Definition	Measurement
Federated search (federated information retrieval or distributed information retrieval) is a method of simultaneously searching numerous text collections and to retrieve relevant answers where its	The Electronic Document Management System (EDMS) that I use enable me to search files/documents easily. The Electronic Document Management System (EDMS) that I use enable me to locate files/documents from across folders and

function is to search a bunch of distinct collections and effectively blend the results they produce for queries	repositories The Electronic Document Management System (EDMS) that I use enable me to access the full content The Electronic Document Management System (EDMS) that I use enable me to upload the documents to the system

4.6.4.3 Collaboration Tools

The collaboration tools are functionality in electronic document management system of which it influences the effectiveness of electronic document management system in the context of present study. Ade Tutty Rokhayati et al. (2019) defined it as the degree to which individuals in the group of EDMS system actively help and support one another for the smooth performance of the task. Hence, for measuring this construct, the researcher amended and adapted items measure developed from the literature review of Björk (2001); Giandon, Mendes Junior et al. (2002); Pho and Tambo (2014); Zdraveski et al. (2020) in measuring the functionalities of collaboration tools in electronic documents management system which is presented in Table 4.24.

Table 4.24
Operational Definition and Measurement for Collaboration Tools

Operational Definition	Measurement
Collaboration Tools enable documents for document changes streamlined collaboration in the system	EDMS that I use provides me with the ability to work faster on user to modify EDMS that I use is easy for me to create and edit documents directly within the system EDMS that I use allows me to the create, upload and categorize new documents without leaving certain interface EDMS that I use enables all users involved in the workflow be notified as tasks are completed by each stage

	EDMS that I use can interact with other electronic document management systems

4.6.4.4 Hierarchical File Indexing & Classification

Hierarchical classification schemes are a natural and effective technique to organise large document collections since they are efficient (Risch et al., 2020). In the context of this study, drawing upon the definition above, hierarchical file indexing and classification is the functionality in EDMS that allows multilevel document classification created from a hierarchical indexing and classification schemes which enable user to use the same terminology in organizing documents. For measuring hierarchical file indexing and classification, five items were formulated based on a study by Alshibly (2007); Gibbons and Shenton (2003); Kunis et al. (2007); Valkonen (2015); as well as Zantout and Marir (1999) as shown in Table 4.25.

Table 4.25
Operational Definition and Measurement for Hierarchical File Indexing and Classification

Operational Definition	Measurement
Hierarchical File Indexing & Classification organized into a structured central repository that keeps documents automatically organized by department, creation date or other information governance parameters	The existing Electronic Document Management System (EDMS) that I use enable me to refer to an index to determine the location of a file or document
	The existing Electronic Document Management System (EDMS) that I use enable me to use the same terminology in organizing the document
	The existing Electronic Document Management System (EDMS) that I use enable me to index large documents at several levels of EDMS process
	The existing Electronic Document Management System (EDMS) that I use enable me to identify the management responsibility for a group of records

4.6.4.5 Storage and Archival Method

Storage can be defined as a way of protecting archival holdings in a secure manner while archival method is a method of retaining information outside the internal memory of a computer (Zhang, 2010a). Building upon this definition, the present study defined storage and archival method as long-term storage of digital format that enables user to save the document into archival folder in EDMS. For measuring the storage and archival methods functionalities in electronic document management system, five items of research instrument have been developed based on research by Burtylev et al., (2013); Groenewald (2004); and Zdraveski et al. (2020).

Table 4.26
Operational Definition and Measurement for Storage and Archival Methods

Operational Definition	Measurement
Storage can be defined as a way of protecting archival holdings in a secure manner while archival method is a method of retaining information outside of the internal memory of a computer	The existing EDMS that I use enable me to save the document into archival folder. The existing EDMS that I use enable me to change the status from open file/document to closed file/document
	The existing EDMS that I use enable me to copy the document/file to another medium (move a file or folder from one folder to another. The existing EDMS that I use enable me to do documents/records inventories.

4.6.4.6 Automated Workflow

Automated workflow is the modelling and enacting of business processes by human and computer agents that used to control the approval and distribution of tasks in the document life cycle transmitted electronically that separate work activities into welldefined tasks, roles, rules, and procedures (Gary, 1999; Giandon et al., 2002). Adapting from this definition, the present study defined automated workflows as functionality in the EDMS contributed to the effectiveness of information system (EDMS) used by the user, for instance at government agencies in Sarawak. The instrument utilized for measuring automated workflow was originally adopted from the study of Pho and Tambo (2014); as well as Zantout and Marir (1999). It was subsequently modified according to the recommendations provided by the experts during pre-test phase. Table 4.27 displays the instruments employed in this study to asure the automated workflows functionalities.

Table 4.27

Operational Definition and Measurement for Automated Workflow

Operational Definition	Measurement
Automated Workflows links people and data into automated processes that are easily created for each organization. (Review and approve; Automated data entry into forms and eSignatures	The existing EDMS that I use enable me to establish ownership /responsibility for each step in the EDMS system process
	The existing EDMS that I use enable me to streamline processes and keep them moving forward with little human effort
	The existing EDMS that I use enable me to easily see the active step, who is responsible for completing it, and how much time it is taking
	The existing EDMS that I use enable me to reduce process error as all file/document are scanned to ensure that all necessary information is captured
	The existing EDMS that I use enable me to respond to my prompted task and clicks submit

4.6.4.7 Security and Audit Trail

An audit trail, alternatively referred to as an audit log, is used to verify the accuracy of transaction flows within a system by storing log data securely, permanently and be used to detect when a security breach occurs (Roratto & Dias, 2014). This study adopted this definition and measuring the instruments adopted from Groenewald (2004) as well as Pho and Tambo (2014). Table 4.28 presents six items utilized in this study to measure security and audit trails functionalities in the electronic document management system.

Table 4.28
Operational Definition and Measurement for Security & Audit Trail

Operation Definition	Measurement
Security & Audit Trails**:** Electronic records Audit trails provide a tool to maintain information and system integrity	The existing EDMS that I use enable me to store the transactions of documents by unique serial numbers The existing EDMS that I use enable me to check-in/check-out content creation and editing The existing EDMS that I use enable me to allow simultaneous editing The existing EDMS that I use enable me to control over the various and previous repetitions of a file The existing EDMS that I use enable me to track the creation and editing of file. The existing EDMS that I use enable me to rollback to previous versions of a document

4.6.4.8 Support and Administer Compliance

Compliance essentially means ensuring that business processes, operations and practices are in accordance with a prescribed and/or agreed set of norms (Syed Abdullah et al., 2009). Building upon established definitions, this study conceptualized compliance as the organization's ability to maintain adherence to legal and regulatory standards within the context of the Electronic Document Management Systems (EDMS). The instrument for the support and administer compliance was developed from some studies conducted (Abdulkadhim et al., 2015; Kassab et al., 2019; Zdraveski et al., 2020). The instrument consists of five items as indicated in Table 4.29.

Table 4.29
Operational Definition and Measurement for Support and Administer

Operation Definition	Measurement
Support and administer compliance describe as compliance with the external rules and internal system of control	Electronic Document Management System (EDMS) that I use enables me to identify and manage regulatory risk.
	Electronic Document Management System (EDMS) that I use enables me to design and implement controls to protect an organization from those risks.
	Electronic Document Management System (EDMS) that I use enables me to monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks.
	Electronic Document Management System (EDMS) that I use enables me to resolve compliance difficulties as they occur.
	Electronic Document Management System (EDMS) that I use enables me to impose on rules and controls of risks.

4.6.5 Information System Effectiveness

Information System Effectiveness refers to the capability of a system to produce a desired result. In this study, the effectiveness of an information system was measured in terms of its dimensions in order to examine its relationship with the functionalities of an EDMS. The dimensions under study were information quality, system quality, perceived usefulness, and user satisfaction. To develop the measurement of information system effectiveness, the researcher referred to previous studies on Information System (IS) success and effectiveness across various fields. To ensure reliability, the original questionnaire items were adopted from previously validated studies and modified to align with the specific context of this research. Information quality was measured using five items adapted from study by Alshibly (2014); Cho (2008); Groenewald (2004); Johnston and Bowen (2005); Laumer et al. (2017); as well as Wang and Liao (2008). System quality was measured by five items adopted from the study by Andriansyah and Elmi (2020). The level of satisfaction was measured using four items that were taken from the study conducted by Doll and Torkzadeh (1988) and perceived usefulness was quantified by six items modified from the study by Davis (1989), Lin (2010), as well as Wang and Liao (2008).

Table 4.30
Operational Definition for Information System Effectiveness

Variables	Definition	Sources
Information Quality	The desirable characteristics of the system outputs (management reports and Web pages). The output example are relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability.	(Petter et al., 2008)
System Quality	The desirable characteristics of an information system such as ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times.	(Petter et al., 2008)
Satisfaction	The amount to which users believe the information system accessible to them meets their requirements, and it is believed to be a useful indicator of system effectiveness.	(Cho, 2008)
Perceived Usefulness	A perceptual measure reflecting the extent to which stakeholder perceive that the use of a particular system has positively contributed to their job performance.	(Seddon, 1997)

Table 4.31
Measurement for Information System Effectiveness

Information Quality

Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Information from the Electronic Document Management System (EDMS) is relevant to my work**.**	1	2	3	4	5	6	7
Information I get from the EDMS is accurate	1	2	3	4	5	6	7
It is easy to understand information from the EDMS	1	2	3	4	5	6	7
The information is presented in a useful format	1	2	3	4	5	6	7
Available on time for its intended use	1	2	3	4	5	6	7

System Quality

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The EDMS is easy to use and to learn**.**	1	2	3	4	5	6	7
The EDMS is useful**.**	1	2	3	4	5	6	7
The EDMS requires little effort to be used**.**	1	2	3	4	5	6	7
The retrieval of information that I need is easy**.**	1	2	3	4	5	6	7
Response to an instruction of the EDMS is fast**.**	1	2	3	4	5	6	7

Satisfaction

Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree

I am satisfied with the system	1	2	3	4	5	6	7
Meets the information processing needs of my task.	1	2	3	4	5	6	7
I am satisfied with the ease of completing the tasks in this system.	1	2	3	4	5	6	7
Using the system is not a frustrating experience	1	2	3	4	5	6	7

Perceived Usefulness							
Statements	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
I am satisfied with the system	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) enables me to accomplish my tasks more quickly	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) improves my job performance.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) increases my productivity.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) enhances my effectiveness in the job.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) makes it easier to do my job.	1	2	3	4	5	6	7
Electronic Document Management System (EDMS) useful to my job.	1	2	3	4	5	6	7

Table 4.32
Sources of Variables for Information System Effectiveness

Variables	Items	Adapted Sources
Information Quality	Information from the Electronic Document Management System (EDMS) is relevant to my work.	(Cho, 2007, 2008)
	Information I get from the EDMS is	(Alshibly, 2014)

	accurate.	(G. P. Johnston & D. V. Bowen, 2005)
	It is easy to understand information from the EDMS.	(Laumer et al., 2017) (T. Groenewald, 2004)
	The information is presented in a useful format.	(Laumer et al., 2017) (T. Groenewald, 2004) (Wang & Liao, 2008)
	Available on time for its intended use.	(Laumer et al., 2017) (T. Groenewald, 2004)
System Quality	The EDMS is easy to use and to learn.	(Andriansyah & Elmi, 2020)
	The EDMS is useful.	(Andriansyah & Elmi, 2020)
	The EDMS requires little effort to be used.	(Andriansyah & Elmi, 2020)
	The retrieval of information that I need is easy.	(Andriansyah & Elmi, 2020)
	Response to an instruction of the EDMS is fast.	(Andriansyah & Elmi, 2020)
Satisfaction	I am satisfied with the system.	(Doll & Torkzadeh, 1988) (Musman et al., 2014)
	Meets the information processing needs of my task.	(Doll & Torkzadeh, 1988)
	I am satisfied with the ease of completing the tasks in this system.	(Doll & Torkzadeh, 1988)
	Using the system is not a frustrating experience.	(Doll & Torkzadeh, 1988)
Perceived Usefulness	Electronic Document Management System (EDMS) enables me to accomplish my tasks more quickly	(Davis, 1989) (Lin, 2010) (Wang & Liao, 2008)
	Electronic Document Management System (EDMS) improves my job performance.	(Davis, 1989) (Lin, 2010) (Wang & Liao, 2008)
	Electronic Document Management System (EDMS) increases my productivity.	(Davis, 1989) (Lin, 2010) (Wang & Liao, 2008)
	Electronic Document Management System (EDMS) enhances my effectiveness in the job.	(Davis, 1989) (Lin, 2010) (Wang & Liao, 2008)
	Electronic Document Management System (EDMS) makes it easier to do my job.	(Davis, 1989) (Lin, 2010) (Wang & Liao, 2008)
	Electronic Document Management System (EDMS) useful to my job.	(Davis, 1989) (Lin, 2010) (Wang & Liao, 2008)

4.6.5.1 Information Quality

Information quality is the desirable characteristics of the system outputs (management reports and web pages). The output examples are relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability (Petter et al., 2008). Accordingly, this study defined information quality as the system output that is used for assessing effectiveness of EDMS functionalities. Initially, the researcher developed five items measure adapted from several studies (Cho, 2007; Cho, 2008; Alshibly, 2014; Laumer et al., 2017; Groenewald, 2004; Wang & Liao, 2008) for measuring information quality. Hence, as depicted in Table 4.33 a total of five items were used to measure information quality.

Table 4.33
Operational Definition and Measurement for Information Quality

Operational Definition	Measurement
Evaluates the effective creation, distribution, and use of information via technology for Information Quality	Information from the Electronic Document Management System (EDMS) is relevant to my work. Information I get from the EDMS is accurate It is easy to understand information from the EDMS The information is presented in a useful format. Available on time for its intended use.

4.6.5.2 System Quality

System quality refers to the measurement of an information system's performance, encompassing from both the technical attributes and design perspectives (Delone & McLean, 2003). Adapting from this definition, system quality in the context of EDMS is conceptualized as the evaluation of its functionalities. Similar to the construct of information quality, the researcher has developed a five-item measurement framework to assess this dimension (Andriansyah & Elmi, 2020) and the feedback from pre-testing as shown in Table 4.34.

Table 4.34
Operational Definition and Measurement for System Quality

Operational Definition	Measurement

Evaluates the effective creation, distribution, and use of information via technology for system quality	The EDMS is easy to use and to learn. The EDMS is useful. The EDMS requires little effort to be used. The retrieval of information that I need is easy. Response to an instruction of the EDMS is fast.

4.6.5.3 User Satisfaction

Satisfaction of the user is measuring the user's viewpoint as well as their experience with the information system (Delone & McLean, 2003). Thus, the level of satisfaction in this study is determined by the user's level of satisfaction with EDMS. This is determined by whether the user has never experienced frustration while using the system, as well as whether or not the user's information processing tasks are met by EDMS, and whether or not the user finds it easy to complete their tasks by using EDMS. Following Doll and Torkzadeh (1988) and Musman et al. (2014), and comments or suggestions from the pretesting exercise, four items have been formulated as shown in Table 4.35.

Table 4.35
Operational Definition and Measurement for User Satisfaction

Operation Definition	Measurement
Evaluates the effective creation, distribution, and use of information via technology for satisfaction.	I am satisfied with the system. Meets the information processing needs of my task. I am satisfied with the ease of completing the tasks in this system. Using the system is not a frustrating experience.

4.6.5.4 Perceived Usefulness

Perceived usefulness is conceptualized as an individual's subjective perception of the ease of use associated with a computer system. This perception influences their overall assessment of the system's usefulness and, consequently, exerts an indirect impact on their evaluation of the system's functionality. Therefore, according to Davis (1989), it is the extent to which a person believes that the adoption of a specific technology improves the performance of their job. In this context of the study, perceived usefulness refers to the user's evaluation of how effectively the functionalities of an Electronic Document Management Systems (EDMS) support the completion of their job tasks. This construct encompasses several dimensions, including the system's ability to facilitate task completion more efficiently, enhance job performance, increase productivity, improve effectiveness, simplify job execution, and provide overall utility in fulfilling job responsibilities. Following a few studies (Davis, 1989; Wang & Liao, 2008; Lin, 2010), and comments or suggestions from the pre-testing exercise, six items have been formulated as shown in Table 4.36.

Table 4.36
Operational Definition and Measurement for Perceived Usefulness

Operation Definition	Measurement
Evaluates the effective creation, distribution, and use of information via technology for perceived usefulness.	Electronic Document Management System (EDMS) enables me to accomplish my tasks more quickly. Electronic Document Management System (EDMS) improves my job performance. Electronic Document Management System (EDMS) increases my productivity Electronic Document Management System (EDMS) enhances my effectiveness in the job. Electronic Document Management System (EDMS) makes it easier to do my job. Electronic Document Management System (EDMS) useful to my job.

4.7 Population, Sampling, and Data Collection

Population can be used to refer to the overall group of people, objects, or activities that are of interest to researchers so that they can investigate the matter into them. Alternatively, "population" can be used to refer to the total number of all parts of the study from which a sample is selected. In most cases, the population serves as the primary focus and focal point of the research setting. Population, according to Sekaran and Bougie (2009), is defined as a group or event that the researcher desires to investigate for their research. Hair (2003) added that a population is a process that involves selecting a sample of units from a data set to measure the characteristics, beliefs, and attitudes of the people who make up the population. In order for the researcher to accomplish the objective of the study, the population was segmented into smaller group. The process is generally referred to as the sampling process. A good sample design should produce an actual representative sample; it should be designed in such a way that it produces a small sampling error; and it should be designed in such a way that it is possible to control systematic bias in a more effective manner. Since it is difficult to include the entire population, therefore a sample set is considered to study and generalise findings; as sample is representative of a population (Bryman, 2013). In a method known as non-probability sampling, the units to be sampled are chosen at the sole discretion of the researcher.

In general, sampling techniques can be divided into two categories: probability and non-probability (Sekaran & Bougie, 2013). In probability sampling, the units of the population are not chosen at random by the researcher, but rather, certain procedures are followed to ensure that each unit of a population has a predetermined chance of being included in the sample. This ensures that the sample is representative of the population. In contrast, the units to be sampled in a non-probability sample are chosen at the researcher's discretion. These samples rely on human judgement to choose units, and there is no theoretical basis for determining the characteristics of the population.

Kumar (2014) categorized three commonly used types of random/probability sampling design which are Simple random sampling (SRS); Stratified random sampling; and Cluster sampling. On the other hand, non-random/non-probability sampling designs in quantitative research are used when the number of elements in a population is either unknown or cannot be individually identified. There are five commonly used nonrandom/non-probability designs, which are quota sampling; accidental sampling; judgemental sampling or purposive sampling; expert sampling; and snowball sampling.

4.7.1 Population of the Study

In the context of this study, government departments and agencies are the entities that operate under the administration of the government. There are 152 establishments consisting of State Ministries; Chief Minister’s Department; 21 State Departments; 12 State Residents’ Offices; 40 District Offices; 25 State Local

Authorities and 25 State Statutory Bodies. Table 4.37 displays the total number of government agencies/departments in Sarawak.

Table 4.37
Sarawak Government Agencies/Department

No.	Government agency/department	Total
1	State Ministries	11
2	Chief Minister's Department	18
3	State Departments	21
4	State Residents Offices	12
5	District Offices	40
6	State Local Authorities	25
7	State Statutory Bodies	25

*Data taken on 3 November 2019

As for this study, the researcher has decided to focus on selecting agencies due to the greater number of civil servants in the Sarawak Government agencies/departments. Therefore, the civil servants who are using the EDMS in the Sarawak Governments were selected as participants. This is because the main objective of this study is to examine the effectiveness of EDMS used in the government agencies and further assessing the performance of EDMS functionalities and assessing the influence of the functionalities' performance on the effectiveness of the EDMS. Therefore, only respondents who are able to provide the required information are selected to participate in this study. These personnel are the ones who are utilising the EDMS in their respective agencies or departments that they are responsible for. The EDMS are exploited to their full potential primarily by the records officer as well as those supervisors, executives and managers, as these are levels that have received instructions of task from the top management via EDMS.

4.7.2 Sampling of the Study

The sample size for the research was counted based on the population size. According to Sekaran and Bougie (2016), if the population is between 1000 to 1200, the suggested sample size is between 278 to 291. The formula for sampling that was proposed by Cochran (1977), states that if the population is larger, then the ideal sample size ought to be 267. Krejcie and Morgan (1970) also suggested a sample size of 234–242 for a total population size of 600–650. Although Partial Least Squares Equation Modelling (PLSSEM) does not have any rules of thumb on using non-probability or probability sampling, PLS-SEM is acknowledged as being suited for identifying important explanators in models (Ali et al., 2022).

Thus, in the context of this study, PLS-SEM was primarily used as a platform for data analysis. Soper (2019) created a formula that uses effect size, statistical power, the number of latent variables, the number of indicators, and the probability level to figure out what is the sample size needed for a structural equation models analysis. Consequently, to calculate the minimum sample size, this study refers to the a-priori sample size calculator for structural equations models (Soper, 2019). Both the total number of variables and the number of latent variables were observed. For this study, number of latent variables is 12 and the number of observed variables is 60 variables. The minimum absolute anticipated effect size of the proposed sample size for the calculation of the structural equation model is of the value of 0.1 (small), 0.3 (medium), and 0.5 (large) respectively. The desired statistical power level should be greater than or equal to 0.8. In this study, the recommended minimum sample size to defect effect is 200 and the minimum sample size for model structure is 100, and the recommended minimum sample size is 200. . Figure 4.3 shows the details of the calculation generated from A-priori sample size calculator for structural equation models from https://www.danielsoper.com/statcalc/calculator.aspx?id=89 developed by Soper (2019).

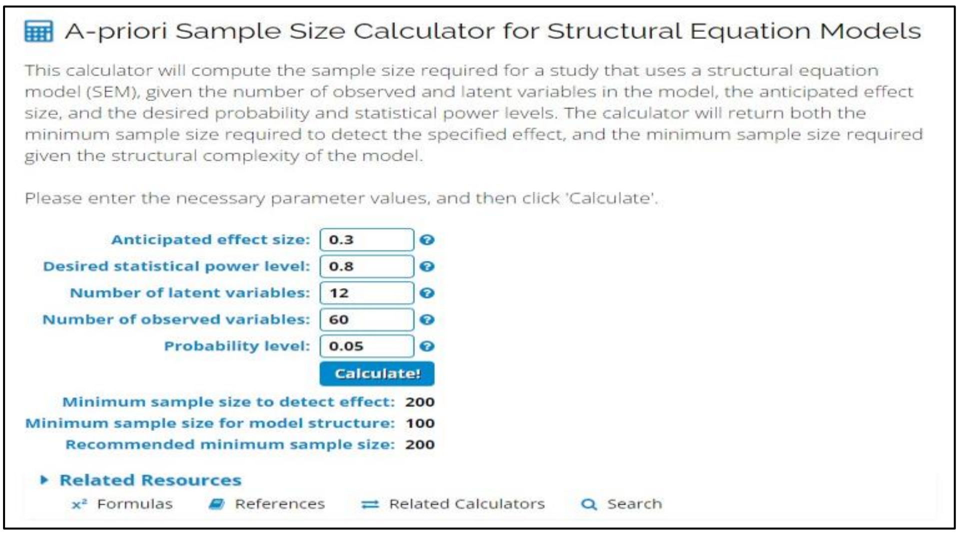

Figure 4.4 A-Priori Sample Size Calculator for Structural Equation Models by Soper (2016)

The sampling method adopted in this study was shaped by the operational constraints during the COVID-19 Movement Control Order (MCO) period. Many government personnel were working remotely or operating under restricted access to offices, making face-to-face engagement impractical. To ensure feasibility while maintaining representativeness, a structured sampling approach was employed. This method allowed respondents to be reached efficiently without interrupting essential administrative duties or requiring prolonged synchronous interaction. The approach was therefore effective in minimising disruption, complying with public health directive, and ensuring the continuity of data collection during the pandemic context. Prior to pandemic COVID19 issues, an official letter was distributed to the Head of Department for each agency for the distribution of questionnaires, with a link provided. The Head of Department then selected the personnel who filled out the questionnaire. Due to pandemic COVID19, respondents were given a Google form to complete the questionnaire. Although the data collection period was set to one month, the challenges of the COVID 19 pandemic extended it beyond the target period.

4.8 Data Collection Strategy

To fulfil the research objective of the study, although facing challenges during the COVID19 pandemic, researcher has developed a proper data collection strategy. The researcher has contacted the Heads of Department of Sarawak government agencies to explain the requirements to conduct research and distribute the questionnaire. A letter of approval was obtained from the Faculty of Information Management, Universiti Teknologi MARA and was emailed to the Sarawak government agencies. The researcher followed up with the Sarawak government agencies that were allowed to be in operation by sending emails and making phone calls to them. This presented a difficult obstacle since the Sarawak government had issued a strict movement control order. Only essential services were allowed to be in the office while others were performing duty from home. The researcher explained further on the criteria of the respondents in order to make the distribution of the questionnaire easier. These criteria included (1) the respondent's position as an EDMS user; and (2) contract or permanent staff (excluding internship student). The criteria were important to strengthen the respondent answer. Deutskens et al. (2004) suggested several steps to be taken including (1) follow-up mailings (2) incentives and (3) the length and presentation of the questionnaire. Apart from that, the researcher also used social media related to work that might help the researcher to promote the research among members who were the EDMS user in particular groups. Sustainable practices have been explicitly incorporated into the research methodology to promote long-term responsibility, efficiency, and environmental stewardship. Data collection utilized digital tools to minimize paper use and reduce carbon footprint.

4.9 Data Analysis Strategy

Although various studies had listed data analysis strategy, there was no standard strategy being established. According to what Sekaran and Bougie (2016) indicated, in order to carry out quantitative analysis, it is important to take into account the following data analysis strategy: (1) coding and data entry; (2) editing data; and (3) data transformation. Meanwhile, Saunders et al. (2000) considered the following respects: (1) type of data (scale of measurement); (2) format in which the data is input to the analysis software; (3) the impact of data coding on subsequent analysis; (4) need to weigh cases; and (5) methods to be used to check data for errors. The data coding process was done by transferring the responses into the SPSS software. During the process of data coding, each questionnaire was given unique code. Each question had been transformed into specific coding to simplify the questions such as: Automated Information Capture > AIC. In the context of this study, the questionnaire was distributed online. Consequently, the data generated were born digital. There was no data entry involved in this study. For the purposes of statistical analysis, the data was converted into two platforms, namely Statistical Package for the Social Science (SPSS) and Partial Least Squares Equation Modelling (SmartPLS) for data analysis.

4.9.1 Descriptive Analysis

Quantitative research is always associated with statistical analysis involving descriptive analysis. The analysis involves presenting, organizing data from the population, describing, either through tables, graphs, charts, or numerical calculation. The main purpose is to provide a summary of the samples and measurements taken during a study. Descriptive statistics refers to the analysis of data that helps in describing, displaying, or summarising data in a meaningful manner, such that patterns may emerge from the data, for instance, while inferential statistics are techniques that enable us to make generalisations about the populations from which the samples were drawn using these samples (Kothari, 2004). Sekaran and Bougie (2016) defined descriptive statistics as statistics that describe the phenomena of interest such as frequencies, and the mean or average score of a set of data collected, as well as the extent of variability in the set.

In the context of this study, the researcher adopted Likert scale 7-point to measure the items. For this reason, the mean is an appropriate statistic to use in order to gain a better understanding of the primary dividing point of scale in the data set. The value of the mean creates a clear picture of whether or not the respondent is in agreement with certain aspects related to the study. As most of the research variables were rated on a seven-point Likert scale, the interpretation of the mean was based on a comparison to the value in the middle of the scale, which is four. If the overall mean of a particular variable is higher than the median value, then it is possible to draw the conclusion that in general, respondents of the study agreed with the situations as they were described in the items.

In addition to providing an interpretation of the value for the mean, researcher also provided an interpretation for the standard deviation of the variables. The standard deviation is a description of analysis that can be used to measure ratio scaled and interval data. Robert (2018) defined standard deviation as a statistical measure that acts as a substitute for the "mean of the mean," and it is frequently useful for illuminating the narrative hidden within a set of data

4.9.2 Partial Least Square Path Modelling (PLS-SEM)

Generally, the Partial Least Square Path Modelling (PLS-SEM) is used in this study because it provides inferential data analysis and tests hypotheses where the pattern of interrelationships between the study constructs is a priori specified and based on established theory (Hoe, 2008). Sections 4.9.2.1, 4.9.2.2, 4.9.2.3 and 4.9.2.4 discuss the overview of PLS-SEM, SEM analysis requirements, the measurement model or confirmatory factor analysis, and structural model or hypothesis testing. The following diagram provides a step-by-step breakdown of the PLS-SEM analysis process, outlining how the model is constructed, measured, and evaluated.

4.9.2.1 Overview of PLS-SEM

A Method Using Partial Least Squares Structural Equation Modeling, also known as Partial Least Squares Structural Equation Modeling (PLS-SEM), is a statistical technique that is used for data analysis and modelling in a variety of fields, such as the social sciences, business, and information systems. It is particularly valuable when working with complex models, limited sample sizes, or situations in which theory development is an ongoing process. It is a versatile and powerful approach that assesses the relationships between latent variables (constructs) and observed indicators by combining elements of factor analysis, regression analysis, and path analysis. Although there are multiple statistical tools that the researchers can use, however, the researcher has used PLS-SEM to analyze the research data.

There are several rules of thumb for selecting PLS-SEM. In this study, the researcher employs an exploratory research design. When selecting PLS-SEM, researchers often consider several guidelines or criteria. In this study, the researcher has chosen PLSSEM based on its suitability for exploratory research design and its ability to handle complex relationships and small sample sizes (Hair et al., 2017). Furthermore, the proposed framework for this study is derived from modifications made to various models and theories. PLS-SEM is particularly relevant and beneficial when researchers aim to extend or modify an existing structural model (Ramayah et al., 2018) PLS-SEM is wellsuited for theory-building efforts. For this study, it allows for the exploration of new relationships, testing additional paths, or modifying existing relationships based on empirical evidence. In contrast, if the research model is on theory testing or theory comparison, Hair et al. (2017) suggest that CEB-SEM may be a more appropriate approach. In the words of Hair et al. (2017), “both the methods are complementary, not competitive”. According to five types of decision considerations, Table 4.38 displays rules of thumb that can be applied when deciding whether to use CB-SEM or PLS-SEM.

Table 4.38
Rules of Thumbs for Selecting CB-SEM or PLS-SEM by Jr. Ringle et al. (2011)

Research Goals	▪ If the goal is predicting key target constructs or identifying key "driver" constructs, select PLS-SEM. ▪ If the goal is theory testing, theory confirmation, or comparison of alternative theories, select CB-SEM. ▪ If the research is exploratory or an extension of an existing structural theory, select PLS-SEM.
Measurement Model Specification	▪ If formative constructs are part of the structural model, select PLS-SEM. Note that formative measures can also be used with CB-SEM but to do so requires accounting for relatively complex and limiting specification rules. ▪ If error terms require additional specification, such as covariation, select CB-SEM.
Structural Model	▪ If the structural model is complex (many constructs and many indicators), select PLS-SEM. ▪ If the model is non-recursive, select CB-SEM
Data Characteristics and Algorithm	▪ If your data meet the CB-SEM assumptions exactly, for example, with respect to the minimum sample size and the distributional assumptions, select CB-SEM; otherwise, PLS-SEM is a good approximation of CB-SEM results. ▪ Sample size considerations: - If the sample size is relatively low, select PLS-SEM. With large data sets, CB-SEM and PLS-SEM results are similar, provided that a large number of indicator variables are used to measure the latent constructs (consistency at large). - PLS-SEM minimum sample size should be equal to the larger of the following: (1) ten times the largest number of formative indicators used to measure one construct or (2) ten times the largest number of structural paths directed at a particular latent construct in the structural model. ▪ If the data are to some extent nonnormal, use PLS-SEM; otherwise, under normal data conditions, CB-SEM and PLS-SEM results are highly similar, with CB-SEM providing slightly more precise model estimates. ▪ If CB-SEM requirements cannot be met (e.g., model specification, identification, nonconvergence, data

	distributional assumptions), use PLS-SEM as a good approximation of CB-SEM results. ▪ CB-SEM and PLS-SEM results should be similar. If not, check the model specification to ensure that CB-SEM was appropriately applied. If not, PLS-SEM results are a good approximation of CB-SEM results.
Model Evaluation	▪ If you need to use latent variable scores in subsequent analyses, PLS-SEM is the best approach. ▪ If your research requires a global goodness-of-fit criterion, then CB-SEM is the preferred approach. ▪ If you need to test for measurement model invariance, use CB-SEM.

Covariance-based Structural Equation Modeling (CB-SEM) and Partial Least Squares Structural Equation Modeling (PLS-SEM) are two distinct approaches used for analyzing complex relationships among variables in social science research. While both methods fall under the broader umbrella of Structural Equation Modeling (SEM), they differ in their estimation techniques, underlying assumptions, and areas of applicability.

Here are other key differences between CB-SEM and PLS-SEM:

Table 4.39
The Differences Between CB-SEM and PLS-SEM

Items	**CB-SEM**	**PLS-SEM**
Estimation Technique	CB-SEM estimates parameters using maximum likelihood estimation	PLS-SEM estimates model parameters using a component-based approach
Handling Complex Models and Small Sample Sizes	CB-SEM works for larger sample sizes and models with many observed variables and complex structural relationships	PLS-SEM is more flexible in handling smaller sample sizes and complex models with fewer observed variables

Treatment of Measurement Models	CB-SEM primarily uses reflective measurement models, where the latent constructs cause the observed indicators.	PLS-SEM accommodates both reflective and formative measurement models
Model Fit Assessment	CB-SEM assesses model fit using various fit indices such as chisquare, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and others	PLS-SEM focuses less on traditional fit indices and more on criteria such as explained variance, predictive relevance, and crossvalidated redundancy
Hypothesis Testing vs Prediction	CB-SEM is well-suited for confirmatory research, hypothesis testing, and assessing the significance of relationships between variables	PLS-SEM places more emphasis on prediction and understanding relationships in exploratory research

In Partial Least Squares Structural Equation Modeling (PLS-SEM), there are several common terms used to describe various elements and concepts within path models. According to Ramayah et al. (2018), in the context of PLS-SEM, latent variables or factors encompass all theoretical constructs, while observed variables or manifest variables represent the unobserved variables. In addition to latent variable and observed variable, PLS-SEM exhibits the capability to accommodate both formative and reflective measurement models, thereby offering a versatile framework for analysing complex relationships within structural equation modelling. Reflective indicators are conceptualised as outcomes or functions of the underlying latent construct, representing the outcome driven by the construct. As the latent construct varies, variations in the latent construct are reflected in corresponding changes in its associated indicator (manifest) variables. In PLSSEM, reflective indicators are graphically represented by single-headed arrows emanating from the latent construct towards the indicator variables. The coefficient associated with these relationships are termed outer loadings, reflecting the strength of the connection between the construct and its indicators. This approach facilitates the visualization of the relationships between the latent construct and its observed indicators, offering a clear and comprehensive representation of the measurement model within the broader structural equation model.

In contrast, formative indicators are conceptualized as drivers or determinants of the latent construct, where variations in the indicators directly influence the construct's value. Visually, formative indicators are represented in PLS-SEM by single-headed arrows directed inward from the indicator variables to the latent construct. The coefficients associated with these formative relationships are referred to as outer weights, reflecting the relative contribution of each indicator to the latent construct (Ringle et al., 2011). Larger weights indicate stronger contributions of the indicators to the latent construct. Figure 4.4 illustrates the example of PLS-SEM modelling.

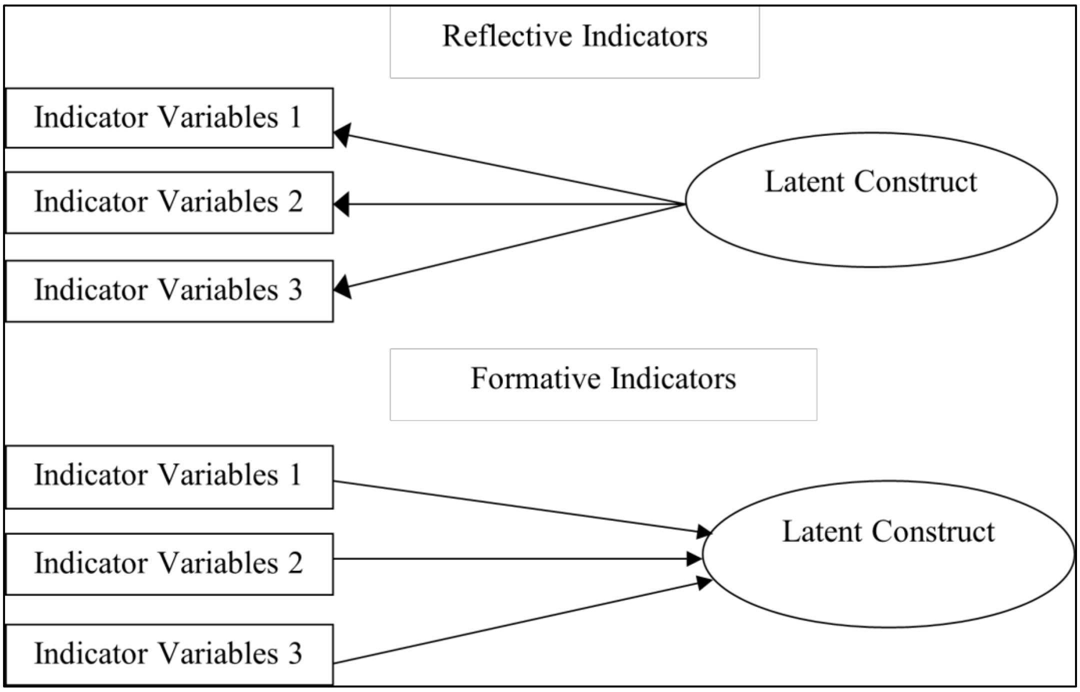

Figure 4.5 An Example of Reflective and Formative Constructs

In Partial Least Squares Structural Equation Modeling (PLS-SEM), there are three distinct types of measurement models: reflective, composite-formative, and causal formative. Ramayah et al. (2018) emphasized that the selection of an appropriate measurement model relies heavily on understanding the nature of the construct under investigation in the study. There are a number of differences between reflective, composite-formative, and causal-formative. In reflective measurement, in terms of the relationship between indicators, the construct causes its indicators. Conversely, within composite measurements, the indicators contribute to shaping the underlying construct being measured. In contrast to reflective and composite-reflective approaches, indicators within causal-formative measurement actively instigate the emergence of the construct. In addition, reflective and composite-formative measurements have high correlations. Ramayah et al., (2018) argued that composite-formative measurement does not necessarily need a high correlation, despite its common use. There is no reason to expect causalformative measurement to be correlated. When considering the aspect of scale score validity, it becomes apparent that the scale score utilized in both reflective measurements and causal-formative measurements is insufficient to represent the construct in the measurements. Conversely, in the realm of composite-formative measurements, the scale score emerges as notably sufficient to represent the construct.

Within the scope of this study, the chosen model specification is reflective measurement. The nature of the construct in this study is latent variable, and the epistemic relations between the various indicators are the consequences of this. The goal of reflective measurement model assessment is to ensure the reliability and validity of the construct measures. Therefore, it provided support for the suitability of their inclusion in the path model (Hair et al., 2014). The goal of the reflective measurement model assessment is to ensure the reliability and validity of the construct measures. As a result, it offers support for the validity and reliability of the measures. The key criteria encompass indicator reliability, composite reliability, convergent validity, and discriminant validity. According to Sarstedt et al. (2019), hierarchical latent variable models consist of four primary types: reflective-reflective, reflective-formative, formative-reflective, and formative-formative. The reflective-reflective approach involves lower-order constructs that undergo reflective measurements, enabling their differentiation while remaining correlated with one another. Reflective models believe that latent variables are hypothesized to exert a causal influence on the observable variables. The utilization of these models occurs when the observed variables are perceived as indications of the latent construct that lies behind them. For example, a reflective model might be used to assess the quality or effectiveness of documents within the system. In the case of a reflective construct, each indicator is individually linked to the construct, and as a result, the covariance of each indicator is shared with all the other indicators. Furthermore, in a reflective construct, the indicators should exhibit highly correlated among themselves because they collectively represent phenomena associated with the same construct. As noted by Hair et al. (2014), a low correlation would suggest limited convergent validity for the construct. This particular hierarchical latent variable model is particularly well-suited when the study's objective is to identify the common factor among several related but distinct reflective constructs.

In this study, a reflective-reflective approach was used, where the lower-order constructs were measured reflectively. In contrast, within the reflective-formative model, the lower-order constructs are assessed by reflective measurements. These constructs are not causally linked, instead contribute to a broader conceptual framework that fully mediates the impact on the subsequent endogenous variables. In the formative-reflective model, the higher-order is typically composed of lower-order formative constructs. The lower-order constructs are those that are measured formatively and collectively contribute to the formation of a higher-level abstract concept. The formative-formative model does not have distinct indices, in contrast to the formative-reflective model mentioned above. The utilization of the formative-formative model can be valuable in structuring a multifaceted formative construct that encompasses multiple indicators into distinct subconstructs.

As stated in Chapter Three, this research was measured based on concept or higher order constructs. Higher order constructs typically entail the examination of second-order models, which encompass dual-layer structures of constructs. Ringle et al. (2011) mentioned, the second-order models find their applications in research contexts where measurement instruments evaluate multiple related constructs, each of which is assessed using multiple items. The composite of the first-order constructs forms the second-order construct, representing the most common approach utilized in social science research (Ringle et al., 2012), This underscores the necessity for a more profound investigation into this hierarchical component model. The second higher order represents the hypothesis that seemingly separate yet interconnect constructs can be explained by one or more shared underlying higher-order construct.

4.9.2.2 Assessing the PLS-SEM

The assessment of PLS-SEM entails several steps, encompassing the assessment of both reflective measurements and the structural model components. The assessment process of the PLS-SEM model varies upon the specific type of path within the model.

There are two variations of PLS-SEM path model, namely the formative measurement model and the reflective measurement model. Within the scope of this research, the PLSSEM path model represents a reflective measurement model. According to Ramayah et al. (2018), four primary assessment for the reflective measurement model encompassing 1) assessment to internal consistency; 2) indicator reliability or factor analysis; 3) convergent validity, and; 4) discriminant validity. Table 4.40 shows the synopses assembled by Ramayah et al. (2018) for every assessment of reflective measurement model.

Table 4.40
Assessment of Reflective Measurement Model Compiled by Ramayah et al**.** **(**2018**)**

Assessment	Name of Index	Guideline
Internal Consistent	Composite reliability (CR)	CR>0.9 (Not Desirable) CR>0.7 – 0.9 (Satisfactory) CR>0.6 (For Exploratory Research)
Indicator Reliability or Factor Loading	Indicator Loading	Recommended >0.708 However, loading value >0.70, 0.60, 0.50, and 0.40 are sufficient if they complement the AVE and CR value.
Convergent Validity	Average Variance (AVE) Extracted	The recommended value for AVE is > 0.50
Discriminant Validity	Cross Loading	The values for each indicator are the highest for their designated constructs.
	Fornell & Larcker's Criterion	The square root of AVE should be higher than the correlations between construct in the model.
	HTMT criterion	HTMT 0.87 (Stringent criterion) HTMT 0.90 (Conservative criterion) HTMT using bootstrapping: does 90% bootstrap confidence interval of HTMT include the value of -1<HTMT<1 (Liberal criterion)

The following step after reflective measurement model assessment in the assessment of the structural model which is discussed further in the analysis of the study chapter five.

4.10 Mapping of Research Objective and Research Model

Table 4.41 displays the correlation between research objectives and research method, considering the variable involved, data collection and data analysis.

Table 4.41
The Correlation Between Research Objectives and Research Method, Variables Involved, Data Collection and Data Analysis

Research Objectives	**Research Method**		
	Variables Involved	Data Collection	Data Analysis
To examine the effectiveness of document management system used in the Sarawak State Government.	Information System Effectiveness Information quality System quality User satisfaction Perceived usefulness	Information quality 5 items Likert Scale System quality 5 items Likert Scale User satisfaction 4 items Likert Scale Perceived usefulness 6 items Likert Scale	SmartPLS Measurement Model Structural Model Analysis
To assess the performance of electronic document management system functionalities.	Automated Information Capture Federated Search & Retrieval. Collaborative Tools. Hierarchical File Indexing & Classification. Storage & Archival Method. Automated Workflow.	Automated Information Capture 4 items Likert Scale Federated Search & Retrieval 4 items Likert Scale Collaborative Tools 5 items Likert Scale Hierarchical File Indexing & Classification	SPSS Descriptive Analysis

	Security & Audit Trail. Support & Administer Compliance	5 items Likert Scale Storage & Archival Method 5 items Likert Scale Automated Workflow 5 items Likert Scale Security & Audit Trail 6 items Likert Scale Support & Administer Compliance 5 items Likert Scale	
To assess the influence of the functionalities performance on the effectiveness of the electronic document management systems.	Not applicable	Not applicable	Not applicable

4.11 Chapter Summary

In Chapter Four, the discussion commences with the research paradigm and the orientation of this study. Subsequently, a comprehensive presentation of the research design and approach follows the discussion on the research paradigm. This study employed a quantitative approach, utilizing surveys as the primary means of data collection. Subsequently, the study's sample size was presented, followed by the pretesting and pilot testing of the instrument. The data collection and analysis strategies for this study were also displayed. The final section of Chapter Four has been the delineating the alignment between research objectives, variables, and research method data collection for this study.

CHAPTER 5
FINDINGS OF THE STUDY

5.1 Introduction

The primary objectives of this study were designed to guide a comprehensive examination of the EDMS implemented in Sarawak Government. The first objective was to examine the overall effectiveness of the document management systems used in Sarawak government, providing a foundational understanding of how these systems support organizational processes. Building on this, the next objective aimed to access the performance of specific EDMS functionalities, identifying strengths and areas for improvement in system operations. The third objective focused on evaluating the influence of the functionalities' performance on the overall effectiveness of the EDMS, thereby establishing the relationship between system functionality and organizational outcome.

Chapter Five provides the findings of the study conducted in the Sarawak State Government selected agencies. In this chapter, the findings of these studies are divided into six sections. The first section is an introduction of the chapter. The second section describes the response rate of the study. The third section, an account on the demographics of the respondents is presented. This is followed by the fourth section that presents the assessment of the measurement model analysis. The fifth section discusses the descriptive statistics analysis of construct. Finally, the sixth section concludes the chapter.

5.2 Justification of Data Analysis Decision

This study employs Partial Least Squares Structural Equation Modelling (PLSSEM) to analyze the proposed research model due to its suitability for predictive research and complex models involving multiple constructs and relationships. The research model comprises twelve hypothesized relationships (H1–H12), making PLS-SEM appropriate for simultaneously assessing both the measurement and structural models. In addition, PLSSEM is robust against violations of normality assumptions and is suitable for small to medium sample sizes, which aligns with the characteristics of the present study.

The use of a five-point Likert scale is justified as it provides an effective balance between respondent comprehension and statistical reliability. Likert-scale data are commonly treated as interval-level measurements in information systems research, allowing for meaningful interpretation of path coefficients, mean values, and relationships among constructs. This approach enables consistent and reliable evaluation of respondents' perceptions regarding EDMS functionalities and system effectiveness.

5.3 Response Rate

In total, 500 questionnaires were distributed to State Ministries, Chief Minister's Department, State Departments, Resident Offices, District Offices, State Statutory Bodies in the state government of Sarawak. The full list of the agencies can be accessed at https://sarawak.gov.my/web/home/list_agency. A total of 293 survey was returned. Since the researcher faced the pandemic COVID19 period during the data collection, a proper data collection strategy helped the researcher to achieve a higher response rate. The researcher decided to collect data via email through Head of Department, sent to seven State Ministries, eight Chief Minister's Department, State Departments, Resident Offices, District Offices, State Statutory Bodies. Researcher followed-up with telephone call as most of the government agencies practised work from home. This approach helped the researcher collect the data effectively despite of the challenges during the pandemic COVID19. Each of the agencies were given two weeks to one month to complete the online survey. Table 5.1 presents the response rate by the Sarawak government agencies.

Table 5.1
The Response Rate by Sarawak Government Agencies

	Total Distributed		**Total Returned**		**Total Usable**	
	Frequency	Percent	Frequency	Percent	Frequency	Percent

State Ministries, Chief Minister's Department, State Departments, Resident Offices, District Offices, State Statutory Bodies	500	293	293

5.4 Demographic Profiles of Respondents

In the context of this study, 293 questionnaires were used. Out of this number, 104 (35.5%) are males while the remaining 189 (64.5%) are females which implies that the population of the female respondents is higher than male (Figure 5.1).

The demographic profile indicates that the majority of respondents are active EDMS users within government agencies, suggesting that the data collected are appropriate for evaluating system effectiveness. The respondents' experience with EDMS supports the credibility of their evaluations, as they are sufficiently familiar with system functionalities, workflows, and information quality. This strengthens the validity of the findings and ensures that subsequent analyses reflect informed user perceptions rather than hypothetical assessments attribution of gender of respondents involved in this study.

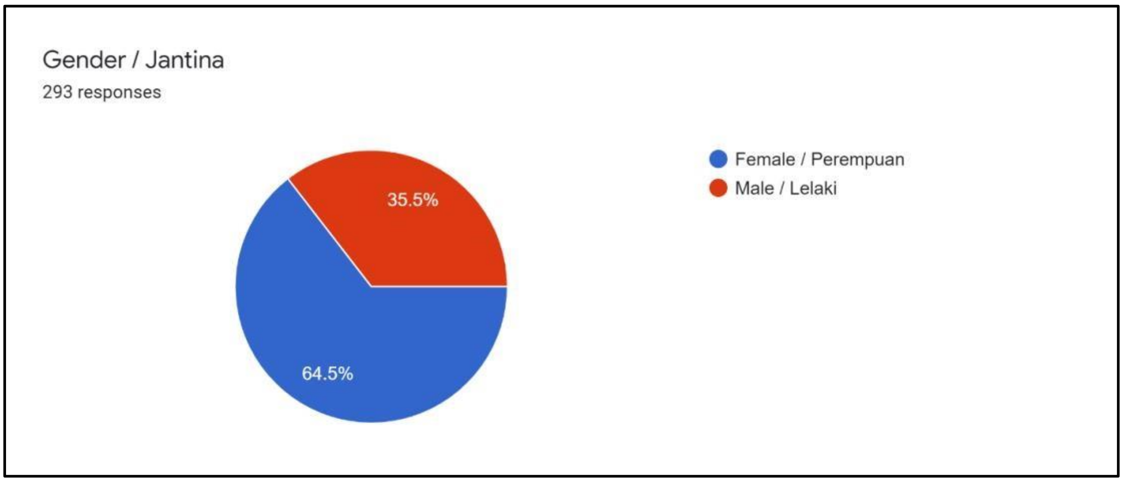

Figure 5.1 Distribution of Gender

Table 5.2 presents the age difference of the government civil service involved in this study. The most dominant age involved in this study is 26 – 33 years old (32.4%), followed by the age range 42 – 49 years old (29.7%) and then 34 – 41 years old (27%).

Table 5.2
Variance Age of Respondents for this Study

Characteristic	Value	Frequency	Percent%
Age	18 – 25 years	12	4.1
	26 – 33 years	95	32.4
	34 – 41 years	79	27
	42 – 49 years	87	29.7
	50 – 57 years	20	6.8

In this study, the minimum education level of the respondents is also recorded. Figure 5.2 indicates the level of education of the respondents. Based on the finding, most of the respondents in this study hold bachelor's degree (n=131, 45.8%), SPM and diploma graduates hold (n=58, 20.3% and n=57, 19.9%) respectively, followed by master's degree (n=21, 7.3%) and STPM (n=58, 20.3%).

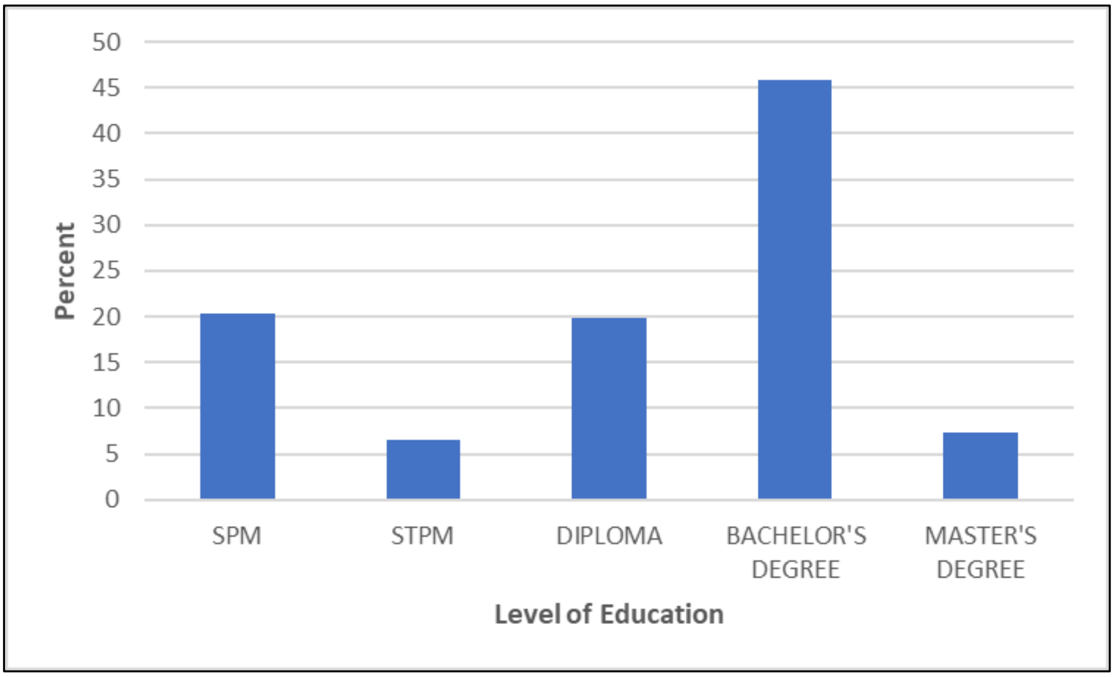

Figure 5.2 Respondents' Level of Education

Besides the level of education, the study also recorded the number of years in service. Figure 5.3 comprehensively presents the data on respondents' years in service. Findings from the figure show that less than 5 years are the higher categories (n= 93, 31.7%), followed by 16 to 20 years (n=57, 19.5%), subsequently by 11 to 15 years (n=50, 17.1%) and 5 to 10 years (n=49, 16.7%). Respondents who served between 21 and 25 years as well as 26 to 30 years recorded a total of 29 (n=29, 9.9%) and 10 (n=10, 3.4%) respectively. Only five (n=5, 1.7%) respondents who participated in this study served more than 30 years of service experience.

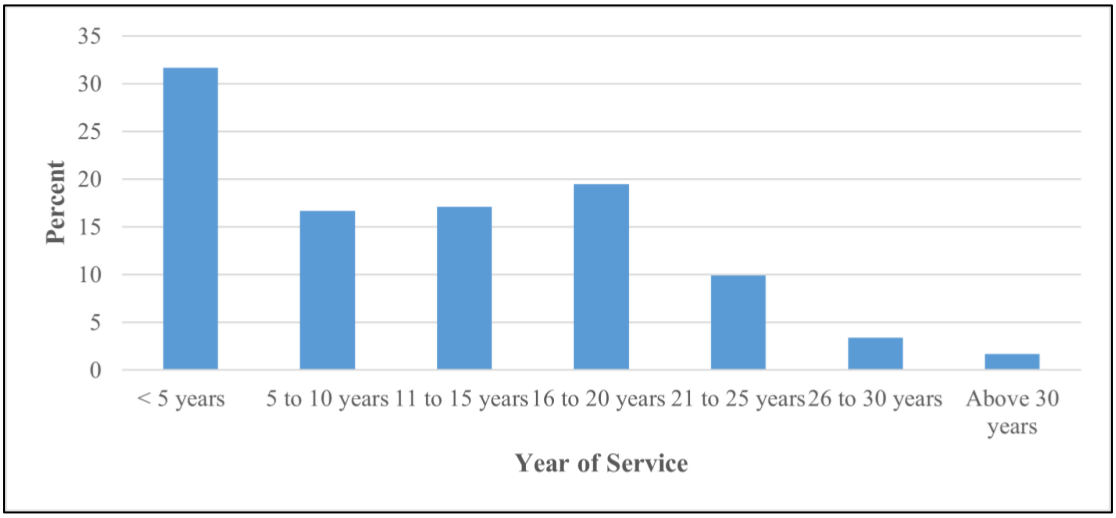

Figure 5.3 Respondents' Year(s) of Service

Apart from year of service of respondents, the level of employment of the respondents were also recorded. In the context of this study, respondents under the operational management category show the highest number of respondents (n=147, 50.2%) as compared to the middle management (n=125, 42.7%) and top management (n=21, 7.2%). Figure 5.4 comprehensively presents the details of the respondents' level of employment.

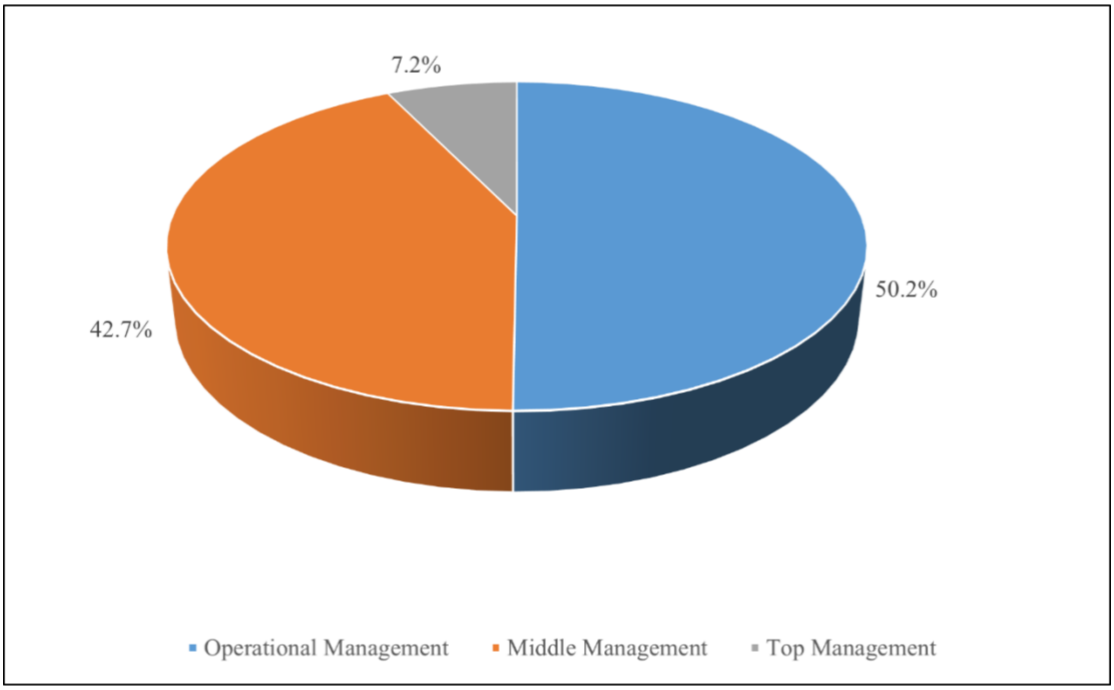

Figure 5.4 Respondents' Level of Employment

With regards to the information shown in Figure 5.5, majority of respondents used CACTUS (n=219, 74.7%) and SCS-GEMS (n=226, 77.1%), while e-Prestasi and e-Recruitment recorded total usage of 202 (n=202, 68.9%) and 147 (n=147, 50.2%) among respondents respectively. However, ER & DO stood at a total of 41 (n=41, 14%) among the respondents and 39 (n=39, 13.3%) used EMS. The rest of the respondents indicated 15 (n=15, 5.1%) for SIFBAS, two (n=2, 0.7%) for ICT-RMS, and one (n=1, 0.3%) for each other system as displayed in Figure 5.5.

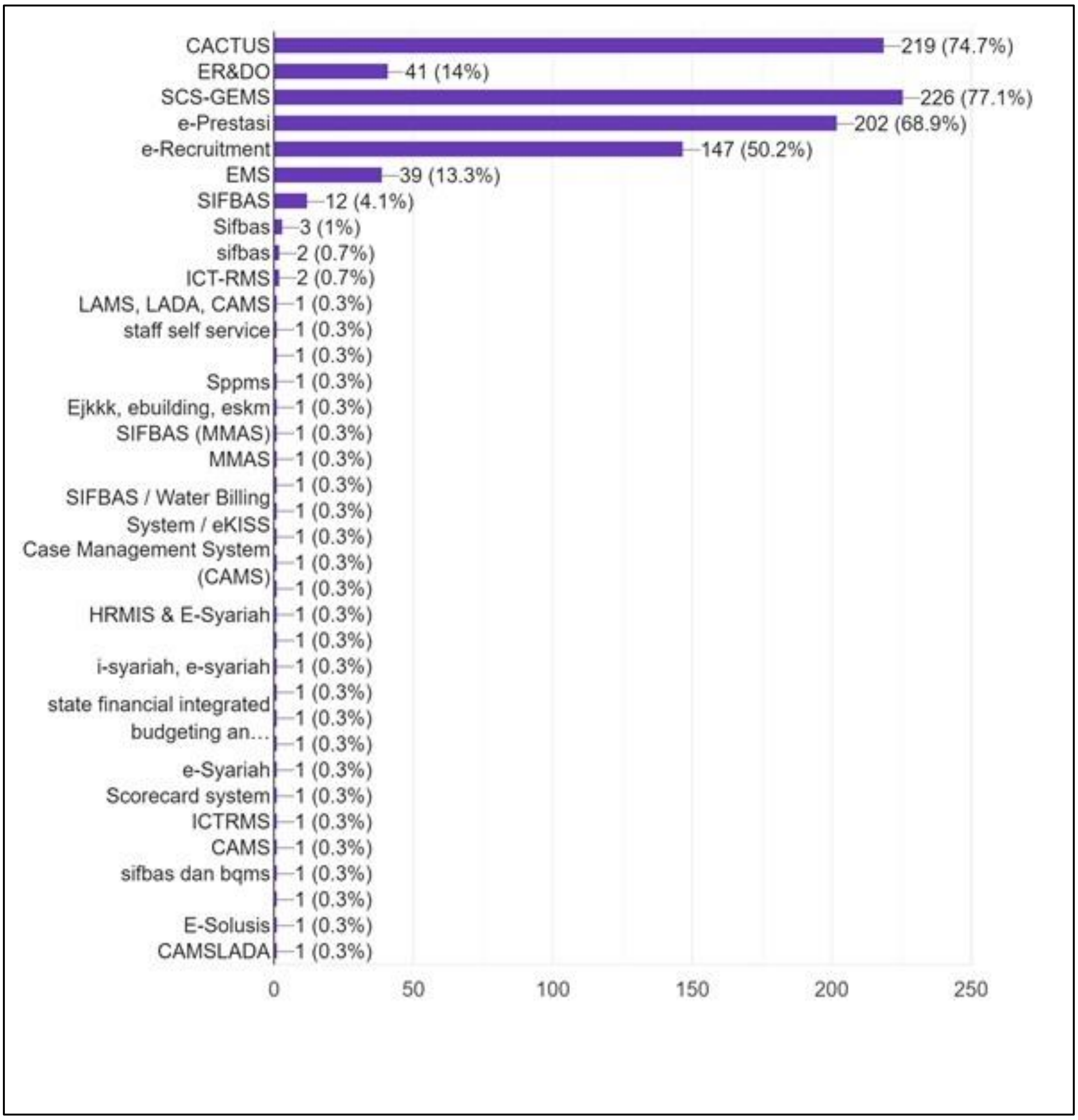

Figure 5.5 EDMS Use by the Respondents

With regard to the number of years using EDMS in this study, respondents who work less than five years (n=102, 34.8%) were the highest number recorded followed by respondents who work between 5 to 10 years at 97 (n=97, 33.1%), 11 to 15 years at 56 (n=56, 19.1%), and 16 to 20 years at 32 (n=32, 10.9%). Only two (n=2, 0.7%) and four (n=4, 1.4%) of the respondents used the EDMS recorded respectively between 21 to 25 years and more than 25 years. In connection with the frequency of using EDMS based on current position or task, 66 respondents (n=66, 22.5%) used the EDMS more than once a week, while 53 respondents (n= 53, 18.1%) used the EDMS every hour in a day. This is followed by 66 of them (n=66, 7.5%) at least once a week, at 15 (n=15, 5.1%) at least once a month, and 14 of them (n=14, 4.8%) less than once a month. The highest frequency was at least once a day stood at 115 (n=115, 39.2%) and the least number of frequencies was more than once a month at 8 (n=8, 2.7%). Table 5.4 expansively presents the details of the findings.

The frequency of data use data underscored the varying levels of system engagement among staff. While a sizeable proportion of respondents reported using the EDMS at least once a day (39.2%) or more than once a week (22.5%), only 18.1% reportedly using the system every hour. This suggests that although the EDMS is integrated on daily workflows for many positions, it may not be equally essential across all job roles. The lower frequencies of use for instance, monthly (5.1%) or less than monthly (4.8%) use could imply that certain tasks remain paper-based, require limited interaction with digital records, or that some staff are peripheral users due to the nature of their duties. The extremely low percentage of users has been due to the nature of their duties. The extremely low percentage of users engaging with the system more than once a month (2.7%) raises concerns about underutilization and possibly inadequate role-based alignment with EDMS functionalities.

The patterns reveal several important implications. First, the concentration of newer users highlights the ongoing need for targeted training, continuous user support, and possibly refresher modules to ensure that users maximise the system's capabilities. Second, disparities in usage frequency may reflect uneven digital integration across units, signalling the need for strategic interventions to ensure consistent system adoption. Third, the limited presence of long-term users may weaken organisational capacity for peer learning, suggesting the need for formalised knowledge transfer mechanisms. Overall, these findings point to the importance of sustaining user competency, reinforcing system relevance across job roles, and addressing structural gaps that may hinder full EDMS utilisation.

Table 5.3
Demographic Profiles for Number of Using EDMS and Frequency of Usage by Respondents

		Frequency	Percentage (%)
Number of years using EDMS	< 5 years	102	34.8
	5 to 10 years	97	33.1
	11 to 15 years	56	19.1
	16 to 20 years	32	10.9

	21 to 25 years	2	0.7
	Above 25 years	4	1.4
Frequency of using EDMS based on current position or task	Less than once a month	14	4.8
	At least once a month	15	5.1
	At least once a week	22	7.5
	More than once a week	66	22.5
	More than once a month	8	2.7
	Every hour in a day	53	18.1
	At least once a day	115	39.2

To complete the demographic information about the population, the respondents' level of expertise in the usage of EDMS were stated. The respondents declared as competent practitioner that they can perform in the activity of using EDMS with understanding of the theory and practice principles without assistance and/or direct supervision (n=138, 49.1%) being the highest number recorded followed by novice (n=98, 37.5%) who can perform this activity with a basic understanding of theory and practice principles but requires some supervision and assistance. Meanwhile, 38 (n=38, 18.4%) have confirmed they are expert that they can perform the activity with understanding of theory and practice principles without assistance and/or direct supervision, at an appropriate pace and adhering to evidence-based practice in EDMS. However, only 27 of the respondents (n=27, 9%) were recorded as novice that can perform the activity but not without constant supervision and assistance. Figure 5.6 comprehensively presents the details.

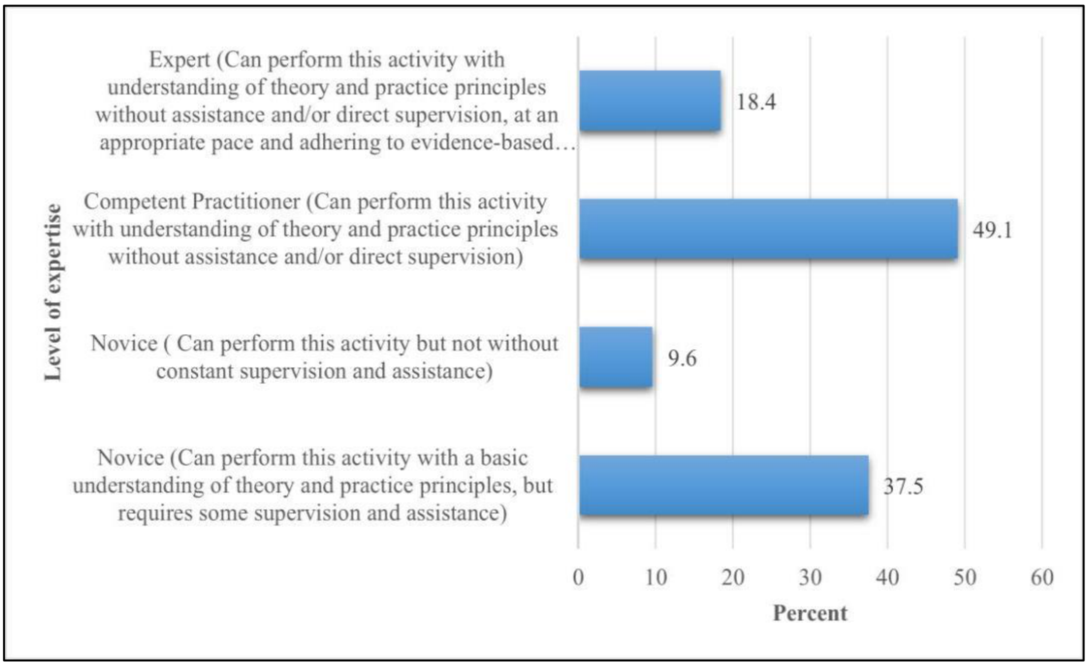

Figure 5.6 Respondents' Level of Expertise in the EDMS Usage

5.5 Assessment of the Measurement Model

Validity and reliability are the two main criteria used in PLS analysis to evaluate the measurement model. Thus, it is important to conduct an assessment of the measurement model analysis before the structural model is assessed. For the assessment of reflective measurement models, the three main assessment criteria are needed which are the internal consistency reliability, convergent validity (indicator reliability/outer loading and average variance extracted) and discriminant validity. Table 5.54 presents the abbreviation for the first and second order constructs in the context of this study.

Table 5.4

Abbreviation for the First and Second Order Constructs

Construct		**Abbreviation**
Information System Effectiveness (ISE)		
Information Quality	ISE_IQ1:	Information from the Electronic Document Management System (EDMS) is relevant to my work
	ISE_IQ2:	Information I get from the EDMS is accurate
	ISE_IQ3:	It is easy to understand information from the EDMS
	ISE_IQ4:	The information is presented in a useful format
	ISE_IQ5:	Available on time for its intended use

System Quality	ISE_SQ1:	The EDMS is easy to use and to learn
	ISE_SQ2:	The EDMS is useful
	ISE_SQ3:	The EDMS requires little effort to be used
	ISE_SQ4:	The retrieval of information that I need is easy
	ISE_SQ5	Response to an instruction of the EDMS is fast

Construct		Abbreviation
Information System Effectiveness (ISE)		
Satisfaction	ISE_S1:	I am satisfied with the system
	ISE_S2:	Meets the information processing needs of my task
	ISE_S3:	I am satisfied with the ease of completing the tasks in this system
	ISE_S4:	Using the system is not a frustrating experience
Perceived Usefulness	ISE_PU1:	EDMS enables me to accomplish my tasks more quickly.
	ISE_PU2:	EDMS improves my job performance.
	ISE_PU3:	EDMS increases my productivity.
	ISE_PU4:	EDMS enhances my effectiveness in the job.
	ISE_PU5:	EDMS makes it easier to do my job.
	ISE_PU6:	EDMS useful to my job.
Document Management Serv		
Automated Information Capture	DMS_AIC1:	The EDMS that I use enable me to transform paper documents into digital files through high-volume scanning and Optical Character Recognition (OCR).
	DMS_AIC2:	The EDMS that I use enable me to organize (e.g.: capture and store) digital files at the point of creation.
	DMS_AIC3:	The EDMS that I use allow me to create document from network folders, Microsoft-office and/or other integrated system(s).
	DMS_AIC4:	The EDMS that I use enable me to capture details of document automatically such as file classification.
Federated Search & Retrieval	DMS_FSR1: DMS_FSR2:	EDMS that I use enable me to search files/documents easily. EDMS that I use enable me to locate files/documents from across folders and repositories.
	DMS_FSR3:	EDMS that I use enable me to access the full content.
	DMS_FSR4:	EDMS that I use enable me to upload the documents to the system.
Collaboration Tools	DMS_CT1:	EDMS that I use provides me with the ability to work faster on document changes.
	DMS_CT2:	EDMS that I use is easy for me to create and edit documents directly within the system.
	DMS_CT3:	EDMS that I use allows me to the create, upload and categorize new documents without leaving certain interface.
	DMS_CT4:	EDMS that I use enables all users involved in the workflow be notified as tasks are completed by each stage.
	DMS_CT5:	EDMS that I use can interact with other electronic document management systems.
Hierarchical File Indexing & Classification	DMS_HFIC1:	The EDMS that I use enable me to refer to an index to determine the location of a file or document.
	DMS_HFIC2:	The existing EDMS that I use enable me to use the same terminology in organizing the document.
	DMS_HFIC3:	The existing EDMS that I use enable me to index large documents at several levels of EDMS process.

	DMS_HFIC4:	The existing EDMS that I use enable me to identify the management responsibility for a group of records.
	DMS_HFIC5:	The existing EDMS that I use enable me to provide context for individual documents and records.
Storage and Archival Methods	DMS_SAM1:	The existing EDMS that I use enable me to save the document into archival folder.
	DMS_SAM2:	The existing EDMS that I use enable me to change the status from open file/document to closed file/document.
	DMS_SAM3:	The existing EDMS that I use enable me to copy the document/file to another medium (move a file or folder from one folder to another).
	DMS_SAM4:	The existing EDMS that I use enable me to do documents/records inventories.
	DMS_SAM5:	The existing EDMS that I use enable me to include the file/document into the retention schedules

Construct		Abbreviation
Information System Effectiveness (ISE)		
Automated Workflows	DMS_AW1:	The existing EDMS that I use enable me to establish ownership /responsibility for each step in the EDMS system process.
	DMS_AW2:	The existing EDMS that I use enable me to streamline processes and keep them moving forward with little human effort.
	DMS_AW3:	The existing EDMS that I use enable me to easily see the active step, who is responsible for completing it, and how much time it is taking.
	DMS_AW4:	The existing EDMS that I use enable me to reduce process error as all file/document are scanned to ensure that all necessary information is captured.
	DMS_AW5:	The existing EDMS that I use enable me to respond to my prompted task and clicks submit.
Security & Audit Trails	DMS_SAT1:	The existing EDMS that I use enable me to store the transactions of documents by unique serial numbers.
	DMS_SAT2:	The existing EDMS that I use enable me to check-in/checkout content creation and editing.
	DMS_SAT3:	The existing EDMS that I use enable me to allow simultaneous editing.
	DMS_SAT4:	The existing EDMS that I use enable me to control over the various and previous repetitions of a file.
	DMS_SAT5:	The existing EDMS that I use enable me to track the creation and editing of file.
	DMS_SAT6:	The existing EDMS that I use enable me to rollback to previous versions of a document.
Support and administer compliance	DMS_SAC1:	Electronic Document Management System (EDMS) that I use enables me to identify and manage regulatory risk.
	DMS_SAC2:	Electronic Document Management System (EDMS) that I use enables me to design and implement controls to protect an organization from those risks.
	DMS_SAC3:	Electronic Document Management System (EDMS) that I use enables me to monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks.
	DMS_SAC4:	Electronic Document Management System (EDMS) that I use enables me to resolve compliance difficulties as they occur.
	DMS_SAC5:	Electronic Document Management System (EDMS) that I use enables me to impose on rules and controls of risks.

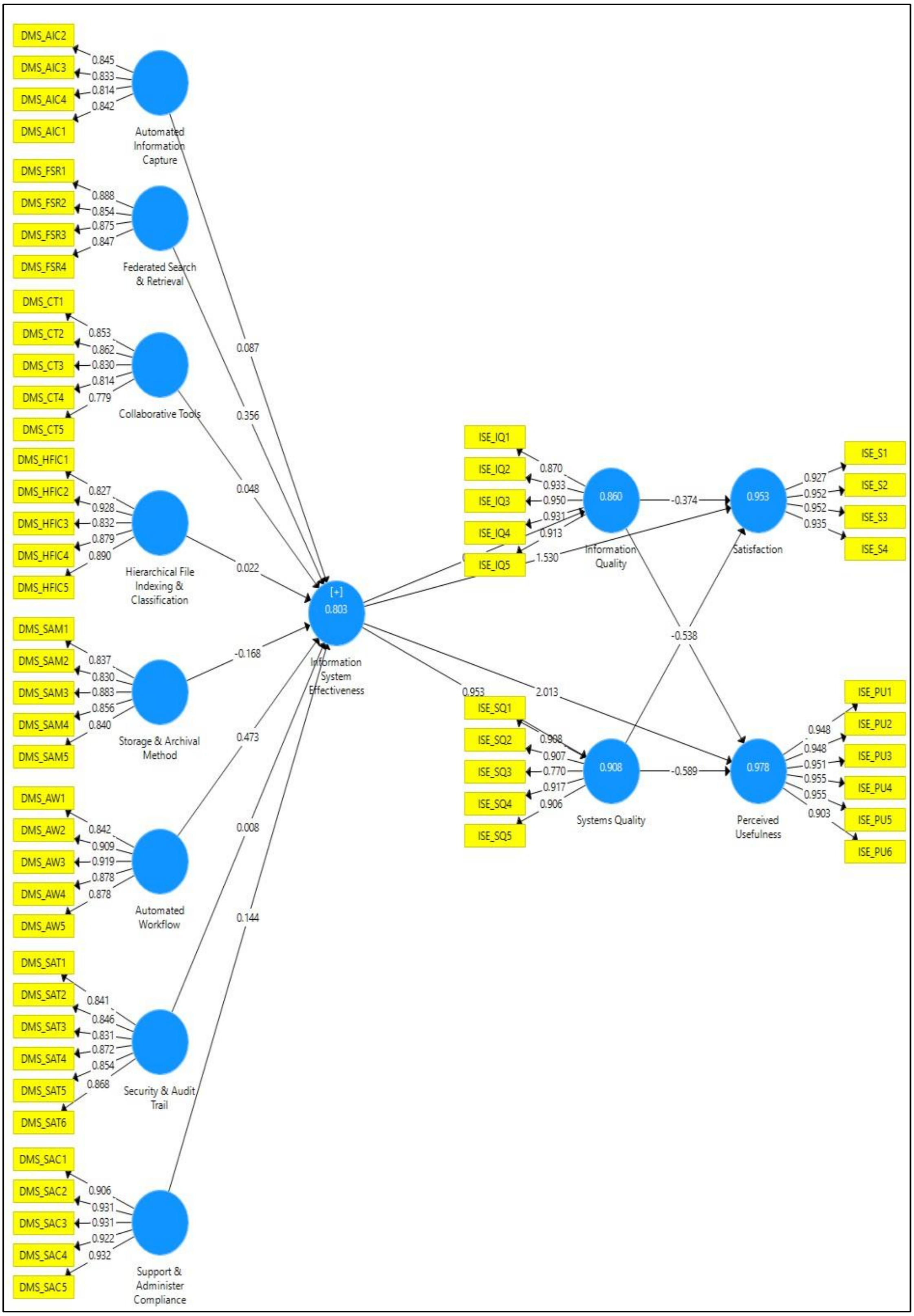

Figure 5.7 Initial Measurement of the Model

Table 5.5
Construct Reliability Validity Analysis

		1st Run					2nd Run				
Constructs	Indicator	Factor Loading	Cronbach's Alpha	**rho_A**	**Composite Reliability**	**Average Variance Extracted (AVE)**	**Factor Loading**	**Cronbach's Alpha**	**rho_A**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Automated Information Capture	DMS_AIC1	0.842	0.854	0.855	0.901	0.695	0.854	0.854	0.855	0.901	0.695
	DMS_AIC2	0.845					0.931				
	DMS_AIC3	0.833					0.886				
	DMS_AIC4	0.814					0.889				
Automated Workflow	DMS_AW1	0.842	0.931	0.932	0.948	0.784	0.842	0.931	0.932	0.948	0.784
	DMS_AW2	0.909					0.909				
	DMS_AW3	0.919					0.919				
	DMS_AW4	0.878					0.878				
	DMS_AW5	0.878					0.878				

Collaborative Tools	DMS_CT1	0.853	0.886	0.896	0.916	0.686	0.852	0.886	0.895	0.916	0.686
	DMS_CT2	0.862					0.862				
	DMS_CT3	0.83					0.83				
	DMS_CT4	0.814					0.813				
	DMS_CT5	0.779					0.779				
Federated Search & Retrieval	DMS_FSR1	0.888	0.889	0.89	0.923	0.75	0.888	0.889	0.89	0.923	0.75
	DMS_FSR2	0.854					0.854				
	DMS_FSR3	0.875					0.875				
	DMS_FSR4	0.847					0.847				
	DMS_HFIC1	0.827	0.921	0.925	0.941	0.76	0.827	0.921	0.925	0.941	0.76
	DMS_HFIC2	0.928					0.928				
Hierarchical File Indexing & Classification	DMS_HFIC3	0.832					0.832				
	DMS_HFIC4	0.879					0.879				
	DMS_HFIC5	0.89					0.89				
Support & Administer Compliance	DMS_SAC1	0.906	0.958	0.958	0.967	0.855	0.906	0.958	0.958	0.967	0.855
	DMS_SAC2	0.931					0.931				
	DMS_SAC3	0.931					0.931				
	DMS_SAC4	0.922					0.922				
	DMS_SAC5	0.932					0.932				

Security & Audit Trail	DMS_SAT1	0.841	0.925	0.928	0.941	0.726	0.84	0.925	0.928	0.941	0.726
	DMS_SAT2	0.846					0.846				
	DMS_SAT3	0.831					0.831				
	DMS_SAT4	0.872					0.873				
	DMS_SAT5	0.854					0.854				
	DMS_SAT6	0.868					0.868				
Storage & Archival Method	DMS_SAM1	0.837	0.904	0.915	0.928	0.721	0.836	0.904	0.915	0.928	0.721
	DMS_SAM2	0.83					0.83				
	DMS_SAM3	0.883					0.883				
	DMS_SAM4	0.856					0.856				
	DMS_SAM5	0.84					0.84				
Information Quality	ISE_IQ1	0.87	0.954	0.956	0.965	0.846	0.87	0.954	0.956	0.965	0.846
	ISE_IQ2	0.933					0.933				
	ISE_IQ3	0.95					0.95				
	ISE_IQ4	0.931					0.931				
	ISE_IQ5	0.913					0.913				
Perceived Usefulness	ISE_PU1	0.948	0.975	0.976	0.98	0.89	0.948	0.975	0.976	0.98	0.89
	ISE_PU2	0.948					0.948				

	ISE_PU3	0.951					0.951				
	ISE_PU4	0.955					0.954				
	ISE_PU5	0.955					0.955				
	ISE_PU6	0.903					0.903				
Satisfaction	ISE_S1	0.927	0.957	0.958	0.969	0.887	0.927	0.957	0.958	0.969	
	ISE_S2 ISE_S3	0.952 0.952					0.952 0.952				0.887
	ISE_S4	0.935					0.935				
Systems Quality_	ISE_SQ1	0.908	0.929	0.936	0.946	0.78	0.908	0.929	0.936	0.946	0.78
	ISE_SQ2	0.907					0.907				
	ISE_SQ3	0.77					0.769				
	ISE_SQ4	0.917					0.917				
	ISE_SQ5	0.906					0.906				
Information System Effectiveness	ISE_IQ1 ISE_IQ2 ISE_IQ3	0.792 0.85 0.886	0.984	0.984	0.985	0.766	0.793 0.849 0.886	0.984	0.985	0.985	0.781
	ISE_IQ4	0.856					0.856				

	ISE_IQ5	0.876	0.876
	ISE_PU1	0.918	0.92
	ISE_PU2	0.903	0.905
	ISE_PU3	0.895	0.897
	ISE_PU4	0.891	0.894
	ISE_PU5	0.897	0.898
	ISE_PU6	0.887	0.889
	ISE_S1	0.874	0.876
	ISE_S2	0.917	0.918
	ISE_S3	0.926	0.926
	ISE_S4	0.912	0.913
	ISE_SQ1	0.864	0.862
	ISE_SQ2	0.873	0.871
	ISE_SQ3	0.698	
	ISE_SQ4	0.871	0.871
	ISE_SQ5	0.885	0.886

The measurement model assessment confirms that all constructs meet the recommended thresholds for internal consistency reliability and convergent validity. Composite reliability values exceeding 0.70 indicate that the measurement items consistently represent their respective constructs. Furthermore, Average Variance Extracted (AVE) values above 0.50 demonstrate that the constructs explain a substantial proportion of variance in their indicators.

Discriminant validity results further confirm that each construct is empirically distinct, ensuring that the measurement model is appropriate for subsequent structural model evaluation. These results validate the adequacy of the measurement instruments in capturing EDMS functionalities, user satisfaction, perceived usefulness, and system effectiveness.

5.5.1 Revised Analysis

One item (1.26%) was removed during the measurement analysis. Therefore, the values of all variables (indicator loading <0.70 or if less it is adequate to complement AVE and CR value, and the value of AVE <0.50) in the context of this study are sufficient to support the reliability and validity in the measurement model. Table 5.6 presents the Cronbach's value and Composite Reliability. The listed variable in this table was used for assessment structural model. The Cronbach's value for this study was reported from 0.854 to 0.984. Figure 5.7 and Figure 5.8 show the details of value for each variable.

Table 5.6
Construct Reliability Analysis

Constructs	Indicators	Cronbach's Alpha	Composite Reliability
	Document Management Services		
Automated Information Capture	DMS_AIC1, DMS_AIC2, DMS_AIC3, DMS_AIC4	0.854	0.901
Automated Workflow	DMS_AW1, DMS_AW2, DMS_AW3, DMS_AW4, DMS_AW5	0.931	0.948

Collaborative Tools	DMS_CT1, DMS_CT2, DMS_CT3, DMS_CT4, DMS_CT5	0.886	0.916
Federated Search & Retrieval	DMS_FSR1, DMS_FSR2, DMS_FSR3, DMS_FSR4	0.889	0.923
Hierarchical File Indexing & Classification	DMS_HFIC1, DMS_HFIC2, DMS_HFIC3, DMS_HFIC4, DMS_HFIC5	0.921	0.941
Security & Audit Trail	DMS_SAT1, DMS_SAT2, DMS_SAT3, DMS_SAT4, DMS_SAT5, DMS_SAT6	0.925	0.941
Storage & Archival Method	DMS_SAM1, DMS_SAM2, DMS_SAM3, DMS_SAM4, DMS_SAM5	0.904	0.928
Support & Administer Compliance	DMS_SAC1, DMS_SAC2, DMS_SAC3, DMS_SAC4, DMS_SAC5	0.958	0.967
Information System Effectiveness			
Information Quality	ISE_IQ1, SE_IQ2, ISE_IQ3, ISE_IQ4, ISE_IQ5	0.954	0.965
Systems Quality_	ISE_SQ1, ISE_SQ2, ISE_SQ3, ISE_SQ4, ISE_SQ5	0.929	0.946
Satisfaction	ISE_S1, ISE_S2, ISE_S3, ISE_S4,	0.957	0.969
Perceived Usefulness	ISE_PU1, ISE_PU2, ISE_PU3, ISE_PU4, ISE_PU5, ISE_PU6	0.975	0.98
Information System Effectiveness	ISE_IQ1, SE_IQ2, ISE_IQ3, ISE_IQ4, ISE_IQ5, ISE_PU1, ISE_PU2, ISE_PU3, ISE_PU4, ISE_PU5, ISE_PU6, ISE_S1, ISE_S2, ISE_S3, ISE_S4, ISE_SQ1, ISE_SQ2, ISE_SQ3, ISE_SQ4, ISE_SQ5	0.984	0.985

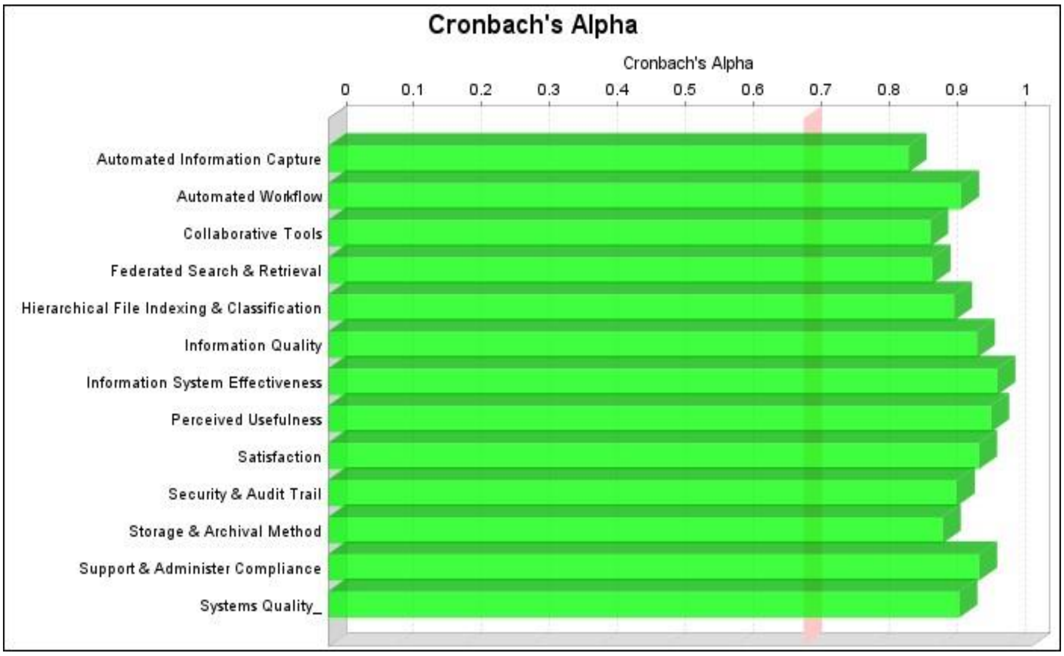

Figure 5.8 Cronbach Alpha

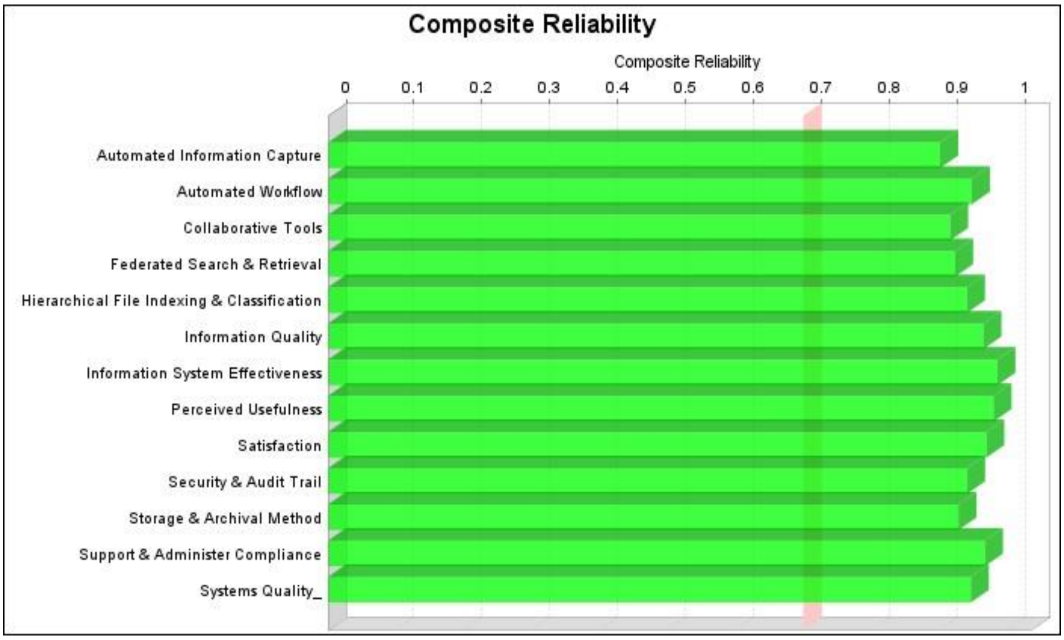

Figure 5.9 Composite Reliability

In the context of this study, all constructs for the Composite Reliability or AVE values are greater than > 0.5. This indicates that measurement had enough value for convergent validity. Table 5.6 shows the assessment of the convergent validity of this study. The values of the factor loading for each construct were presented. The factor loading of each construct was recorded from 0.769 to 0.955. Nonetheless, the AVE value for this study is between 0.686 (Collaboration Tools) and 0.890 (Perceived Usefulness). The average values of AVE were presented in Figure 5.7. Decisively, Figure 5.7 shows the measurement model of SmartPLS output for this study.

Table 5.7
Assessment of Convergent Validity

Constructs	Indicator	Factor Loading	Average Variance Extracted (AVE)
	Document Management Services		
Automated Information Capture	DMS_AIC1	0.854	0.695
	DMS_AIC2	0.931	
	DMS_AIC3	0.886	
	DMS_AIC4	0.889	
Automated Workflow	DMS_AW1	0.842	0.784
	DMS_AW2	0.909	
	DMS_AW3	0.919	
	DMS_AW4	0.878	
	DMS_AW5	0.878	
Collaborative Tools	DMS_CT1	0.852	0.686
	DMS_CT2	0.862	
	DMS_CT3	0.830	
	DMS_CT4	0.813	
	DMS_CT5	0.779	
Federated Search & Retrieval	DMS_FSR1	0.888	0.75
	DMS_FSR2	0.854	
	DMS_FSR3	0.875	
	DMS_FSR4	0.847	
Hierarchical File Indexing & Classification	DMS_HFIC1	0.827	0.76
	DMS_HFIC2	0.928	
	DMS_HFIC3	0.832	
	DMS_HFIC4	0.879	
	DMS_HFIC5	0.890	
Support & Administer Compliance	DMS_SAC1	0.906	0.855
	DMS_SAC2	0.931	
	DMS_SAC3	0.931	
	DMS_SAC4	0.922	
	DMS_SAC5	0.932	
Security & Audit Trail	DMS_SAT1	0.840	0.726
	DMS_SAT2	0.846	
	DMS_SAT3	0.831	
	DMS_SAT4	0.873	
	DMS_SAT5	0.854	
	DMS_SAT6	0.868	
Storage & Archival Method	DMS_SAM1	0.836	
	DMS_SAM2	0.830	

	DMS_SAM3	0.883	0.721
	DMS_SAM4	0.856	
	DMS_SAM5	0.840	
	Information System Effectiveness		
Information Quality	ISE_IQ1	0.870	0.846
	ISE_IQ2	0.933	
	ISE_IQ3	0.950	
	ISE_IQ4	0.931	
	ISE_IQ5	0.913	
Perceived Usefulness	ISE_PU1	0.948	0.89
	ISE_PU2	0.948	
	ISE_PU3	0.951	
	ISE_PU4	0.954	
	ISE_PU5	0.955	
	ISE_PU6	0.903	
Satisfaction	ISE_S1	0.927	0.887
	ISE_S2	0.952	
	ISE_S3	0.952	
	ISE_S4	0.935	
Systems Quality_	ISE_SQ1	0.908	0.78
	ISE_SQ2	0.907	
	ISE_SQ3	0.769	
	ISE_SQ4	0.917	
	ISE_SQ5	0.906	
Information System Effectiveness	ISE_IQ1	0.793	0.781
	ISE_IQ2	0.849	
	ISE_IQ3	0.886	
	ISE_IQ4	0.856	
	ISE_IQ5	0.876	
	ISE_PU1	0.920	
	ISE_PU2	0.905	
	ISE_PU3	0.897	
	ISE_PU4	0.894	
	ISE_PU5	0.898	
	ISE_PU6	0.889	
	ISE_S1	0.876	
	ISE_S2	0.918	
	ISE_S3	0.926	
	ISE_S4	0.913	
	ISE_SQ1	0.862	
	ISE_SQ2	0.871	
	ISE_SQ3	-	
	ISE_SQ4	0.871	
	ISE_SQ5	0.886	

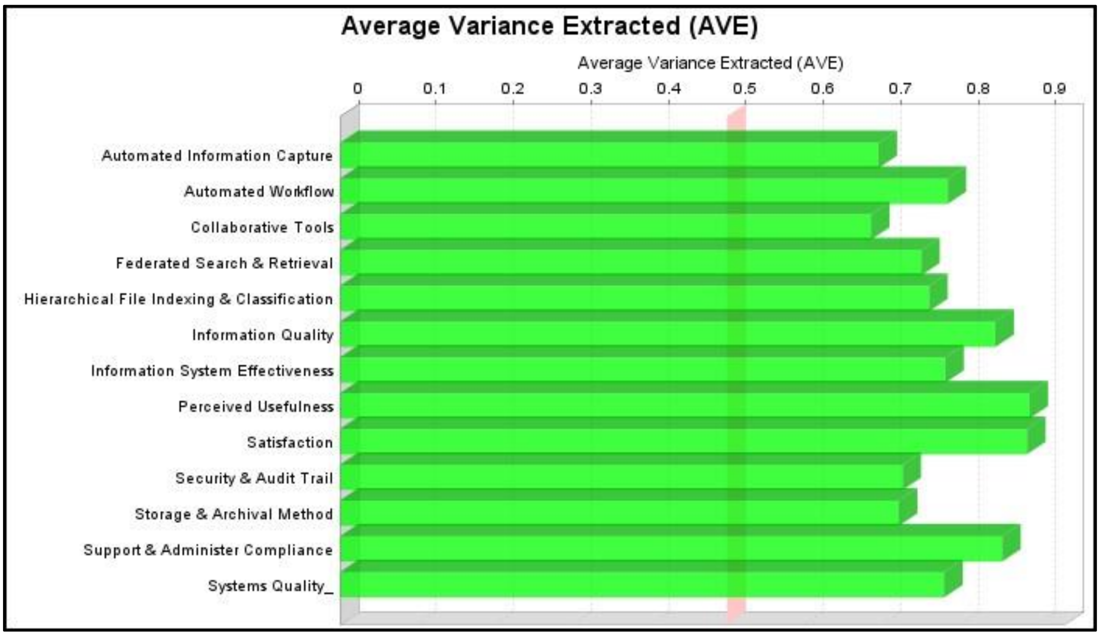

Figure 5.10 Average Variance Extracted (AVE)

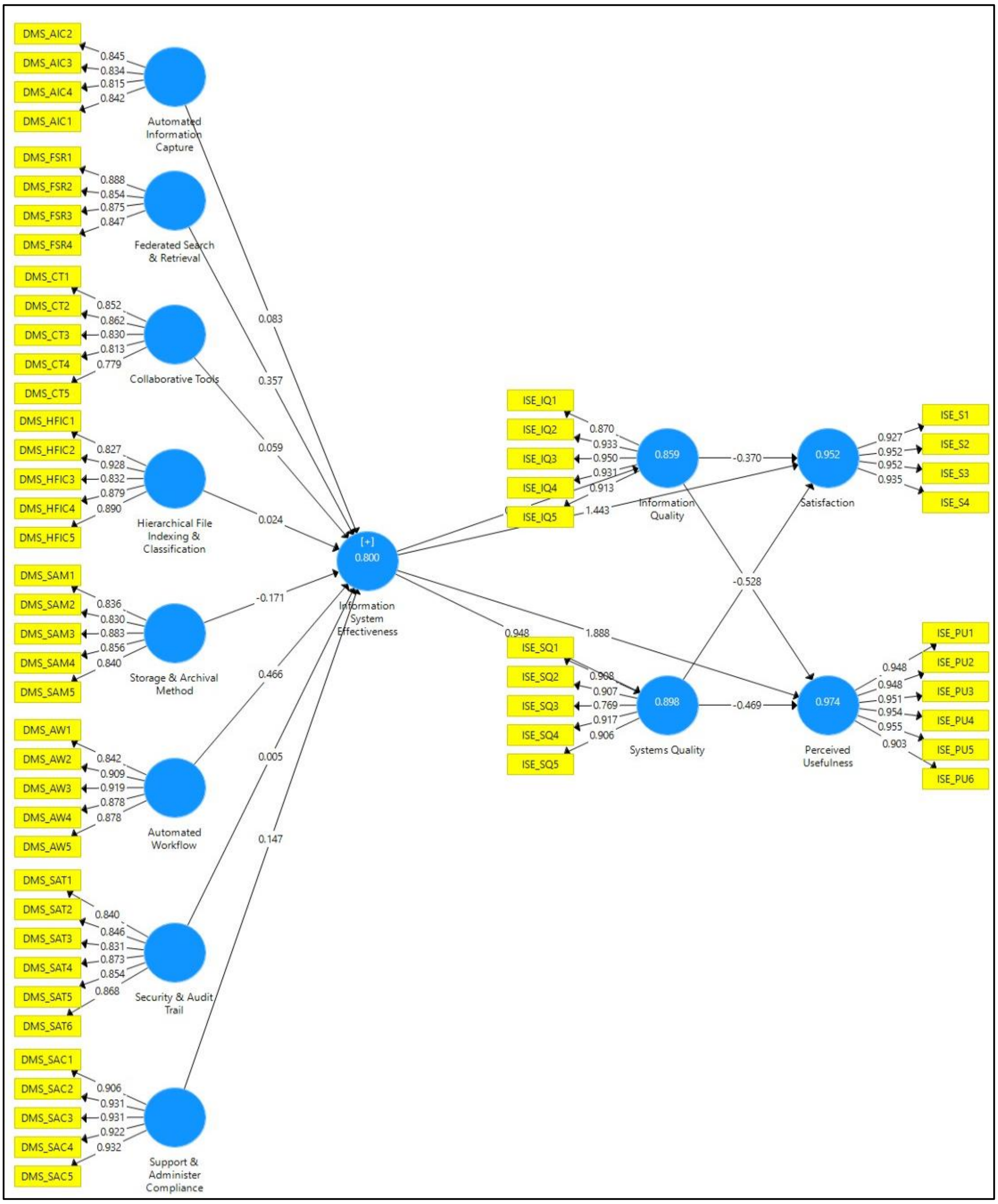

Figure 5.11 Revised Measurement Model of the SmartPLS Output

The discriminant validity of the model was subsequently evaluated. In SmartPLS, there are three kinds of discriminant validity to be chosen, namely the cross-loading criterion, the criterion of Fornell and Larcker (1881) and the correlation ratio HeterotraitMonotrait (HTMT) (Ramayah et al., 2018.

Discriminant validity refers to the degree to which the construct varies empirically from each other. The size of the variations between the overlapping constructs is also measured. Cross-loading of the indicator, Fornell and Larcker criteria and HeterotraitMonotrait (HTMT) correlation ratio can be used to determine the discriminant validity. The factor loading indicators on the assigned construct must be higher than all the loading of other constructs by looking at the cross-loading, such that the factor loading cut-off value is higher than 0.70.

Table 5.8 displays the results for Fornell-Larcker criterion results. Discriminant validity of Fornell and Larcker's (1981) analysis on square root of AVE is above the correlation value. Thus, the discriminant validity can be assumed. The square root of AVE of COM is smaller compared to the correlation between Automated Information Capture, Automated Workflow, Collaborative Tools, Federated Search and Retrieval, Hierarchical File Indexing and Classification, Information System Effectiveness, Security and Audit Trail, Storage and Archival Method, and Support and Administer Compliance. The researcher also decided to perform Heterotrait-Monotrait (HTMT) analysis.

Table 5.8
Results for Fornell-Larcker Criterion Results

Automated Information Capture	**0.834**								
Automated Workflow	0.686	**0.886**							
Collaborative Tools	0.7	0.781	**0.828**						
Federated Search & Retrieval	0.742	0.72	0.709	**0.866**					
Hierarchical File Indexing & Classification	0.721	0.757	0.773	0.722	**0.872**				
Information System Effectiveness	0.711	0.838	0.741	0.8	0.717	**0.884**			
Security & Audit Trail	0.622	0.817	0.729	0.639	0.776	0.701	**0.852**		
Storage & Archival Method	0.579	0.734	0.705	0.609	0.787	0.608	0.811	**0.849**	
Support & Administer Compliance	0.554	0.791	0.721	0.606	0.737	0.715	0.773	0.735	**0.925**

Using the HTMT as a criterion involves comparing it to a predefined threshold. If the value of the HTMT is higher than this threshold, one can conclude that there is a lack of discriminant validity. In the context of this study, HTMT is adequate to observe HTMT value. Table 5.9 presents the HTMT results for this study. The value of HTMT should be lower than 0.85 (Kline, 2016), or lower than 0.90 (Gold et al., 2001). The results of HTMT for this study are not greater than the value suggested. Hence, there are no discriminant validity issues.

Table 5.9
Heterotrait-Monotrait (HTMT)

Automated Information Capture								
Automated Workflow	0.768							
Collaborative Tools	0.803	0.855						
Federated Search & Retrieval	0.849	0.791	0.785					
Hierarchical File Indexing & Classification	0.812	0.818	0.857	0.796				
Information System Effectiveness	0.774	0.875	0.78	0.856	0.75			
Security & Audit Trail	0.697	0.879	0.806	0.702	0.84	0.729		
Storage & Archival Method	0.655	0.795	0.788	0.668	0.86	0.633	0.885	
Support & Administer Compliance	0.613	0.839	0.781	0.656	0.79	0.736	0.821	0.785

5.6 Descriptive Analysis of Constructs

Descriptive statistics is a branch of statistics that aims at describing several data characteristics usually involved in a study. The main purpose of descriptive statistics is to provide a brief summary of the samples and the measures done on a particular study. According to Taylor (2020), there are two kinds of descriptive statistics in social science research. Measures of central tendency such as the mean, median, and mode summarize the performance level of a group of scores, and measures of variability describe the spread of scores among participants. Measures of spread are often visually represented in tables, pie and bar charts, and histograms to aid in the understanding of the trends within the data.

For this study, eight variables for document management services consisting of the main constructs were measured including Automated Information Capture, Federated Search and Retrieval, Collaborative Tools, Hierarchical File Indexing and Classification, Storage and Archival Method, Automated Workflow, Security and Audit Trail, and Support and Administer Compliance. Moreover, this study also measured four variables of information system effectiveness which is information quality, systems quality, satisfaction and perceived usefulness. In the context of this study, descriptive analysis is performed to answer the Research Question Number One and Research Question Number Two or to achieve Research Objective One and Research Objective Two in Chapter One mainly on (i) how effective is the document management systems used in Sarawak State Government? and (ii) how is the performance of the services provided by the document management systems?

5.6.1 Information System Effectiveness

This study used three out of the six dimensions of the D&M model comprising system quality, information quality, and satisfaction including Perceived Usefulness from Respecified Version of DeLone and McLean's (1992) Model of IS Success by Seddon (1997). The descriptive analysis for Information Systems Effectiveness is presented in the 5.6.1.1, 5.6.1.2, 5.6.1.3 and 5.6.1.4 below.

5.6.1.1 Information Quality

As shown in Table 5.11, the overall mean for the variable task innovation turned out to be 5.738, which means that the information quality of the respondents is above the average. The range of the mean is between 5.683 and 5.823. The overall standard deviation is 1.045 and the range is between 1.022 and 1.095. The lowest mean is for the item "ISE_IQ1", while the highest is for the item "ISE_IQ5". The overall mean for the information quality construct (M=5.738) indicates that respondents generally perceive the EDMS to deliver information of above-average quality. The mean values range from 5.683 to 5.823, suggesting relatively consistent agreement across items. The standard deviation values, which range between 1.022 and 1.095 (overall SD = 1.045), indicate moderate variability in responses, implying that while users share a broadly favourable perception, individual experiences of information quality vary to some extent. The lowest score, recorded for item ISE_IQ1, may reflect areas in which the EDMS does not fully support aspects such as completeness, accuracy, or relevance of the information delivered. Conversely, the highest mean for item ISE_IQ5 demonstrates that users are more satisfied with specific features possibly timeliness, clarity, or accessibility of information indicating relative strengths in these dimensions.

This pattern of results has several implications. First, it affirms that the EDMS contributes positively to ensuring reliable and usable information for government tasks. Second, the variation across items suggests that although core functions related to information provision are performing satisfactorily, there remains room for improvements to ensure greater consistency across different elements of information quality. These findings align with previous literature DeLone and McLean (1992; 2016) and Seddon (1997) where perceived information quality is a significant predictor of system acceptance and user satisfaction.

From a contextual perspective, the data was gathered during COVID19 MCO conditions, which required remote work and heightened reliance on digital access to information. The comparatively high perceptions of information quality therefore suggest that the EDMS succeeded in minimizing disruption to government operations during this period. However, areas indicated by lower mean scores highlight opportunities for postpandemic optimization, particularly as hybrid working norms persist. These findings align with study by Rathnayaka et al. (2023) as well as Nikolina et al. (2020), which show that high information quality contributes directly to user satisfaction and perceived system usefulness, particularly in digital environments supporting administrative workflows.

Furthermore, given that the data collection was conducted during the COVID19 MCO period, when reliance on digital records increased significantly due to remote working, the relatively high perceptions of information quality suggest that the EDMS supported continuity of governance functions during a period of heightened operational stress. This strengthens the argument that the EDMS was not only functioning acceptably but was also critical to enabling uninterrupted service delivery during disruptions.

Table 5.10
Descriptive Statistics of Information Quality

	Items	**Mean**	**Median**	**Min**	**Max**	**Standard Deviation**
ISE_IQ1	Information from the Electronic Document Management System (EDMS) is relevant to my work	5.683	6	2	7	1.054
ISE_IQ2	Information I get from the EDMS is accurate	5.727	6	2	7	1.026
ISE_IQ3	It is easy to understand information from the EDMS	5.741	6	2	7	1.022
ISE_IQ4	The information is presented in a useful format	5.717	6	1	7	1.095
ISE_IQ5	Available on time for its intended use	5.823	6	2	7	1.027
	Overall Score	5.738				1.045

The mean scores for each item are relatively high, ranging from 5.683 to 5.823 on a scale of 1 to 7. This suggests that the participants in this study generally view the EDMS positively. Specifically, the mean scores indicate that the participants perceive the EDMS as relevant to their work, accurate, easy to understand, presented in a useful format, and available on time for use. The overall score, which is the average of all six items, is 5.738. This indicates that, on average, the participants have a positive overall perception of the EDMS. However, the strength of the findings goes beyond simple positivity. The relatively narrow range of means (0.140 difference between lowest and highest) indicates consistency in perceptions across the different dimensions of information quality. This suggests that the EDMS is not only performing adequately in isolated areas, but it is also delivering reasonably balanced quality across all aspects measured. The moderate standard deviation (1.045) implies that although perceptions are generally favourable, there is still variability among respondents, perhaps due to differing work processes, departmental environments, or levels of system reliance. The lower score on item ISE_IQ1 signals an area where improvement may be required, this could relate to occasional gaps in data completeness, accuracy, or contextual relevance depending on the item's specific wording. In contrast between these two items highlights that while the EDMS provides overall strong quality, there are nuanced strengths and weaknesses that should be addressed to improve uniformity of user experience.

5.6.1.2 System Quality

As depicted in Table 5.12, the overall mean for the variable System Quality is 5.815, which means that the system quality of the information system effectiveness is above average. The range of mean is between 5.693 and 6.020. The overall standard deviation is 1.057 and the range is between 0.974 and 1.098. The lowest mean is for item "The EDMS requires little effort to be used" and the highest is for item "The EDMS is useful". The lowest rated item, although still above the midpoint of the scale, highlights that ease of use is perceived as slightly less favourable compared to other system attributes. This suggests the potential need for refinements in areas such as user interface design, system navigation, or user support resources. Conversely, the highest rated item, signifies strong perceived operational value, reinforcing the notion that users regard the system as beneficial to their daily work tasks. These findings indicate that the EDMS not only provides functional expectations, but it also provides practical benefits that enhance users' work efficiency and performance. The ratings also point to high levels of system responsiveness and retrieval capability, reflecting positively on the system's technical execution. This aligns with established information systems research, particularly the DeLone and McLean IS Success Model, which highlights system usefulness, usability, and responsiveness as essential determinants of system success. Consistent with the literature, the strong perception of system usefulness suggests that users recognize tangible value in adopting and utilising the EDMS.

Table 5.11
Description Statistics of System Quality

	Items	**Mean**	**Median**	**Min**	**Max**	**Standard Deviation**
ISE_SQ1	The EDMS is easy to use and to learn	5.771	6	1	7	1.07
ISE_SQ2	The EDMS is useful	6.02	6	3	7	0.974
ISE_SQ3	The EDMS requires little effort to be used	5.693	6	3	7	1.062
ISE_SQ4	The retrieval of information that I need is easy	5.782	6	2	7	1.08
ISE_SQ5	Response to an instruction of the EDMS is fast	5.809	6	1	7	1.098
	Overall Score	5.815				1.057

The mean scores for each item are relatively high, ranging from 5.693 to 6.02 on a scale of 1 to 7. This suggests that the participants in this study generally view the EDMS positively. Specifically, the mean scores indicate that the participants perceive the EDMS as easy to use and learn, useful, requiring little effort to use, easy to retrieve, and with a fast response to instructions The overall score, which is the average of all five items, is 5.815. This indicates that, on average, the participants have a positive overall perception of the EDMS. The relatively narrow range of mean values supports the interpretation that the EDMS performs reasonably well across all tested dimensions of system quality.

Nonetheless, the slight variation between the lowest and highest mean values suggests scope for further enhancement, particularly in reducing perceived user effort. Improving this dimension could increase overall user satisfaction and contribute to a more seamless system experience. In summary, the descriptive results demonstrate that respondents recognise the EDMS as a system of high quality, characterised by usefulness, ease of use, responsiveness, and effective information retrieval. While the findings reflect strong performance, targeted improvements, particularly in further simplifying user interaction could enhance consistency in user experience and further strengthen system acceptance.

5.6.1.3 User Satisfaction

As shown in Table 5.12, the overall mean of the variable user satisfaction is 5.771, which means that user satisfaction of the information system effectiveness is above the average. The range of the mean is between 5.747 and 5.799. The overall standard deviation is 1.032, ranged from 1.023 and 1.057. The lowest mean is for item "I am satisfied with the system" and the highest is for item "I am satisfied with the ease of completing the tasks in this system".

Table 5.12
Descriptive Statistics of User Satisfaction

	Items	Mean	Median	Min	Max	Standard Deviation
ISE_S1	I am satisfied with the system	5.747	6	2	7	1.057
ISE_S2	Meets the information processing needs of my task	5.765	6	3	7	1.023
ISE_S3	I am satisfied with the ease of completing the tasks in this system	5.799	6	2	7	1.024
ISE_S4	Using the system is not a frustrating experience	5.771	6	3	7	1.025

	Overall Score	5.771	1.032

With the highest mean score of 5.799, the item "I am satisfied with the ease of completing the tasks in this system", indicates that the system's functionality enhances a seamless and fulfilling user experience as part of information system effectiveness. Conversely, the lowest mean score of 5.747, the item "I am satisfied with the system" is a slight decrease in satisfaction when compared to other evaluated aspects. It is crucial to understand user perspectives for the purpose to address any potential concerns and improve overall satisfaction with the system. The narrow range of mean scores demonstrates that the EDMS delivers a relatively consistent user experience. However, the slight variation suggests that attention to specific usability enhancements or targeted user support initiatives could further elevate overall satisfaction. The interpretation is consistent with established information systems literature, which asserts that user satisfaction is a consequence of both system quality and information quality, and in turn contributes to system acceptance and sustained usage. In summary, the results indicate that users are largely satisfied with the EDMS, particularly in its ability to support efficient task completion. Nonetheless, the subtle differences across item ratings point to potential areas for refinement to further strengthen user satisfaction and maximise system effectiveness.

5.6.1.4 Perceived Usefulness

As shown in Table 5.13, the overall mean for the variable perceived usefulness turned out to be 5.852, which means that the perceived usefulness of the information system effectiveness is above the average. The range of the means is between 5.802 and 5.969. The overall standard deviation is 1.041 and the range is from 1.039 and 1.081. The lowest mean is for item "EDMS improves my job performance" and the highest is for item "EDMS is useful to my job".

Table 5.13
Descriptive Statistics for Perceived Usefulness

	Items	Mean	Median	Min	Max	Standard Deviation
ISE_PU1	EDMS enables me to accomplish my	5.819	6	1	7	1.07

	tasks more quickly.					
ISE_PU2	EDMS improves my job performance.	5.802	6	1	7	1.081
ISE_PU3	EDMS increases my productivity.	5.857	6	2	7	1.055
ISE_PU4	EDMS enhances my effectiveness in the job.	5.846	6	2	7	1.045
ISE_PU5	EDMS makes it easier to do my job.	5.816	6	1	7	1.039
ISE_PU6	EDMS useful to my job.	5.969	6	3	7	0.954
	Overall Score	5.852				1.041

The mean scores for each item are indicating that users on average agree with each statement to at least a moderate extent. The highest mean score is for "EDMS is useful to my job" at 5.969, suggesting that users see the system as valuable in helping them to perform their job duties. The overall mean score of 5.852 indicates that users generally perceive the EDMS to be a useful tool. The mean scores for each item are relatively close to each other, ranging from 5.816 to 5.869, indicating that users have a consistent perception of the system's usefulness across different dimensions. Users acknowledge usefulness at a conceptual level but may see practical improvements as possible in areas such as workflow speed, compatibility with departmental processes, or output convenience. The narrow range of mean values illustrates a consistent perception of usefulness across all items. This consistency suggests that the EDMS contributes to multiple aspects of task performance rather than only isolated functionalities. Moreover, users see usefulness not only in the ability to perform tasks, but also in the system's boarder functional relevance and support. This finding aligns with Seddon (1997), that identifies perceived usefulness as one of the strongest determinants of Information System Success. The results therefore emphasise that the EDMS is meeting user expectations for functional value and organizational relevance. At the same time, the slight differences within mean scores may signal areas for future refinement to maximise the system's potential to improve job performance, especially for tasks requiring high levels of accuracy, collaboration, or retrieval efficiency. In summary, the results indicate high levels of perceived usefulness among respondents, reinforced by consistent mean values across the construct dimensions. While users broadly agree on the system's benefits, the data also highlights potential areas for enhancement to ensure that perceived usefulness translates more evenly into measurable job performance outcomes.

5.6.2 Electronic Document Management System Functionalities

5.6.2.1 Automated Information Capture

As shown in Table 5.14, the overall mean for the variable Automated Information Capture turned out to be 5.495, which means that the Automated Information Capture of the document management system is above the average. The range of the mean is between 5.394 and 5.655. The overall standard deviation is 1.208 and the range is between 1.115 and 1.276. The lowest mean is for the item "The EDMS that I use allow me to create document from network folders, Microsoft-office and/or other integrated system(s)" and the highest is for the item "The EDMS that I use enable me to organize (capture and store) digital files at the point of creation".

Table 5.14

Description Statistics of the Automated Information Capture

	Items	**Mean**	**Median**	**Min**	**Max**	**Standard Deviation**
DMS_AIC1	The EDMS that I use enable me to transform paper documents into digital files through high-volume scanning and Optical Character Recognition (OCR).	5.457	6	1	7	1.276
DMS_AIC2	The EDMS that I use enable me to organize (e.g.: capture and store) digital files at the point of creation.	5.655	6	1	7	1.115
DMS_AIC3	The EDMS that I use allow me to create document from network folders, Microsoft-office and/or other integrated system(s).	5.394	6	1	7	1.213

DMS_AIC4	The EDMS that I use enable me to capture details of document automatically such as file classification.	5.474	6	1	7	1.227
	Overall Score	5.495				1.208

Users' responses indicate that an overall perception of the capability to transform paper documents into digital files through high-volume scanning and Optical Character Recognition (OCR). The mean score, which stands above the midpoint score (3.5), suggests that, on average, respondents view this functionality positively. The user found effectiveness in the EDMS functionality related to the conversion of physical documents into digital formats. Users expressed satisfactory perception on the ability of the EDMS to organize digital files at the point of creation. On average, users perceive the EDMS positively in terms of creating documents from diverse sources. The EDMS is generally perceived in terms of its ability to automatically capture documents details such as file classification. Overall, the findings indicate that users perceive the EDMS as effective in transforming physical documents into digital formats, particularly through features such as high-volume scanning, optical character recognition (OCR), and automated metadata capture. The above average mean score confirms that respondents generally find this functionality useful for digitization and organization of documents. However, the slightly lower score for integration with external applications highlights an area where system enhancements could further improve automation and streamline document workflows. These results suggest that the Automated Information Capture is a functional strength of the EDMS, contributing to efficiency in document management and recordkeeping. By facilitating the automatic capture and organization of digital files at the point of creation, the system reduces manual processing and supports reliable classification, which is critical for effective information management within the organization.

5.6.2.2 Federated Search and Retrieval

Table 5.15 presents the descriptive analysis for federated search and retrieval. The overall mean is 5.738 and the range is between 5.597 and 5.887. The overall standard deviation is 1.125. The range is between 1.053 and 1.212. The lowest variable is for the item "EDMS that I use enables me to locate files/documents from across folders and repositories" and the highest mean is "EDMS".

Table 5.15
Descriptive Statistics of Federated Search and Retrieval

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_FSR1	EDMS that I use enable me to search files/documents easily.	5.887	6	1	7	1.076
DMS_FSR2	EDMS that I use enable me to locate files/documents from across folders and repositories.	5.597	6	1	7	1.212
DMS_FSR3	EDMS that I use enable me to access the full content.	5.635	6	1	7	1.16
DMS_FSR4	EDMS that I use enable me to upload the documents to the system.	5.833	6	1	7	1.053
	Overall Score	5.738				1.125

Users appreciated the EDMS for its efficiency in enabling easy file/document searches, as evidenced by the mean score significantly above the midpoint. Users found the EDMS effective in facilitating the location of files/documents across and repositories, as indicated by the mean score. The EDMS is perceived positively in terms of enabling users to access the full content of documents. The mean score, although slightly lower than the first item, still indicates effectiveness of the system's ability to provide comprehensive access to document. Users express a positive perception of the EDMS's functionality to upload documents to the system. This functionality is efficient and user-friendly, contributing to overall experience with uploading of documents. The research analysis indicates that respondents/users have a positive perception of the EDMS, with mean scores above the midpoint for each item and an aggregated overall mean score of 5.738. The system is well-received in terms of enabling easy searches, locating documents across repositories, providing access to full content, and facilitating document uploads. Overall, the findings demonstrate that the EDMS is perceived positively in several key aspects of federated search and retrieval. Users report that the system facilitates easy document searches, effective access to full content, cross-repository retrieval, and streamlined document uploads, contributing to an efficient and user-friendly experience. The slightly lower score for cross-repository search highlights an area for potential improvement, as optimizing search across multiple repositories could further enhance workflow efficiency and user satisfaction. These results underscore the importance of search and retrieval functionality in EDMS performance.

5.6.2.3 Collaboration Tools

Table 5.16 shows overall mean for the variable collaboration tools that turned out to be 5.431, which means that the document management services are above the average. The range of mean is between 5.147 and 5.761. The overall standard deviation is 1.190 and the range is between 1.098 and 1.270. The lowest mean is for the item "EDMS that I use can interact with other electronic document management systems" and the highest is for the item "EDMS that I use can interact with other electronic document management systems".

Table 5.16
Descriptive Statistics of Collaboration Tools

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_CT1	EDMS that I use provides me with the ability to work faster on document changes.	5.761	6	1	7	1.098
DMS_CT2	EDMS that I use is easy for me to create and edit documents directly within the system.	5.447	6	1	7	1.251
DMS_CT3	EDMS that I use allows me to the create, upload and categorize new documents without leaving certain interface.	5.246	5	1	7	1.169
DMS_CT4	EDMS that I use enables all users involved in the workflow be notified as tasks are completed by each stage.	5.553	6	2	7	1.163

DMS_CT5	EDMS that I use can interact with other electronic document management systems.	5.147	5	1	7	1.270
	Overall Score	5.431				1.190

The users responded perception on the Collaborative Tools functionalities within the Electronic Document Management System (EDMS) as effective. Users appreciate the ability of the EDMS to facilitate the faster document changes which result in efficiency of document changes (means: 5.761). This data showed Collaborative Tools are effective in supporting users who need to work together in document modifications. Users found the EDMS to be user-friendly in creating and editing documents directly within the system. This feedback demonstrated Collaborative Tools functionalities support a smooth workflow for users engaged in document creation and editing tasks (mean: 5.447). The mean rating for efficiency in document creation, upload, and categorization (mean: 5.246) slightly lower than the previous results, still indicating a positive perception regarding the EDMS's Collaborative Tools. As for the notification system for workflow tasks (mean: 5.553), user appreciate the EDMS's ability to notify all users involved in the workflow as tasks are completed at each stage, keeping everyone informed and involved in the workflow process. The findings indicate that the EDMS provides functional Collaborative Tools that support interaction and coordination among users. While the mean scores are above average, the slight differences between items suggest potential areas for enhancement, particularly in improving cross-system compatibility and streamlining collaborative processes. Strengthening these functionalities could further enhance teamwork efficiency, reduce duplication of effort, and support more effective document sharing. The results highlight both the strengths in system interoperability and opportunities to optimise collaborative capabilities, reinforcing the system's role in facilitating coordinated work within the organization.

5.6.2.4 Hierarchical File Indexing and Classification

Table 5.17 presents the descriptive analysis for hierarchical file indexing and classification. The overall mean is 5.375 and the range is between 5.266 and 5.468.

The overall standard deviation is 1.137. The range is between 1.072 and 1.211. The lowest range of mean is for the item "The existing EDMS that I use enables me to index large documents at several levels of EDMS process" and the highest mean is "The existing EDMS that I use enables me to provide context for individual documents and records".

Table 5.17
Descriptive Statistics of Hierarchical File Indexing and Classification

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_HFIC1	The EDMS that I use enable me to refer to an index to determine the location of a file or document.	5.341	5	1	7	1.211
DMS_HFIC2	The existing EDMS that I use enable me to use the same terminology in organizing the document.	5.44	6	1	7	1.127
	Items	Mean	Median	Min	Max	Standard Deviation
DMS_HFIC3	The existing EDMS that I use enable me to index large documents at several levels of EDMS process.	5.266	5	1	7	1.167
DMS_HFIC4	The existing EDMS that I use enable me to identify the management responsibility for a group of records.	5.362	5	2	7	1.108
DMS_HFIC5	The existing EDMS that I use enable me to provide context for individual documents and records.	5.468	6	1	7	1.072
	Overall Score	5.375				1.137

Users found that the EDMS effectively enables them to refer to an index to determine the location of file or document (mean: 5.341). Users likely to appreciate the convenience and effectiveness in locating documents through the hierarchical file indexing. Using the same terminology in organizing documents (mean: 5.44) rating, showed that users found the EDMS effective in allowing them to use consistent terminology when organizing documents, contributing to better organization and retrieval. Rating of indexing large documents at several levels of EDMS process (mean: 5.266) is low, but still crucial for managing complex documents effectively. Users found identifying management responsibility for grouped records (mean: 5.362) not only in terms of content, but also in terms of organizational responsibility, facilitating effective records management. Users perceived that the EDMS provides context for individual document and records (mean: 5.468) that implies the functionality of hierarchical file indexing and classification contributed to a comprehensive understanding of content and purpose of each document, enhancing overall document management. The findings indicate that the EDMS provides a structured approach to document management, supporting consistent classification and retrieval. The above scores reflect user recognition of the system's contribution to organizing information in a hierarchical manner, which is essential for maintaining an efficient records management system. The moderate variation between the highest and lowest scores suggests opportunities for improvement, particularly in streamlining multilevel indexing processes and enhancing user guidance for handling large or complex documents. Effective implementation of this functionality not only support accurate recordkeeping, but also enhances overall system usability and operational efficiency, contributing to improve information management outcomes within the organization.

5.6.2.5 Storage & Archival Method

Table 5.18 presents the descriptive analysis for storage and archival method. The overall mean is 5.189 and the range is between 4.986 and 5.375. The overall standard deviation is 1.284. The range is between 1.235 and 1.358. The lowest range of mean is for the item "The existing EDMS that I use enables me to change the status from open file/document to closed file/document" and the highest mean is "The existing EDMS that I use enables me to save the document into archival folder".

Table 5.18
Descriptive Statistics of Storage and Archival Method

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_SAM1	The existing EDMS that I use enable me to save the document into archival folder.	5.375	5	1	7	1.254
DMS_SAM2	The existing EDMS that I use enable me to change the status from open file/document to closed file/document.	4.986	5	1	7	1.358
DMS_SAM3	The existing EDMS that I use enable me to copy the document/file to another medium (move a file or folder from one folder to another).	5.205	5	1	7	1.28

DMS_SAM4	The existing EDMS that I use enable me to do documents/records inventories.	5.355	5	1	7	1.235
DMS_SAM5	The existing EDMS that I use enable me to include the file/document into the retention schedules	5.024	5	1	7	1.292
	Total Score	5.189				1.284

Users found that saving documents into archival folders in EDMS allows them to save the documents into archival folders effectively. The mean rating (5.375) indicates positive experience, that showed the system supports the organized storage and archival of documents. This aligns with the findings of Asnawi et al. (2019), who emphasised that proper archival storage is essential for preserving institutional memory and ensuring longterm accessibility of digital records. A well-structured archival system supports efficient retrieval and reduces risks of document loss, which is critical in government document management contexts. The mean rating for changing status from open to closed (4.986), indicating that the users found some challenges or areas for improvement in the EDMS when it comes to changing the status of files or documents from open to closed. This observation echoes the challenges reported by McLeod and Gormly (2017), regarding the practical adoption of digital storage systems, where certain operational features, such as updating document statuses, can be less intuitive and may affect compliance with retention schedules.

Users perceived that the EDMS enables them to copy documents to another medium effectively (mean: 5.205). This shows EDMS's ability to manage documents copies and movement between folders. EDMS also allows the users to conduct documents/records inventories efficiently (mean: 5.355) indicating that EDMS support users in managing and keeping track of documents and records. Users suggest for improvement pertaining to the process of including documents in retention schedules within EDMS (mean: 5.024) that need enhancement. The findings indicate that while users perceive the EDMS positively for storage and archival functions, the moderate variability across items points to differences in usability and adoption of certain features. Efficient Storage and Archival Methods are critical for ensuring compliance with recordkeeping standards, supporting document retrieval, and preserving organizational knowledge. Overall, the mean scores suggest that the EDMS is generally effective in enabling document storage and archival.

However, the moderate variation across items highlights opportunities for system enhancement, particularly in automating lifecycle management and ensuring user-friendly processes for closing files. As Bunawan et al. (2014) noted in their study of government ERMS, features that streamline archival and retrieval processes significantly improve user satisfaction and operational efficiency. Similarly, Tsvuura and Tshuma (2022) emphasised that frameworks for digital archival must ensure both preservation and usability to support organizational workflow effectively. The findings indicate that the EDMS provides functional support for Storage and Archival Methods, particularly in facilitating the structured saving of documents. Strengthening lifecycle management features, such as automated status updates for open and closed files, could further enhance the system's effectiveness, compliance, and overall user satisfaction. Integrating these functionalities aligns with best practices in records management and digital preservation, reinforcing the EDMS as a reliable tool for document and archival management within the Sarawak government.

5.6.2.6 Automated Workflow

Table 5.19 presents the descriptive analysis for the automated workflow. The overall mean is 5.551, and the range is between 5.427 and 5.730. The overall standard deviation is 1.144. The range is between 1.115 and 1.179. The lowest range of mean is for the item "The existing EDMS that I use enables me to establish ownership /responsibility for each step in the EDMS system process" and the highest mean is "The existing EDMS that I use enables me to respond to my prompted task and click submit".

Table 5.19
Descriptive Statistics of Automated Workflow

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_AW1	The existing EDMS that I use enable me to establish ownership /responsibility for each step in the EDMS system process.	5.427	5	1	7	1.153
DMS_AW2	The existing EDMS that I use enable me to streamline processes and keep them moving forward with little human effort.	5.539	6	1	7	1.14
DMS_AW3	The existing EDMS that I use enable me to easily see the active step, who is responsible for completing it, and how much time it is taking.	5.556	6	1	7	1.115

DMS_AW4	The existing EDMS that I use enable me to reduce process error as all file/document are scanned to ensure that all necessary information is captured.	5.502	6	1	7	1.179
DMS_AW5	The existing EDMS that I use enable me to respond to my prompted task and clicks submit.	5.730	6	1	7	1.132
	Overall Score	5.551				1.144

Users found that the EDMS enables them to assign ownership and responsibility for each step in the system process (mean: 5.427) and facilitate the streamlining of processes, allowing the users to progress with minimal human intervention (5.539). The EDMS provides users with clear visibility into the active step, the person responsible for its completion, and the time it takes to progress (mean: 5.556). Users noted that EDMS helps in reducing process errors by ensuring that all files/documents are scanned to capture necessary information. Users found that EDMS is effective in prompting tasks and allowing easy submission with streamlined click process (mean: 5.730). This suggests that users value the EDMS's ability to guide them through assigned tasks and facilitate timely task completion. This aligns with study emphasizing that workflow automation can improve operational efficiency, reduce delays, and minimize manual errors in document management systems (Bunawan, Yaacob, & Kamaruddin, 2014). These descriptive statistics illustrate user's perception of the automated workflow functionalities in EDMS with the high level of effectiveness in various aspects of document management and process optimization. Conversely, the lowest range of mean (M=5.427), with item "The existing EDMS that I use enables me to establish ownership/responsibility for each step in the EDMS system process", highlights a potential limitation in workflow clarity and accountability. While users can respond to tasks efficiently, the assignment of responsibility at each workflow step may be less explicit. This is consistent with studies on EDMS and ERMS implementations, which reported that successful workflow automation requires clearly defined roles, responsibilities, and accountability mechanisms to ensure process consistency and prevent bottlenecks (Asnawi & Yunus, 2019). Strengthening workflow clarity and accountability can improve user confidence and satisfaction, which are critical for sustained EDMS adoption and maximizing the benefits of automation (Bunawan et al., 2014; Asnawi et al., 2019).

5.6.2.7 Security and Audit Trail

Table 5.21 presents the descriptive analysis for security and audit trail. The overall mean is 5.275 and the range is between 5.034 and 5.440. The overall standard deviation is 1.251, indicating some variability in user experiences, which may reflect departmental differences, administrative access levels, or familiarity with EDMS functionalities. The range is between 1.183 and 1.304. The lowest range of mean is for the item "The existing EDMS that I use enables me to allow simultaneous editing" and the highest mean is "The existing EDMS that I use enables me to store the transactions of documents by unique serial numbers" (M=5.440) which suggests that users place confidence in the system's ability to maintain traceability of document transactions. This aligns with standard EDMS principles where unique identifiers allow traceable audit history, supporting accountability, version control, and compliance. Maintaining document provenance is essential in government environments, especially where documentation supports legal, administrative, or financial decisions.

In digital records environments, traceability is considered essential for ensuring the integrity and authenticity of records (ISO 15489 Part 1, 2016; InterPARES Trust Guidelines, 2013). Meanwhile, the lowest mean score, "The existing EDMS that I use enables me to allow simultaneous editing" (M=5.034), highlights a more cautious user perception. While simultaneous editing may enable collaboration, it may also pose perceived risks to record integrity, version control, and preservation of "authoritative version" must be preserved and protected from uncontrolled concurrent editing. This observation reflects documented concerns that collaborative functions in document systems must balance efficiency with control, to maintain reliability and prevent accidental overwriting or loss of metadata (National Archives UK, 2016). The high mean for audit transactions indicates that users recognize the EDMS's capacity to secure document histories. This is a crucial asset supporting governance, accountability, and compliance. Lower perceptions here may reflect legitimate caution, as simultaneous edits carry risk if not managed with locking mechanism, version trails, or controlled permissions. The variability across items underscores the need for clear guidance, training, and awareness on system security procedures. Users who better understand security functions tend to report higher confidence. Continued enhancement of audit functionality and clearer communication of how audit logs protect integrity contribute to improving user assurance and long-term trust in the EDMS. The findings show that users have a reasonably positive perception of EDMS security and audit trail functions, particularly concerning traceability, though there remains room to strengthen collaborative security controls and improve organizational confidence in secure, compliant records editing.

Table 5.20
Descriptive Statistics of Security and Audit Trail

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_SAT1	The existing EDMS that I use enable me to store the transactions of documents by unique serial numbers.	5.440	5	1	7	1.183
DMS_SAT2	The existing EDMS that I use enable me to check-in/check-out content creation and editing.	5.406	5	1	7	1.201
DMS_SAT3	The existing EDMS that I use enable me to allow simultaneous editing.	5.034	5	1	7	1.225
DMS_SAT4	The existing EDMS that I use enable me to control over the various and previous repetitions of a file.	5.198	5	1	7	1.299
DMS_SAT5	The existing EDMS that I use enable me to track the creation and editing of file.	5.246	5	1	7	1.304
DMS_SAT6	The existing EDMS that I use enable me to rollback to previous versions of a document.	5.329	5	1	7	1.293
	Overall Score	5.275				1.251

Users commend the EDMS for its effectiveness in allowing them to securely store and track documents transactions using unique serial numbers (mean: 5.440). The EDMS is praised for providing users with the capability to check-in and check-out content, enhancing control and security during the creation and editing process (mean: 5.406). Users express moderation satisfaction with EDMS pertaining to its ability to enable simultaneous editing of documents, indicating a potential area for improvement (mean: 5.034). The EDMS allowing users a degree of control over multiple repetitions and previous versions of a file, contributing to organized and secure document management. User acknowledges that the EDMS effectively facilitates tracking the creation and editing of history of files, enhancing transparency and security in document management (mean: 5.246). Users acknowledge that EDMS provides the capability to rollback to previous versions of a document, ensuring flexibility, and supporting error corrections in the document management process. These descriptive statistics indicate a positive perception of the security and audit trail functionalities in EDMS.

5.6.2.8 Support and Administer Compliance

Table 5.21 presents the descriptive analysis for Support and Administer Compliance. The overall mean is 5.309 and the range is between 5.259 and 5.345. The overall standard deviation is 1.107. The range is between 1.067 and 1.13. The lowest range of mean is for the item "Electronic Document Management System (EDMS) that I use enables me to identify and manage regulatory risk" and the highest mean are "Electronic Document Management System (EDMS) that I use enables me to design and implement controls to protect an organization from those risks" and "Electronic Document Management System (EDMS) that I use enables me to monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks".

Table 5.21
Descriptive Statistics of Support and Administer Compliance

	Items	Mean	Median	Min	Max	Standard Deviation
DMS_SAC1	Electronic Document Management System (EDMS) that I use enables me to identify and manage regulatory risk.	5.321	5	2	7	1.067
DMS_SAC2	Electronic Document Management System (EDMS) that I use enables me to design and implement controls to protect an organization from those risks.	5.345	5	1	7	1.13
DMS_SAC3	Electronic Document Management System (EDMS) that I use enables me to monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks.	5.259	5	1	7	1.13

DMS_SAC4	Electronic Document Management System (EDMS) that I use enables me to resolve compliance difficulties as they occur.	5.324	5	1	7	1.112
DMS_SAC5	Electronic Document Management System (EDMS) that I use enables me to impose on rules and controls of risks.	5.297	5	1	7	1.098
	Overall Score	5.309				1.107

Users responded that EDMS effectively enables them to identify and manage regulatory risks (mean: 5.321). The EDMS recognizes its capabilities to enable users to design and implement controls that protect the organisation from various risks (mean; 5.345). Users also acknowledge the EDMS allows them to monitor and report on the effectiveness of risk controls in both management and the organization's exposure to risks (mean: 5.259). The EDMS effectively enable users to promptly resolve compliance difficulties as they occur (5.324). Users noted that the EDMS provides the capability to impose rules and controls effectively on various risks, contributing to compliance management. Thus, these descriptive statistics analyses highlight the functionality of Support and Administer Compliance in EDMS valuable in identifying, managing and resolving regulatory risks as well as implementing controls and monitoring effectiveness. The item with the lowest mean indicates that users may perceive risk identification as less directly supported by the system. This may reflect the fact that regulatory risk assessment often requires human judgement and contextual knowledge beyond the technical functionality of an EDMS.

While the EDMS may capture and store compliance related information, users might not see it as a tool that independently interprets or flags risks. These results suggest that users see the EDMS as particularly valuable for operationalizing compliance, meaning that once compliance rules and policies are established, the EDMS assists in ensuring they are applied, monitored, and documented. This finding aligns with widely recognized principles in records and risk management. For example, regulatory frameworks such as those informed by ISO 15489 (Records Management) and ISO 27001 (Information Security Control) emphasize that systems must support monitoring, traceability, auditability, and accountability to demonstrate compliance and organizational risks. The perception that users can "monitor and report on the effectiveness of risk controls" is notable, as monitoring and reporting are key compliance requirements in the public sector. This capability reflects the EDMS's contribution to transparency, auditability, and governance, all of which underpin good recordkeeping practice. While the system is not perceived as independently identifying risks, its strengths lie in operationalizing compliance, documenting accountability, and reinforcing good governance practices, consistent with institutional requirements and internationally recognized records management principles.

5.6.3 Assessment of the Structural Model

After the measurement model and descriptive analysis was completed, the next step is to assess the structural model of the study. The structural model and its latent variables represent the stable, conceptually and theoretically defined contextual relation between the input and output side data observed. Based on the structural model, the aim of the analysis is to predict the output layer data by means of the input layer data. In other words, the structural model is used to illustrate one or more dependent relationships similar to the hypothesized model's construct. In order to assess the structural model, Sarstedt et al. (2014) proposed five-step structural model assessment procedure, mainly 1) assess structural model for collinearity issue; 2) assess the path coefficient; 3) assess the level of R^2; 4) assess the effect size f^2; and 5) assess the predictive relevance Q^2

5.6.3.1 Assess Structural Model for Colinearity Issue

The first step in the analysis of the structural model is to assess the collinearity issue. There are several views on the level of acceptance for the value of variance inflator factor (VIF). In order to assess the collinearity issue, VIF should not be greater than 5 (Ringle et al., 2011) and for a more stringent criterion where VIF should be lower than 3.3 (Diamantopoulos & Siguaw, 2006). To identify the value of VIF, PLS Algorithm were run and the inner value of VIF was observed. In the context of this study, the value of VIF is between 2.865 and 4.779. This indicates no issue of multicollinearity in the structural model for this study. Table 5.23 shows the collinearity assessment in the context of this study.

Table 5.22
Collinearity Assessment

	Information System Effectiveness
Automated Information Capture	2.865
Automated Workflow	4.779
Collaborative Tools	3.541
Federated Search & Retrieval	2.943
Hierarchical File Indexing & Classification	4.462
Security & Audit Trail	4.543
Storage & Archival Method	3.712
Support & Administer Compliance	3.446

Note *Inner VIF value for each construct should be lower than 3.3 (Diamantopoulos and Siguaw 2015) or 5 (Hair, Hult et al. 2017).

5.6.3.2 Assess the Path Coefficient

The next structural model assessment is to assess the path coefficient. The bootstrapping technique must be employed in evaluating the PLS path modelling to evaluate the significance of all path coefficients since bootstrapping is the only mechanism in the PLS study to analyse the significance of path coefficients (Chin, 2010). Bootstrapping is a non-parametric sampling technique involving repeated random sampling with the original sample replacement (Efron & Tibshirani, 1993). Using the same method described above, t-statistics are used to estimate the path coefficients. The significance level of the t-value was assessed by a one-tailed or two tailed distribution (Chin & Newsted, 1999). The number of sub-samples suggested is 500 (Joe et al., 2014). Table 5.24 shows the values of path coefficient of the structural model. In the context of this study, the tvalue for this study is between 0.075 and 11.913 which indicates a significant relationship (t-value > 1.645). Besides t-value, the value of p-value is also been recorded. It is suggested that when the p-value is less than < 0.05, it shows the significance of the null hypothesis (Ramayah et al., 2018). This is supported by Hair et al. (2017), whereby the minimum value for the level of acceptance where for one-tailed or two-tailed, p-value < 0.05. In the context of this study, the p-value is between 0.000 and 0.940. Four out of twelves relationships were rejected.

Table 5.23
Path Coefficient of the Structural Model

The Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Automated Information Capture -> Information System Effectiveness	0.083	0.089	0.059	1.413	0.158
Automated Workflow -> Information System Effectiveness	0.466	0.464	0.057	8.132	0.000
Collaborative Tools -> Information System Effectiveness	0.059	0.06	0.069	0.854	0.393
Federated Search & Retrieval -> Information System Effectiveness	0.357	0.341	0.067	5.309	0.000
Hierarchical File Indexing & Classification -> Information System Effectiveness	0.024	0.031	0.063	0.376	0.707
Information Quality -> Perceived Usefulness	-0.528	-0.532	0.044	11.913	0.000
Information Quality -> Satisfaction	-0.37	-0.366	0.059	6.287	0.000
Security & Audit Trail -> Information System Effectiveness	0.005	0.022	0.064	0.075	0.940
Storage & Archival Method -> Information System Effectiveness	-0.171	-0.172	0.054	3.166	0.002
Support & Administer Compliance -> Information System Effectiveness	0.147	0.136	0.066	2.234	0.026
Systems Quality_ -> Perceived Usefulness	-0.469	-0.473	0.05	9.407	0.000
Systems Quality_ -> Satisfaction	-0.143	-0.138	0.072	1.989	0.047

Although the t-value and p-value are sufficient to support the significant and relevance of the path coefficient, it is important to refer to the confidence interval bias. According to Ramayah et al. (2018), reporting t-value and p-value is not sufficient for a dissertation. The value of the lower and upper from confidence intervals bias corrected is reported. In the context of this study, there is no 0 straddle between the results (value from 2.5% and 97.5%). It means that there is a significant result of the relationship. Table 5.25 shows the details in confident interval bias for this study.

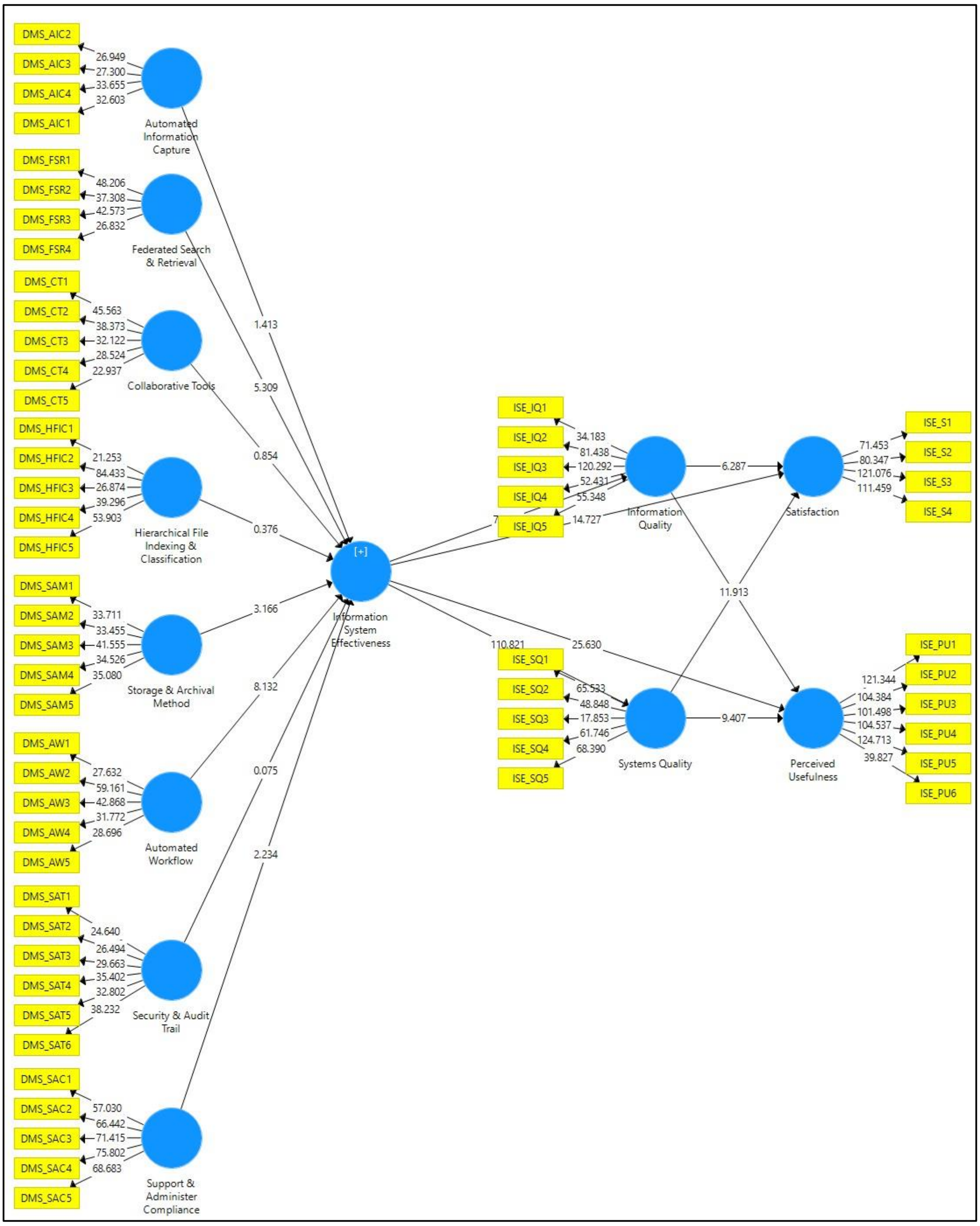

Figure 5.12 Measurement Model of the SmartPLS Output

Table 5.24
Coefficient Interval Bias

The Relationship	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
Automated Information Capture -> Information System Effectiveness	0.083343	0.088586	0.005242	-0.03879	0.192702

Automated Workflow -> Information System Effectiveness	0.466359	0.464454	-0.00191	0.350946	0.575994
Collaborative Tools -> Information System Effectiveness	0.05887	0.060128	0.001258	-0.08401	0.186688
Federated Search & Retrieval -> Information System Effectiveness	0.356664	0.341264	-0.0154	0.225947	0.479229
Hierarchical File Indexing & Classification -> Information System Effectiveness	0.023689	0.031074	0.007384	-0.10891	0.138148
Information Quality -> Perceived Usefulness	-0.52759	-0.53182	-0.00423	-0.61423	-0.44539
Information Quality -> Satisfaction	-0.36991	-0.36648	0.003425	-0.48045	-0.25117
Security & Audit Trail -> Information System Effectiveness	0.004834	0.022042	0.017208	-0.13429	0.116599
Storage & Archival Method -> Information System Effectiveness	-0.17141	-0.17239	-0.00098	-0.28831	-0.07481
Support & Administer Compliance -> Information System Effectiveness	0.146512	0.135972	-0.01054	0.022948	0.270154
Systems Quality_ -> Perceived Usefulness	-0.46884	-0.47276	-0.00392	-0.56844	-0.37296
Systems Quality_ -> Satisfaction	-0.14307	-0.13845	0.004623	-0.28848	-0.00888

5.6.3.3 Assess the Level of R^2

The next steps in assessing the significance and relevance of the structural model relationship are to assess the levels of R^2. This step involves reviewing the R^2, which indicates the variance explained in each of the endogenous constructs. As a rule of thumb, the R^2 values of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak (Jr, Ringle et al. 2011) . Meanwhile, Cohen (1988) suggested R^2 values for endogenous latent variables are assessed as follows: 0.26 (substantial), 0.13 (moderate), and 0.02 (weak). Different rules by Chin (1998) recommended R^2 values for endogenous latent variables based on: 0.67 (substantial), 0.33 (moderate), and 0.19 (weak). The value of R^2 is comprehensively displayed in Table 5.25 that shows the R^2 suggested by Hair, et al. (2017) are all above 0.3 and has strong predictive relevance due to the substantial value for the level of predictive accuracy.

Table 5.25
Level of R^2 (Coefficient of Determination)

Variable	R Square	*R* Square Adjusted	Hair (2018)	Chin (1998)	Cohen (1988)
Information Quality	0.859	0.859	Substantial	Substantial	Substantial
Information System Effectiveness	0.8	0.795	Substantial	Substantial	Substantial

Perceived Usefulness	0.974	0.974	Substantial	Substantial	Substantial
Satisfaction	0.952	0.952	Substantial	Substantial	Substantial
Systems Quality	0.898	0.898	Substantial	Substantial	Substantial

5.6.3.4 Assess the Effect of Size f^2

Statistic effect size helps us in determining if the difference is real or if it is due to a change of factors. In hypothesis testing, effect size, power, sample size, and critical significance level are related to each other. Effects size, f^2 analysis was conducted for multiple independent variables on dependent variable, which is used to measure the changes in R^2 in the attempt to understand whether or not each specific independent latent construct and dependent latent construct have a practical impact (Cohen 1988). For each of the effect through the path model, one can evaluate the effect size by means of f^2. To interpret the impact of f^2 at the structural level, it has been suggested that the effect is large when f^2 is 0.35, medium when f^2 is 0.15, and small when f^2 is 0.03, as suggested by (Cohen (1988). In this study, except for satisfaction and perceived usefulness, other score is less than 0.3, meaning results are not influence by effect size. Table 5.27 shows the effect of size f^2.

Table 5.26
The Effect of Size f^2

	Information System Effectiveness	Perceived Usefulness	Satisfaction
Automated Workflow	**0.228**		
Collaborative Tools	0.005		
Federated Search & Retrieval	0.216		
Hierarchical File Indexing & Classification	0.001		
Security & Audit Trail	0.000		
Storage & Archival Method	0.040		
Support & Administer Compliance	0.031		

Information Quality	1.509	0.403
Systems Quality	0.865	0.044

5.6.3.5 Assess the Predictive Relevance Q^2

Many research studies used Stone and Geisser's Q^2 to assess the predictive relevance (Q^2) (Ramayah et al. 2018). In SmartPLS, Q^2 can be measured using the blindfolding process, which is also known as samples re-use technique. According to Stone (1974), Hair et al., (2017) and Geisser (1974), endogenous constructs have fully predictive relevance by exogenous contracts when Q^2 value is larger than .0. Chin (2010) proposed the predetermined distance value (D) could be any number from 5 to 12. However, the value cannot be an integer number (Ramayah et al. 2018). In the context of this study, the D value to execute blindfolding procedure is 7. Based on Table 5.27, the predictive relevance Q^2 of information quality is 0.721, information system effectiveness is 0.62, perceived usefulness is 0.861, satisfaction is 0.838 and system quality is 0.694. The results of the Q^2 value are considered above zero and can be concluded that the model has predictive relevance based on information quality, information system effectiveness, perceived usefulness, satisfaction and system quality. Thus, the structural model must be able to provide a prediction of the endogenous latent variable indicators.

Table 5.27
Predictive Relevance Q^2

	SSO	SSE	Q^2 (=1-SSE/SSO)
Information Quality	1465	408.234	0.721
Information System Effectiveness	5567	2116.622	0.62
Perceived Usefulness	1758	244.334	0.861
Satisfaction	1172	189.673	0.838
Systems Quality	1465	448.433	0.694

The predictive relevance (Q^2) in the PLS model was confirmed by the Q^2 values which were all >0, therefore meaningful, while in one case in the linear model (LM) model Q^2 was <0. The interpretation of the output of PLS predict was conducted by a comparative analysis looking at whether the PLS analysis compared to the LM analysis yields higher prediction errors in terms of Root Mean Squared Error (RMSE). Risher et al. (2018) suggested that higher RMSE values in the PLS output for all meant no predictive power; for the majority, low predictive power; for the minority or the same number, medium predictive power; and for none of the indicators, high predictive power. Table 5.28 shows that all RMSE (PLS) and Q^2_predict (PLS) values, except for one (ISE_SQ2), were the same as the RMSE (LM) and Q^2_predict (LM). Therefore, this model has a moderate/high out-of-sample predictive power.

Table 5.28

Predictive Relevance (Q^2) for the Endogenous Consturcts

	PLS	**LM**		**PLS**	**LM**	
	RMSE	RMSE	PLS RMSE < LM RMSE	Q²_predict	Q²_predict	PL Q² >LM Q²
ISE_IQ1	0.72	0.799	YES	0.537	0.430	YES
ISE_IQ2	0.64	0.726	YES	0.613	0.502	YES
ISE_IQ3	0.564	0.657	YES	0.698	0.590	YES
ISE_IQ4	0.689	0.873	YES	0.608	0.369	YES
ISE_IQ5	0.644	0.677	YES	0.610	0.569	YES
ISE_IQ1	0.719	0.799	YES	0.537	0.43	YES
ISE_IQ2	0.641	0.726	YES	0.613	0.502	YES
	PLS	LM		PLS	LM	
ISE_IQ3	0.563	0.657	YES	0.698	0.590	YES
ISE_IQ4	0.689	0.873	YES	0.608	0.369	YES
ISE_IQ5	0.644	0.677	YES	0.610	0.569	YES
ISE_SQ1	0.729	0.814	YES	0.539	0.426	YES
ISE_SQ2	0.660	0.659	YES	0.545	0.545	NO
ISE_SQ4	0.654	0.705	YES	0.636	0.577	YES
ISE_SQ5	0.628	0.672	YES	0.675	0.628	YES
ISE_S1	0.671	0.736	YES	0.600	0.519	YES
ISE_S2	0.605	0.708	YES	0.653	0.524	YES
ISE_S3	0.644	0.739	YES	0.607	0.483	YES
ISE_S4	0.599	0.661	YES	0.661	0.587	YES
ISE_PU1	0.68	0.784	YES	0.599	0.468	YES
ISE_PU2	0.704	0.852	YES	0.579	0.384	YES
ISE_PU3	0.677	0.774	YES	0.591	0.466	YES
ISE_PU4	0.687	0.796	YES	0.571	0.425	YES
ISE_PU5	0.691	0.793	YES	0.560	0.421	YES
ISE_PU6	0.636	0.731	YES	0.559	0.417	YES

ISE_PU1	0.679	0.784	YES	0.600	0.468	YES
ISE_PU2	0.704	0.852	YES	0.579	0.384	YES
ISE_PU3	0.678	0.774	YES	0.591	0.466	YES
ISE_PU4	0.688	0.796	YES	0.570	0.425	YES
ISE_PU5	0.693	0.793	YES	0.558	0.421	YES
ISE_PU6	0.634	0.731	YES	0.562	0.417	YES
ISE_S1	0.671	0.736	YES	0.600	0.519	YES
ISE_S2	0.605	0.708	YES	0.653	0.524	YES
ISE_S3	0.644	0.739	YES	0.608	0.483	YES
ISE_S4	0.599	0.661	YES	0.661	0.587	YES
ISE_SQ1	0.729	0.814	YES	0.540	0.426	YES
ISE_SQ2	0.659	0.659	NO	0.545	0.545	NO
ISE_SQ3	0.825	0.935	YES	0.400	0.230	YES
ISE_SQ4	0.654	0.705	YES	0.636	0.577	YES
ISE_SQ5	0.63	0.672	YES	0.673	0.628	YES

RMSE: Root Mean Squared Error; PLS: Partial Least Squares; LM: Linear Model; Q^2 Predictive Relevance

5.6.3.6 Final Report on Structural Analysis and Hypotheses Testing

Twelve hypotheses have been postulated to answer the research questions. During the structural analysis of the model, all hypotheses were tested. Based on Table 5.29 and Table 5.31, four hypotheses were rejected and eight were supported. However, according to Cohen (1935), hypotheses are never "right" or "wrong" but are "supported" or "unsupported" by the data and evidence. He also added that the hypothesis is capable of being supported or unsupported.

Table 5.29
Hypothesis Testing for the Direct Effect

Hypotheses		**Original**	**Sample Mean**	**Standard Deviation**	**T Statistics**	**P Values**	**Decision**
		Sample (O)	(M)	(STDEV)	(|O/ STDEV)		
H5	Automated Information Capture - > Information System Effectiveness	0.083	0.089	0.059	1.413	0.158	Rejected
H10	Automated Workflow - > Information System Effectiveness	0.466	0.464	0.057	8.132	0	Supported
H7	Collaboration Tools - > Information	0.059	0.06	0.069	0.854	0.393	Rejected

	System Effectiveness						
H6	Federated Search & Retrieval - > Information System Effetiveness	0.357	0.341	0.067	5.309	0.000	Supported
H8	Hierarchal File Indexing & Classification - > Information System Effectiveness	0.024	0.031	0.063	0.376	0.707	Rejected
H2	Information Quality - > Perceived Usefulness	-0.528	-0.532	0.044	11.913	0.000	Supported
H1	Information Quality - > User Satisfaction	-0.37	-0.366	0.059	6.287	0.000	Supported
H11	Security & Audit Trail - > Information System Effectiveness	0.005	0.022	0.064	0.075	0.940	Rejected
H9	Storage & Archival Method - > Information System Effectiveness	-0.171	-0.172	0.054	3.166	0.002	Supported
H12	Support & Archival Method - > Information System Effectiveness	0.147	0.136	0.066	2.234	0.026	Supported
H4	System Quality - > Perceived Usefulness	-0.469	-0.473	0.05	9.407	0.000	Supported
H3	System Quality - > User Satisfaction	-0.143	-0.138	0.072	1.989	0.047	Supported

The structural model results demonstrate that several EDMS functionalities and system quality dimensions significantly influence information systems effectiveness, user satisfaction, and perceived usefulness. These findings provide empirical support for the theoretical assumptions derived from the DeLone and McLean IS Success Model and the Technology Acceptance Model.

The significant path coefficients indicate that users place strong emphasis on information quality, system reliability, and automation features when evaluating the effectiveness of EDMS. This suggests that both technical and functional dimensions of EDMS play a critical role in shaping user perceptions and system success.

The analysis of EDMS functionalities that influence Information System Effectiveness (ISE) found that statistical analysis for the present study did not support the hypothesis about Automated Information Capture (T-Value: 1.413). H5 was not supported. Although Automated Information Capture theoretically contributes to Information Quality, the insignificant result suggests that the current implementation of metadata capture, form completeness or accuracy may not sufficiently translate into perceived system effectiveness. Users may not recognise these benefits directly, indicating potential gaps in application or awareness. This contradicts to the initial expectations and suggests that there is significant positive relationship between Automated Information Capture and Information System Effectiveness.

On the other hand, the hypothesis testing for Automated Workflow received strong support (T-Value: 8.132), indicating a strong and statistically significant positive relationship that highlights the importance of EDMS functionalities in improving the overall effectiveness of the information system. H10 was supported, demonstrating that automation of workflows positively contributes to Information System Effectiveness. This reflects System Quality, where workflow efficiency and process reliability reduce operational burden. According to Seddon, well-performing automated workflows enhance perceived usefulness, leading to improve organizational productivity.

Collaborative Tools were not supported (T-Value: 0.854) due to insufficient statistical evidence supporting a significant positive relationship between their functionalities and Information System Effectiveness. H7 was rejected. While Collaborative Tools conceptually relate to System Quality, their influence on Information System Effectiveness was not statistically evident. This suggests that collaborative functionality may be underutilized, not well integrated into workflows, or perceived as peripheral rather than core to performance outcomes described by Seddon's perceived usefulness dimension.

However, the study found that Federated Search and Retrieval had a significant positive relationship with Information System Effectiveness, as indicated by a T-Value of 5.309. H6 was supported, indicating that the presence of advanced search and retrieval features enhances Information System Effectiveness. The significance of this path is consistent with Information Quality in the DeLone and McLean model, where accessible, accurate, and timely information contributes to higher system effectiveness. In relation to Seddon's model, the finding implies that improved information retrieval influences perceived usefulness, which reinforces overall system performance. This highlights the relevance of EDMS functionalities of federated search and retrieval.

Inversely, Hierarchical File Indexing and Classification was rejected (T-Value: 0.376), prompting a deeper exploration of this EDMS functionalities. This hypothesis

8 was not supported. Though hierarchical indexing contributes to Information Quality, its lack of significance indicates that consistent application, training or user familiarity may be insufficient. Users may not interpret benefits of classification directly as improving system performance, limiting its impact on perceived usefulness. This led to a more thorough investigation of the functionalities of hierarchical file indexing and classification in EDMS.

With regard to the user's experience, the study found that Information Quality had a significant positive impact on both Perceived Usefulness (T-Value: 11.913) and Satisfaction (T-Value: 6.287). This emphasises the importance of information quality in influencing user satisfaction. The EDMS functionalities for Security and Audit Trail was also rejected due to a low T-Value of 0.075, which questions the existence of a significant positive relationship with Information System Effectiveness. This rejection prompts a reassessment of the impact of Security and Audit Trail. Despite mapping clearly to System Quality, by ensuring reliability, accountability, and transparency, users may perceive security and audit mechanisms as background elements rather than features influencing performance impact. As Seddon notes, if users do not directly associate these features with usefulness or satisfaction, their statistical influence on information system effectiveness becomes minimal.

Conversely, the Storage and Archival Method were supported with a T-Value of 3.166, highlighting the significance of Electronic Document Management System functionalities towards the effectiveness of information systems. The significant positive relationship shows that robust storage and archival practices contribute to information system effectiveness. This aligns with System Quality, where data integrity, accessibility, and reliability underpin effective system use. From Seddon’s perspective, dependable archival functions support user satisfaction, as user gain confidence when retrieval and records preservation are stable and predictable.

The Support and Administer Compliance also supported (T-Value: 2.234), suggesting a significant positive relationship and highlighting the effectiveness of compliance measures in enhancing information system effectiveness. The path from compliance functionality to information system effectiveness was significant. This reflects System Quality in governance, integrity, and risk mitigation. From Seddon’s refinement, functionality that supports compliance increases user confidence, contributing indirectly to satisfaction and perceived usefulness. The study also found that Systems Quality had a significant positive relationship on both Perceived

Usefulness (T-Value: 9.407) and Satisfaction (T-Value: 1.989), highlighting the importance of system quality in influencing user satisfaction.

Table 5.30
Research Mapping between Research Objectives, Variables, Hypotheses, and Findings of the Study

Research Objective	Variable	Hypothesis	Finding
To examine the effectiveness of the document management systems used in Sarawak State Government	1) Information Quality 2) Satisfaction	H1: Information quality has a significant positive relationship with satisfaction	Supported (t - 0.000, $p < 0.05$)
	1) Information Quality 2) Perceived usefulness	H2: Information quality has a significant positive relationship with perceived usefulness	Supported (t - 0.000, $p < 0.05$)
	1) System Quality 2) Satisfaction	H3: Systems quality has a significant positive relationship with satisfaction	Supported (t - 0.047, $p < 0.05$)
	1) System Quality 2) Perceived usefulness	H4: Systems quality has a significant positive relationship with perceived usefulness	Supported (t - 0.000, $p < 0.05$)
To assess the performance of the services provided by the document management systems	1) Automated Information capture 2) Information systems effectiveness	H5: Automated information capture has a significant positive relationship with information systems effectiveness	Rejected (t - 1.413, $p < 0.05$)
	1) Federated Search and Retrieval Information 2) systems effectiveness	H6: Federated search and retrieval have a significant positive relationship with information systems effectiveness	Supported (t - 5.309, $p < 0.05$)
	1) Collaborative Tools 2) Information systems effectiveness	H7: Collaborative Tools has a significant positive relationship with information systems effectiveness	Rejected (t - 0.854, $p < 0.05$)
	1) Hierarchical File Indexing and Classification 2) Information systems effectiveness	H8: Hierarchical file indexing and classification has a significant positive relationship with information systems effectiveness	Rejected (t - 0.376, $p < 0.05$)
	1) Storage & Archival Method 2) Information systems effectiveness	H9: Storage & archival method has a significant positive relationship with information systems effectiveness	Supported (t - 0.002, $p < 0.05$)
Research Objective	Variable	Hypothesis	Finding

	1) Automated Workflow 2) Information systems effectiveness	H10: Automated Workflow has a significant positive relationship with information systems effectiveness	Supported (t - 8.132, $p < 0.05$)
	1) Security & Audit Trail 2) Information systems effectiveness	H11: Security & Audit Trail has a significant positive relationship with information systems effectiveness	Rejected (t - 0.940, $p < 0.05$)
	1) Support & Administer Compliance 2) Information system effectiveness	H12: Support & Administer Compliance has a significant positive relationship with information systems effectiveness	Supported (t - 0.026, $p < 0.05$)
To assess the influence of the functionalities' performance on the effectiveness of the electronic document management systems	N/A	N/A	Partial Least Square Structural Equation Modelling

Hypothesis 5: Automated Information Capture has a significant positive relationship with information systems effectiveness. The hypothesised path for H5 was rejected (t - 1.413, $p < 0.05$). The findings indicate that H5 was not supported. This suggests that Automated Information Capture alone does not directly enhance the perceived effectiveness of the EDMS in this context. The second rejected hypothesis was Hypothesis 7: Collaborative Tools have a significant positive relationship with information systems effectiveness (t - 0.854, $p < 0.05$). This result indicates that collaborative functionalities, as implemented and used by respondents, did not significantly influence the overall effectiveness of the EDMS. While the third rejected hypothesis was H8: Hierarchical file indexing and classification have a significant positive relationship with information systems effectiveness (t - 0.376). H8 was not supported, that demonstrated the hierarchical file indexing and classification of files in the EDMS did not have a measurable positive impact on user perceptions of system effectiveness. The fourth rejected hypothesis was H11: Security and Audit Trail have a significant positive relationship with information systems effectiveness (t - 0.940, $p < 0.05$). H11 was also rejected, as it indicates that while security and audit trail

functionalities are present in the system, they did not significantly contribute to the users' perception of the EDMS's effectiveness. These findings objectively show that four of the hypothesised relationships were unsupported in the Sarawak government EDMS context. These results are reported here for clarity and are further interpreted and discussed in Chapter 6.

5.7 Discussion of Rejected Hypotheses

Although certain hypotheses were not supported, these findings provide valuable insights rather than indicating weaknesses in the research model. The rejection of some hypotheses may reflect contextual factors such as organizational practices, user readiness, or the level of EDMS implementation maturity within government agencies. For instance, functionalities related to collaboration or advanced workflows may not exhibit significant effects if users primarily rely on EDMS for document storage and retrieval rather than collaborative processes. This suggests that system effectiveness may be influenced not only by system capabilities, but also by how extensively those capabilities are utilised in practice. Such findings highlight the importance of organisational context in interpreting EDMS success.

Overall, the findings of this study align closely with the research objectives and the underlying theoretical framework. The results support the DeLone and McLean IS Success Model by confirming the role of information quality and system quality as key antecedents of user satisfaction and perceived usefulness. Additionally, the findings extend existing theory by demonstrating how specific EDMS functionalities contribute to information systems effectiveness within the public sector context.

5.8 Chapter Summary

The summarization and mapping between research objectives, variables, hypotheses, and findings of the study are presented in Table 6.31. Chapter Six presents comprehensively the findings of the study. In this chapter, data analysis methods, study results and a discussion on the findings have been presented. Data findings were described as correlations to the study variables and presented as tabulations. The first section in Chapter Six presents the response rate for this study. A complete demographic profile is presented in terms of gender, age, length of service, level of education and level of responsibility of the respondents. Next is the assessment of the measurement model analysis. In the context of this study, the researcher had used SmartPLS to analyse the findings. During the initial analysis, one item (1.26%) was removed during the measurement analysis. Subsequently, the descriptive statistic is completely presented in 6.5 followed by assessment of the structural model analysis. In the next chapter, the discussion and the conclusion of EDMS and the relationship between the document management system and information system effectiveness are discussed.

CHAPTER 6
DISCUSSION, RECOMMENDATION & CONCLUSION

6.1 Introduction

This chapter presents a detailed discussion of the study findings reported in Chapter 5. It interprets their theoretical and practical implications, provides recommendations, and concludes the study. The discussion is structured according to the supported and rejected hypotheses, with a focus on Electronic Document Management System (EDMS) effectiveness in the context of Sarawak's state-of-the-art digital ecosystem, including AI initiatives (Sarawak AI Centre), cloud infrastructure (AWS), next-generation connectivity (ZTE), and digital identity platforms (SarawakPass). The findings are interpreted through the lens of modified Seddon (1997) IS Success Model and contemporary information system literature. Thus, this chapter consists of six sections. In this first section, the outlines of the research are explained. The second section provides the discussions of the findings. The results achieved are compared with those of other similar studies identified in the literature. In the third section, the research contribution is presented. The fourth section outlines several recommendations for the functionalities and effectiveness of EDMS based on the research findings. The fifth section discusses the limitation of the study and possible research opportunities. The last section concludes this chapter and the study.

6.2 Discussion

This section provides the discussion of the findings as presented in Chapter Five. In the context of this study, the functionalities and effectiveness of the Electronic Document Management System are the focus of the study. Therefore, the conceptual framework for this study is developed based on the functionalities in the Electronic Document Management System and the effectiveness of information system. Based on that, the discussion is organized according to the research objectives. To recall, the following are the objectives of the research:

i) To examine the effectiveness of the document management systems used in Sarawak State Government.
ii) To assess the performance of the services provided by the document management systems.
iii) To assess the influence of the functionalities' performance on the effectiveness of the electronic document management systems.

6.2.1 The Effectiveness of The Electronic Document Management Systems Used in Sarawak State Government

The first objective of this study aims to examine the effectiveness of the document management systems used in Sarawak State Government. To answer this objective, there are four hypotheses developed. Measurement model and followed by structural model was performed for testing these hypotheses. The outcome of the measurement model showed that only four items were used for each of the Information System Effectiveness, namely information quality, system quality, satisfaction, and perceived usefulness. Further analysis using structural model showed that the *p* value for the β of all paths between information system effectiveness and electronic document management system functionalities are significant. Four research hypotheses were formulated. As shown in Table 6.1, a summary of the research hypotheses is provided under RQ1. All hypotheses (H1 to H4) are supported by the empirical evidence and finding.

Table 6.1
Summary of Hypotheses Testing Results RQ1

	Research Questions and Hypotheses Testing	Results
RQ1	To examine the effectiveness of the document management systems used in Sarawak State Government.	
H1	Information quality has a significant positive relationship with satisfaction.	Supported
H2	Information quality has a significant positive relationship with perceived usefulness.	Supported
H3	Systems quality has a significant positive relationship with satisfaction.	Supported
H4	Systems quality has a significant positive relationship with perceived usefulness.	Supported

The discussion of each hypothesis is presented below:

H1: Information quality has a significant positive relationship with satisfaction.

Based on the above hypothesis, the finding of this study discovered that information quality has a significant positive relationship with user satisfaction. In the context of an Electronic Document Management System (EDMS), information quality reflects the accuracy, relevance, timeliness, and usability of the information output, which directly affects user satisfaction. High-quality information ensures the users can complete their tasks efficiently, make informed decisions, and achieve their work objectives (European Proceedings, 2024). Empirical studies in government and public sector information systems consistently support this relationship. Rahman, Mohamed Shuhidan, Masrek, and Baharuddin (2024) found that the quality of information in a Geographical Information System (GIS) significantly influenced user satisfaction and individual work performance. Similarly, studies of e-government and digital public services demonstrate that information quality is a key determinant of satisfaction, perceived usefulness, and system adoption (Rahmatullah et al., 2025; Ernungtyas, Boer, and Qadrifa, 2024). These studies confirmed that when information is accurate, relevant, and timely, users are more likely to perceive the system as useful, functional, and efficient, leading to higher satisfaction. Information from the EDMS is accurate, which affects user perceptions of system reliability and usefulness. This is backed up by the fact that information quality of EDMS represents the contents provided by system which also represents a user's reaction to the accuracy of characteristics information output (Alshibly, 2014). Furthermore, timely and accurate information enhances information currency and improves user satisfaction (Haidera, 2015).

Recent studies have provided additional support for this relationship. Aji et al. (2024) found that high information quality significantly influences e-government user satisfaction, with accuracy, relevance, and timeliness of information being key determinants. Rahmatullah et al. (2025) similarly demonstrated that information quality, measured alongside system quality in the DeLone and McLean IS Success Model, strongly predicted user satisfaction and perceived net benefits in e-government systems. Habsah, Purwanto, and Rulinawaty (2025) confirmed that information quality remains a critical factor in user satisfaction, even when considering additional variables such as digital literacy. The findings on the ease of understanding information from the EDMS indicate that information quality has a significant positive relationship with satisfaction. The respondents commented on the information in the EDMS is presented in a useful format. Overall, user satisfaction with EDMS is influenced by multiple factors, including system usability, accuracy, timeliness, and relevance of information. This supports the notion that EDMS provides organizations with effective information management solutions that lead to user satisfaction (Sathiadas & Wikramanayake, 2003). EDMS also enhances individual performance by making information available when needed, improving decision-making, and increasing productivity. As individual performance is being effected by the use of EDMS and normally measured by the increase in individual productivity and also by improving the decision capacity; it is actually influenced by EDMS that impact users at the individual level with: information being available when required; achieving greater quality, efficiency and effectiveness at work with processes being better, easier and quicker (Afonso et al., 2015). Furthermore, high information quality enhances organizational efficiency and supports individual performance by providing information when needed, improving decision-making, and facilitating task completion (European Proceedings, 2024; Rahman et al., 2024). These results add to the rapidly expanding field of information system. The results confirmed to support the theory of Information System Success, by Delone and McLean Information Systems Success Model, which posits that information quality is a core predictor of user satisfaction across information systems, including EDMS and other government digital platforms (Rahmatullah et al., 2025).

H2: Information quality has a significant positive relationship with perceived usefulness.

The findings of the present study confirmed that the information quality has a significant positive relationship with perceived usefulness. This relationship is theoretically grounded in Seddon's (1997) respecification of the Information System Success Model, which reconceptualizes perceived usefulness as a central net benefit derived from system use. According to Seddon (1997), users' perception of usefulness is directly influenced by the quality of information produced by an information system, particularly in terms of accuracy, relevance, timeliness, and completeness. This outcome also ties well with previous studies by Sastrodiharjo and Wijanto (2008), that the perceived usefulness of information is positively influenced by the quality of the information. Findings on information quality has significant positive relationship with perceived usefulness that also indicates that EDMS enables user to accomplish their tasks more quickly. This is in line with the findings by Gable et al, (2008) and Petter et al., (2012) which timeliness is part of the measurement for information quality. The best information quality in information system such as EDMS, is the quicker tasks to be accomplished by the users. The result of this study provides evidence to improve user's job performance as emphasized by Seddon that perceived usefulness plays a crucial role in assessing system effectiveness and individual performance outcome. Accordingly, the performance of an information system, such as an EDMS, should be evaluated based on users' perceived usefulness, as it reflects the extent to which the system is perceived to enhance work efficiency, productivity, and task accomplishment, thereby verifying its contribution to improve job performance. Thus, the most obvious finding in this study is to emerge from the analysis is that EDMS increase user's productivity and enhance user's effectiveness in their job. As suggested by Adams, Nelson et al. (1992), the perception of usefulness is a major determinant of system usage, and this study found that the system usage is resulting from the effectiveness of the system functionalities. The findings on EDMS makes it easier to do the job at least hint that the users tend to feel comfortable and secure during work by using the system so that users feel helpful in completing the job. From the results, it is clear that EDMS useful to user's job. This is in line with previous studies of EDMS use to impact users at the individual level with efficiency and effectiveness at work with processes being better, easier and quicker that enabling concentration on core work by the user (Johnston & Bowen 2005 ; Afonso et al., 2015). Consequently, the perceived usefulness factor has been shown to explain the user's reason for using the information system and this proved the information system success model is supported by this research study.

Recent empirical research continues to validate this relationship using DeLone and McLean's Information System Success Model, which aligns closely with Seddon's conceptualization of perceived usefulness as an outcome of information quality. For example, Elmunsyah et al. (2023), in a study evaluating a learning management system using a modified DeLone and McLean model, found that information quality significantly influenced perceived usefulness and system effectiveness, indicating that users were more likely to perceive the system as beneficial when information outputs met their task requirements. Similarly, Alduaij et al. (2024) reported that information quality positively affected perceived usefulness and overall system success when assessing an organizational information system within DeLone and McLean framework. Thus, information quality was found to have a significant positive relationship with satisfaction (H1) and perceived usefulness (H2). High quality information, accurate, timely, and relevant, is critical for supporting decision making and workflow efficiency in public sector organizations. These findings corroborate prior studies (DeLone & McLean, 2023; Seddon, 1997) that emphasize information quality as a key determinant of IS Success. The integration of AIassisted data capture and validation mechanisms significantly enhances the reliability and accuracy of information within the EDMS. Additionally, cloud-based storage solutions and platforms such as SarawakPass provide secure and readily accessible records across government agencies. Collectively, these technological innovations ensure that high quality information is consistently available to end users, thereby reinforcing both user satisfaction and perceived usefulness.

H3: Systems quality has a significant positive relationship with satisfaction

The results indicate that system quality is a critical determinant of user satisfaction in the Sarawak government's EDMS. It is a measure of the information processing itself, which includes software and data components, in addition to a measure of the technical soundness of the system. As for satisfaction, Doll and Torkzadeh (1988) stated that the level of user satisfaction with an information system can be measured through elements of content, accuracy, ease of use, format and timeliness. This can also be interpreted by five important characteristics that would figure EDMS functionalities such as easy to use and to learn; useful; requires little effort to be used; retrieval of needed information easily; and response to an instruction of the EDMS is fast. This finding is quite consistent with that of Benmoussa et al. (2018), the quality of the system is the performance in terms of functionalities and other system parameters. Based on a study by Vijai (2018), there is a positive relationship between system quality and user satisfaction in the success of knowledge management system, where the system is easy to use and to learn.

Another system quality characteristic that has a significant positive relationship with satisfaction in this study is useful. Effective EDMS functionalities fulfil the need of user and it must be precise, useful and clear from user perspective (Musman et al., 2014). On the other hand, users' feedback collected by Mishra and Mishra (2011) revealed that they were satisfied with the system's performance because it provided a clear and useful report format. This would cause a perception that user is satisfied because of the EDMS functionalities is useful. On the question of whether or not an EDMS requires little effort to use, this study discovered that users of an EDMS are less satisfied with the system, despite the fact that such a system allows them to save paper, speed up communications, and increase the productivity of business processes, among other things (Sprague, 1995; Johnston & Bowen, 2005).

Another important finding was that the retrieval of information that the user need is easy with EDMS in this study. The availability of EDMS functionalities ensures the quality of a system that is capable of storing documents and retrieving them whenever they are required in the future (Zantout & Marir, 1999). It is interesting to note that response to an instruction of the EDMS is fast that proved the EDMS functionalities can save both time and cost by improving the speed of records retrieval and removing the need to maintain separate content infrastructure (Sathiadas & Wikramanayake, 2003). Nonetheless, we believe that it is well justified to conclude that systems quality has a significant positive relationship with satisfaction. Recent studies continue to support this relationship. Lubis, Erlina, and Yuliaty (2024) found that system quality significantly improves user satisfaction in local government accounting information systems, highlighting that reliable and user-friendly system features enhance task performance. Similarly, Eka et al. (2023) observed that staffing service systems with high system quality led to higher user satisfaction, confirming the importance of usability, reliability and responsiveness in government IT systems. In addition, a study of Malaysian public hospitals applying the DeLone and McLean IS Success Model has demonstrated that system quality is a significant predictor of satisfaction, emphasizing the relevance of this construct in public sector information systems (Hassan et al., 2025).

H4: Systems quality has a significant positive relationship with perceived usefulness

The present study confirmed the findings about system quality which consists of response time, system reliability, and system availability, have a positive impact on the perceived ease of use and perceive usefulness of website (Masri, 2019) In addition, there have been other studies that have also shown that the system quality has a significant relationship with perceived usefulness (Chung & Koo, 2015). In terms of response time, the system offers timely responses to request for information or action that leads to a degree of perceived usefulness by the user of the system. From the findings of this study, users of EDMS anticipate timely responses to requests for access to documents. As a result, they should not be ignored or delayed in responding to the request but rather should be prompt in responding to the request. In the same way Afonso et al. (2015) stated that consumers would want EDMS to be able to respond to effect users at the individual level with information being available when needed. The results demonstrate that end users also believe that the system is reliable to use, which inevitably leads to the belief that the system, such as EDMS, provides unfailing information without any doubt.

The system's availability that is reliable to use is measured in terms of its operational equipment, which includes equipment that operates under normal conditions and equipment that operates when it is required. This is supported by Ali et al. (2020) that EDMs should be able to give access to documents for both five and thousands of users of the system. However, the system's overall performance and reliability should not be compromised. Thus, results demonstrate that systems quality has a significant positive relationship with perceived usefulness. System quality significantly influenced satisfaction (H3) and perceived usefulness (H4). EDMS systems that are stable, reliable, and userfriendly enhance user confidence and perceived value. The deployment of cloud infrastructure (AWS) combined with next-generation network connectivity provided by ZTE and Sacofa ensures high system availability and low latency across government agencies. Such technological investments reinforce system reliability, which aligns with governmental objectives of delivering efficient, transparent, and accountable digital services. These findings found that, even within a highly advanced digital environment, system quality continues to function as a foundational determinant of information systems success, consistent with the principles articulated in the modified Seddon (1997) model.

Recent research supports the link between system quality and perceived usefulness in contemporary information system context. Alsquor, Attar, Alibraheem, and Alsaqoor (2025) found in a study of digital accounting systems in Jordanian SME that the system quality significantly influenced perceived usefulness, indicating that better system performance, such as ease of navigation, technical reliability, and responsiveness, leads users to view systems as more useful for their work. By applying this evidence to the Sarawak EDMS context, it is clear that system quality directly shapes users' perceptions of whether the system beneficial for completing document management tasks. Thereby, supporting the hypothesis that system quality has a significant positive relationship with perceived usefulness.

6.2.2 The Performance of The Functionalities Provided by The Electronic Document Management System

In the context of this study, eight hypotheses (H5 - H12) were developed to measure the functionalities of EDMS based on automated information capture, federated search and retrieval, collaborative tools, hierarchical file indexing and classification, storage and archival method, automated workflow, security and audit trail, as well as support and administer compliance. As shown in Table 6.2, a summary of the research hypothesis is provided under RQ2. Hypotheses H6, H9, H10 and H12 are supported by the empirical evidence and findings, while Hypotheses H5, H7, H8, and H11 are rejected. The second objective of this study is examined through the testing of the following hypotheses:

Table 6.2
Summary of Hypotheses Testing Results RQ2

	Research Questions and Hypotheses Testing	Results
RQ2	To assess the performance of the services provided by the document management systems.	
H5	Automated information capture has a significant positive relationship with information systems effectiveness.	Rejected
H6	Federated search and retrieval have a significant positive relationship with information systems effectiveness.	Supported
H7	Collaborative Tools has a significant positive relationship with information systems effectiveness.	Rejected
H8	Hierarchical file indexing and classification has a significant positive relationship with information systems effectiveness.	Rejected
H9	Storage & archival method has a significant positive relationship with information systems effectiveness.	Supported
H10	Automated Workflow has a significant positive relationship with information systems effectiveness.	Supported
H11	Security & Audit Trail has a significant positive relationship with information systems effectiveness.	Rejected

H12	Support & Administer Compliance has a significant positive relationship with information systems effectiveness.	Supported

The outcome of the PLS Structural Equation Modelling (SEM) analysis showed that out of eight hypothesized relationships between document management functionalities and information system effectiveness, four were accepted while another four were rejected. Using the SEM analysis, CFA and structural model were developed in order to test the hypotheses. The outcome of the CFA showed that eight items were used to measure each of the four dimensions of information system effectiveness, namely information quality, system quality, user satisfaction and perceived usefulness and the four items were used to measure each of the eight dimensions of document management functionalities, namely, automated information capture, federated search and retrieval, collaborative tools, hierarchical file indexing and classification, storage and archival method, automated workflow, security and audit trail, as well as support and administer compliance. Following CFA, structural model or path analysis was executed. The results indicated that the *p* value for the t value of four paths between information system effectiveness and the dimensions of document management functionalities are significant, while another four paths between information system effectiveness and the dimensions of document management functionalities are not significant, suggesting that only four formulated hypotheses are supported. The highest *t* value is the path between information system effectiveness and Automated Workflow (t - 8.132, $p < 0.05$), while the lowest t value is the path between information system effectiveness and Storage and Archival Method (t - 0.002, $p < 0.05$). The remaining two paths are as follows: between information system effectiveness and Federated Search and Retrieval (t - 5.309, $p < 0.05$); and between information system effectiveness and Support and Administer Compliance (t - 0.026, $p < 0.05$). The meaning of this finding is that one unit increase of the information system effectiveness results in an increase of Automated Workflow by 8.132 units, Federated Search and Retrieval by 5.309 units, Support and Administer Compliance by 0.026 units, and Storage and Archival Method by 0.002 units. The findings were further strengthened from other studies (Delone & McLean, 1992; Delone & McLean, 2003; Seddon, 1997).

By definition, automated workflow is the functionality in EDMS which allows for efficient control of the activities carried out. The result of testing Hypotheses Ten

(H10) in this study shows that automated workflow has significant positive relationship with information systems effectiveness (H10: supported, t - 8.132, $p < 0.05$). H10 was supported, demonstrating that automation of workflows positively contributed to ISE. This reflects System Quality, where workflow efficiency and process reliability reduce operational burden. According to Seddon, well-performing automated workflows enhances perceived usefulness, leading to improve organizational productivity. This indicates automated workflows streamline document processes, from creation to approval and distribution. The system notifies all users of the working instructions assigned to them. The supervisors are able to monitor the performance of the activities by their subordinates who are responsible for them, and they are notified if the activities deviate from their regular course. As a result of the processing performed on the workflows they are included in, both supervisors and subordinates are automatically generated based on each user's position in an organization and their role within the organisation. These activities, applications and process participants are based on automated workflow that have been developed to support an automatic, efficient execution of business processes in organizations, as explained by Bae and Kim (2002) for workflow management.

The tasks that users from every level of positions in organizations receive via EDMS determine the effectiveness of the information system they are using. If the functionality of automated workflow is utilized, then the information system is effective. As mentioned by Gary (1999) and Giandon et al. (2002), the automated workflow reveals its significance as the modelling and enactment of business processes involving both human and computer agent such as EDMS. These processes serve as a control mechanism for the approval and distribution of tasks throughout the electronic transmission of the document life cycle. The automation separates work activities into distinct tasks, delineates roles, establishes rules, and outlines procedures, contributing significantly to the efficient of automated workflow functionality. Therefore, the functionality of automated workflow in streamlining and optimizing the document in EDMS has a significant positive relationship with information systems effectiveness.

In terms of federated search and retrieval in EDMS by the users' federated search has a significant positive relationship with information systems effectiveness (H6: supported, t - 5.309, $p < 0.05$) that shows distribution of information retrieval, and it searches for document that cannot be accessed by conventional search in other information system. Federated search capabilities enable users to search across multiple repositories and sources. It is a strategy in the EDMS for searching several documents at the same time using a single search engine as explained by Ade Tutty Rokhayati et al. (2019). EDMS provides authorised representatives with the ability to locate records across several archive envelopes and storage facilities. Such searching capabilities often include document name, metadata, report substance, and other information.

The functionalities of federated search and retrieval in EDMS used by Sarawak civil government enable them to search files/documents easily, locate files/documents from across folders and repositories, access the full content, and enable them to upload the documents to the system. Given the findings, it is apparent that EDMS provides long-term backup and disaster recovery compliance, as well as aid with legal compliance difficulties, such as document retention policies, among other things to demonstrate the support and administer compliance functionalities in EDMS. In support of this, Zdraveski et al. (2020) stated EDMS assists the organization with legal compliance issues, mainly the SarbanesOxley Act requires an efficient document retention policy, which is part of EDMS functionalities.

Compliance is proactively monitored and documented in EDMS to access the functionalities of support and administer compliance, which in turn shows a positive relationship with information quality, system quality, satisfaction, and perceived usefulness. As a matter of fact, EDMS may offer internal storage or the ability to work with an external storage system, depending on the needs of the organization. It enables the user to save the document into archival folder and change the status from open file/document to closed file/document. The present study confirmed the findings about archival method as one of the EDMS functionalities which enable the user to do documents/records inventories and include the file/document into the retention schedules. Such schedules include the assignment of retention periods to documents/records and lead to the production of reports for the disposition or archiving of records. The significant positive effect of federated search and retrieval indicates efficient document search and retrieval enhance IS effectiveness. This aligns with DeLone and McLean's Information Quality dimension, which emphasizes timely, accurate, and accessible information as critical for user satisfaction and net benefits. Similarly, Seddon's framework identifies task performance impact as a key outcome of effective information access. In the Sarawak context, the EDMS enables users to quickly locate and access relevant files across multiple repositories, thereby improving operational efficiency and decision-making quality.

Contrary to the researcher's expectation, H5, H7, H8 and H11 were rejected, which means Automated Information Capture, Collaborative Tools, Hierarchical File Indexing and Classification have no significant positive relationship with information systems effectiveness. The possible explanation for the rejection of these hypotheses is that the information system effectiveness normally indicates the users concerned on accuracy, reliability, timeliness in responding to a request, assistance, and the adequacy with which the requirements definition is met by the EDMS that they are using. The effectiveness of information system depends on the quality of the system itself, its output (information quality), its use level, whether users are satisfied with it, and how the users perceived the system usefulness. If this is the case, then not all of the automated information capture from files or documents received by government agencies is automatically captured. Instead, the user must submit or receive documents manually through another application, such as email, and then upload them to EDMS, which is particularly inconvenient when dealing with large-scale documents. Thus, the hypothesis that automated information capture has a significant positive relationship with information systems effectiveness was rejected ($t = 1.413$, $p < 0.05$). This indicates that while automated information capture may contribute to some aspects of system functionality, its impact is not statistically significant in enhancing overall system effectiveness. One possible explanation is that automation alone does not ensure data quality or relevance, which are critical components of effectiveness.

Additionally, contextual factors, such as the users' familiarity with the system or the organization's readiness for automation, might play a moderating role. Comparing this result with prior studies, Coombs et al. (2020) have found significant effects of automation on system performance, while others suggested that the benefits depend on complementary factors such as training and system integration. Yadav et al. (2023) suggested deep learning in automated information capture and retrieval to improve performance, reduce guide processing, and allow organizations to save time for other crucial tasks. Despite theoretical expectations, automated information capture did not significantly influence IS effectiveness. Although EDMS provides functionalities for converting physical documents into digital formats, organizational and technical barriers can hinder their impact.

A systematic literature review on electronic records management adoption highlights that technology alone is insufficient without organizational support and readiness (Bizi, Ghazali, & Yunus, 2025). Additionally, metadata practices are critical for ensuring captured documents are accessible and usable. However, where metadata integration is weak, automated capture contributes less to system performance (Hussin et al., 2025). While the EDMS provides functionalities for converting physical documents into digital formats, contextual factors such as limited user training, inconsistent metadata standards, and underutilization of the automation features may explain the weak effect. DeLone and McLean (2003) as well as Seddon (2002) both noted that system use, and organizational integration are crucial mediators between system functionalities and performance impact.

In addition, when working with private and confidential documents, the user does not require verification by the superior on and vice versa using collaboration tools functions for a specific document. For the case of private and confidential document, only one person who is responsible for such a document is allowed to manage it. As a result, the effectiveness of the information system of the collaboration tool's functionality is not applicable. Therefore, the hypothesis regarding collaborative tools ($t = 0.854$, $p < 0.05$) was also rejected, indicating no statically significant relationship with information system effectiveness. This result could be attributed to organizational resistance to use collaborative tools or concerns over data security, as noted in previous research. Furthermore, the effectiveness of collaborative tools might depend on their adoption rate and integration with existing workflows as well as communication and task coordination are factors facilitating distributed project teams to adopt and use various collaboration tools (Ishak et al., 2022).

It is possible that some documents received by users via EDMS include a floor plan, and the users of EDMS employ metadata to index such documents. However, using merely content or metadata for hierarchical indexing and classification of documents is insufficient for establishing the context of records in an EDMS. The rejection of H8: Hierarchical file indexing and classification ($t = 0.376$, $p < 0.05$) suggested that hierarchical file indexing and classification do not directly influence system effectiveness. One possibility is that while hierarchical structures improve organization and retrieval, they may not address user satisfaction or perceived system utility. Nevertheless, hierarchical classification can improve performance in visual content classification, but proper high-level feature representations and well-chosen prior taxonomies are crucial for achieving better results (Hoyoux et al., 2016).

Although attention should be given to security and audit trail of an EDMS to ensure proper retrieval of the information contained within the documents, and are not compromised after indexing and classification, still not all applications are resubmitted every time a user has retrieved the document and finished entering changes, thus allowing the database to store every version of the document. Similarly, the lack of significance for the security and audit trail hypothesis ($t = 0.940$, $p < 0.05$) may reflect that this functionality, although essential for compliance and governance, are not directly perceived as enhancing system effectiveness. Users might view this functionality as baseline requirements rather than value-adding components.

Despite their theoretical importance, H5 (Automated Information Capture), H7 (Collaborative Tools), H8 (Hierarchical File Indexing and Classification), and H11 (Security and Audit Trail) were rejected. The rejection of Hypotheses H5, H7, H8, and H11 pointed out the complexity of achieving information system effectiveness. Automated information capture, collaboration tools, hierarchical file indexing, and security and audit trail did not show significant impact on system effectiveness. These findings suggested that the effectiveness of individual system functionalities is influenced by a combination of technical, organizational, and user-related factors. Misalignment between system capabilities and daily workflows may reduce perceived usefulness (H5, H8), limited integration and user adoption of collaborative tools may hinder effective teamwork across departments (H7), and security and audit trail functionality. Meanwhile, though technically robust, it may not directly influence user satisfaction or task performance (H11). For instance, automated information capture, collaborative tools, and security and audit trail may require complementary elements such as training, integration, and trust-building initiatives to deliver significant benefits. While these hypotheses were not supported, their rejection provided valuable insights into areas requiring further investigation.

Future research aims to identify the conditions and contextual factors that enhance the impact of these functionalities on system effectiveness. By addressing these gaps, this study contributes to a more nuanced understanding of information systems design and implementation, ultimately supporting the development of more effective. In the context of Sarawak, these findings reflect the maturity of Sarawak's digital ecosystem, where foundational EDMS functionalities are considered hygiene factors rather than drivers of effectiveness. The results extended IS Success theory by highlighting that technological context and user expectations influence which features are perceived as value-adding.

However, when these unsupported hypotheses were run individually, the results of bootstrapping for all rejected hypotheses were supported as described in Table 6.3.

Table 6.3
Path Coefficient of Unsupported Hypotheses Results after the Bootstrapping Run Individually

Hypothesis		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
H5	Automated Information Capture -> Information System Effectiveness	0.713	0.715	0.042	16.88	0	Supported
H7	Collaborative Tools -> Information System Effectiveness	0.74	0.744	0.039	18.881	0	Supported
H8	Hierarchical File Indexing & Classification -> Information System Effectiveness	0.718	0.722	0.038	18.678	0	Supported
H11	Security & Audit Trail -> Information System Effectiveness	0.704	0.707	0.046	15.389	0	Supported

The analysis of the path coefficients for unsupported hypotheses after the bootstrapping run reveals strong evidence supporting each hypothesis individually. The T statistics for automated information capture, collaborative tools, hierarchical file indexing and classification, and security and audit trail are 16.88, 18.881, 18.678, and 15.389, respectively. All these values significantly differ from zero. Furthermore, the p-values corresponding to each hypothesis are documented as 0, providing further confirmation of their statistical significance.

Based on the strong T statistics and significantly low p-values, it can be concluded that there is a strong relationship between automated information capture and information system effectiveness (T statistics of 16.88). Additionally, the T statistics of 18.881 provides evidence supporting the hypothesis that the use of collaborative tools significantly influences information system effectiveness. Furthermore, the T statistics of 18.678 indicates a strong relationship between hierarchical file indexing and classification as well as information system effectiveness. Subsequently, the T statistics of 15.389 suggests a positive relationship between security and audit trail measures as well as information system effectiveness. There is a substantial positive impact on the effectiveness of information systems. The user of EDMS employing automated information capture may experience improved efficiency and overall system performance. Collaborative tools have the potential to enhance communication, teamwork, and overall collaboration skills in the EDMS. The utilization of hierarchical indexing and classification greatly enhances the overall effectiveness of information systems. These measures lead to easier data retrieval and management and user-centric systems.

6.2.3 The Performance of EDMS Functionalities Contribute Towards the Electronic Document Management System Effectiveness

The results supported the claims of Cho, V (2008) that IS could be measured at three levels: the technical level, semantic level, and effectiveness level. In this study, IS has been measured by its effectiveness through EDMS functionalities towards the document management system effectiveness. In this regard, the effectiveness of document management system of an IS particularly on the aspect of EDMS functionalities which are automated information capture, federated search and retrieval, collaborative tools, hierarchical file indexing and classification, storage and archival method, automated workflow, security and audit trail, and support and administer compliance. The finding provides a new insight into the relationship between EDMS functionalities and the document management systems effectiveness. The findings for the effectiveness of information systems, specifically document management system effectiveness, have previously been discussed in terms of organisational impact and individual impact. However, these results demonstrated that EDMS functionalities are encompassed in the findings for the effectiveness of information systems, particularly document management system effectiveness. The result of the descriptive analysis suggested that respondents of the study were using quite extensively the EDMS and were used by the government agencies employee as part of their routine of work.

To measure the performance of EDMS functionalities contribute towards the document management systems effectiveness, the study used a questionnaire. The results from data collection were analysed and min, max, mean, median, and standard deviation were recorded. In the context of this study, the 7-point Likert Scale was adapted. The lowest measurement is 1 (strongly disagree) and the highest is 7 (strongly agree). The overall mean value of the document management system effectiveness of the electronic document management system functionalities was examined.

Observing the usage of the electronic document management system, it is obvious that the electronic document management system functionalities contribute to the information management system effectiveness. Four to five questions were asked for each functionality that related to Automated Information Capture; Federated Search and Retrieval, Collaboration Tools; Hierarchical File Indexing and Classification; Storage and Archival Method; Automated Workflow; Security and Audit Trail; Support and Administer Compliance. While another set of four to five questions are related to Document Management System Effectiveness consisting of Information Quality; System Quality; Satisfaction; and Perceived Usefulness.

In total, there were 39 questions asked to measure the Electronic Document Management System Functionalities in enhancing the Information System Effectiveness.

The users of Electronic Document Management System were asked on:

a. measuring the functionality of automated information capture of electronic document management system in terms of transform paper documents into digital files, organize digital files at the point of creation, by creating document from network folders, Microsoft-office and/or other integrated system, and capture details of document automatically such as file classification to reflect nature of work in the Sarawak government agencies that use electronic document management system;
b. measuring the functionalities of federated search and retrieval of electronic document management system in terms of easy access to files/documents, locate files/documents from across folders and repositories, access the full content, and upload the documents to the system.
c. measuring the functionalities of collaboration tools of electronic documents management system in terms of the ability to work faster on document changes; easy to create and edit documents directly within the system; create, upload and categorize new documents without leaving certain interface; enables all users involved in the workflow be notified as tasks are completed by each stage; and interaction with other electronic document management systems;

d. measuring functionalities of hierarchical file indexing and classification of electronic document management system in terms of referring to an index in the system to determine the location of a file or document; use the same terminology in organizing the document; index large documents at several levels of EDMS process; identify the management responsibility for a group of records; and provide context for individual documents and records;
e. measuring functionalities of the storage and archival methods of electronic document management system in terms of save the document into archival folder; change the status from open file/document to closed file/document; copy the document/file to another medium; inventories of documents/records; and include the file/document into the retention schedules.
f. measuring functionalities of automated workflow of electronic documents management system in terms of establishment of ownership /responsibility for each step in the EDMS system process; streamline processes and keep them moving forward with little human effort; easily see the active step, who is responsible for completing it, and how much time it is taking; reduce process error as all files/documents are scanned to ensure that all necessary information is captured; and respond to the prompted task by clicking the submit button;
g. measuring functionalities of security and audit trails of electronic document management system in terms of storing the transactions of documents by unique serial numbers; check-in/check-out of content creation and editing; allow simultaneous editing; control over the various and previous repetitions of a file; track the creation and editing of file; and rollback to previous versions of a document; and
h. measuring functionalities of support and administer compliance in terms of identify and manage regulatory risk; design and implement controls to protect an organization from the risks; monitor and report on the effectiveness of risk controls in the management and the organization's exposure to risks; resolve compliance difficulties as they occur; and impose on rules and controls of risks.

In terms of performance of automated information capture functionalities that contribute towards the document management systems effectiveness, the users at the government agencies were asked including the Electronic Document Management

System’s capability to transform the paper document into digital files through high-volume scanning and Optical Character Recognition (OCR); to organize the digital files in creation of folders within the system networks; and capture details of document automatically. Based on the findings, the government department that used the electronic document management system were rarely able to utilize this functionality of EDMS in terms of creation of documents from network folders or from Microsoft office. Therefore, it is crucial to conduct usability studies to identify the factors that impact limitations on usage of document creation from network folders and evaluate if there are challenges or barriers hindering.

Survey studies on training should be provided to government departments staff on this matter. Future research should explore the role of complementary factors such as user training, system interoperability, and data governance in enhancing the impact of automated information capture on electronic document management system effectiveness. Government departments and agencies should also consider pilot studies to assess automation readiness before full implementation of the system. User may not fully utilize automated information capture functionality, or the system may not seamlessly integrate with other digital tools. While EDMS can technically automate document capture, effectiveness is contingent on workflow alignment and user engagement. Users may still rely on manual processes due to habit, training gaps, or perceived complexity. The Artificial Intelligence (AI) and digitalisation push, including Sarawak AI Centre, provides opportunities to integrate intelligent document recognition and AI-driven data extraction, improving both accuracy and ease of use. Predictive classification algorithms could reduce manual intervention, boosting functionality relevance and effectiveness.

Federated search and retrieval are the second functionalities of electronic document management system that its performance has contributed towards the document management systems effectiveness. Questionnaires were directed to users of EDMS as highlighted in Chapter Two, where Björk (2003) believed that the effectiveness of federated search by meta data-based search mechanisms in electronic document management system, improve the capabilities to search documents and satisfy the users. The finding from this study seemed to align with the research finding from the data collection. It is no doubt that the functionalities of federated search and retrieval of the electronic documents management system is to facilitate the recovery and retrieval of files, hence ensuring users to successfully accomplish their task. Ade

Tutty Rokhayati et al. (2019) remarked that electronic documents management system enables authorised personnel to retrieve documents from the archival folders and repositories, typically searching through resources such as documents title, metadata, report content, and other criteria. This is measuring the functionalities of federated search and retrieval of electronic document management system in terms of easy access to files/documents, locate files/documents from across folders and repositories, access the full contents, and upload the documents to the system.

From the mean score, the users of EDMS in the Sarawak government agencies have utilized the functionality that enables them to search files/documents easily and locate files/documents from across folders and repositories in the EDMS. This shows that the functionalities of federated search and retrieval, contributed towards the document management system effectiveness.

The third functionalities of electronic document management system performance of EDMS functionalities that contribute towards the document management systems effectiveness is the collaboration tools. The findings of this study are aligned with the study done by Ade Tutty Rokhayati et al. (2019) that mentioned collaboration has been defined as the degree to which individuals in the group of EDMS system actively help and support one another for the smooth performance of the task. Respondents appreciate the ability of the EDMS to facilitate the faster document changes which result in efficiency of document changes.

However, the mean rating for interaction with other electronic document management systems contradicted with the finding of this study. The functionality of collaboration tools for interacting with other systems did not significantly contribute to the overall effectiveness of information system among government users of electronic document management system. Awareness and refresher training among the users of electronic document management system in the government has to be provided to ensure that they are proficient in utilizing collaboration tools in the system. To maximize the benefit of collaborative tools, government departments and agencies have to address potential resistance through change management strategies and by ensuring robust data security measures.

Further studies could examine how specific features of collaborative tools contribute to effectiveness in different organizational contexts. Collaborative tools functionality may be underutilized due to limited inter-departmental integration before 2025, vis-a-vis lack of user awareness or insufficient training. EDMS may not fully support real-time editing or cross-agency workflows. Collaboration tools are only impactful if users actively adopt them for joint document creation, review, and decision-making. Low usage reduces the perceived contribution to overall system effectiveness. Meanwhile, opportunity through Sarawak initiatives, the Sarawak's digitalisation strategy and AI integration can enable enhanced collaborative platforms, linking EDMS with cloud-based tools, secure messaging, and workflow automation. This can improve interdepartmental coordination, particularly for large infrastructure projects (KUTS, ART, Ports) and biomedical research initiatives.

Besides collaboration tools functionality, performance of Hierarchical File Indexing and Classification functionalities in electronic document management system performance of EDMS functionalities contribute towards the document management systems effectiveness by organizing the documents into a structured central repository that keeps documents automatically organized by department, including creation date or other information governance parameters. However, the mean score indicates that the user of EDMS from the government agencies are not aware of the classification and indexing of hierarchical file digital documents that were arranged in a focal store based on envelope structure and keep reports, consequently composed of office, creation date or other data administration parameters.

Essentially, the mean scores were not aligned with the study by Alshibly (2014), who emphasized that electronic documents management system (EDMS) support dynamic, multidimensional hierarchies. Although Zantout and Marir (1999) claimed the hierarchical indexing enables the document searchable, and serves as the key component in EDMS, its effectiveness hinges on user engagement. Merely having this capability may not suffice, it requires active exploration by users to unlock its full potential.

As mentioned in Chapter 2 and Chapter 3, Valkonen (2015) believed that hierarchical indexing and classification enable users to identify management responsibility for a group of records by associated document groups (folder/file structure), metadata indexing, and full-text indexing; though the mean scores have shown otherwise. Without users delving into the hierarchical structure, the streamlined and efficient determination of precise location of files or documents may remain unrealized. Therefore, the mean score for Hierarchical File Indexing and Classification functionalities is low compared to the rest of the dimensions and items in the study. Researcher might investigate alternative file organization methods, such as dynamic or non-hierarchical systems, to understand their relative impact on system effectiveness. Complex file structures and multiple levels of classification may overwhelm users or be inconsistently applied, reducing effectiveness. The EDMS may provide the functionality, but without clear guidelines or user-friendly interfaces, adoption remains low. If indexing is inconsistent, retrieval efficiency and perceived usefulness are compromised. Users may not see a clear benefit to the hierarchical structure, limiting impact on system effectiveness.

Through Sarawak initiatives, and growing digital content from researcher, infrastructure, and creative sectors, there is a strategic need for AI-assisted metadata generation and auto-classification. Integration machine learning for indexing can reduce cognitive load and improve system adoption. The lack of a significant relationship suggests that collaborative functionalities are underutilized or not fully integrated into day-to-day workflows. Although collaboration theoretically enhances efficiency and knowledge sharing, Sarawak's implementation may face barriers such as departmental silos or insufficient change management practices. This highlights an opportunity to align system design with organizational behaviour to achieve intended outcomes. The non-significant effect indicates that advanced indexing capabilities may not translate into improved effectiveness unless users consistently apply classification protocols. Both theoretical frameworks suggest that system quality and information quality must be fully leveraged through proper usage and process alignment to impact performance outcomes.

The other EDMS functionalities performance of EDMS functionalities contribute towards the document management systems effectiveness is the storage and archival method. In terms of its functionality to connect to records retention schedules for full document lifecycle management, the mean score indicates that the users of EDMS at the government agencies is aware of its functionalities which allow the user to manage the life cycle of document, especially on the change of status from open file/documents to closed file/documents distribution, storing and archiving. The users can save the document into archival folder which is ready to be used by the users and enable the users to do documents/records inventories. It supports what was stated by Burtylev et al. (2013) in their study, namely providing each user with the potential to store the whole history of their operations, enabling users to save documents into archival folder in EDMS. This centralized control enhances transparency and accountability in document management processes in each government agency.

Providing refresher courses or extensive training to inexperienced users in government agencies using Electronic Documents Management System (EDMS) is a notable strategic target. The positive effect of storage and archival methods suggested that reliable and organized document storage enhances IS effectiveness. This supports DeLone and McLean's (2003) System Quality, emphasizing reliability, stability, and maintainability. Seddon (2002) also highlights that performance impacts are maximised when information is trustworthy and consistently available. Proper archival procedures in Sarawak's EDMS ensure regulatory compliance, data integrity, and long-term accessibility, which in turn support evidence-based governance.

The subsequent performance of EDMS functionalities contributing to the effectiveness of document management system is the implementation of automated workflows. The mean score finding shows it is articulated with Zantout and Marir (1999), that EDMS functionalities of automated workflow play an important role for the performance of document management system effectiveness in tracking and routing papers associated with the management process. Beyond this, Pho and Tambo (2014) also stated that the functionalities of the automate workflow in EDMS facilitate real-time monitoring of the management process. The mean score of the findings aligns with the guideline presented by the Minnesota State Archives (2012) that the performance of EDMS functionalities of automated workflow is a process-oriented nature of process level, presenting each process with links to relevant documents stored within the EDMS. Efficient EDMS allows users in the government agencies to rerun them with a single click that enhancing operational of EDMS effectively. Automated workflow significantly improves IS effectiveness by streamlining tasks, assigning responsibilities, and minimizing human error. This finding is consistent with DeLone and McLean's (2003) notion that system functionalities enhancing operational efficiency that positively affecting net benefits. Seddon's (2002) framework also emphasizes that performance impacts are closely linked to process optimization. In practice, the Sarawak EDMS allows users to respond promptly to task prompts and submit approvals digitally, reducing delays and enhancing overall productivity.

While the security and audit trails functionalities within EDMS are important considerations in EDMS, the findings of this study, as reflected in the mean score, indicated a noteworthy observation. Users within the government agencies utilizing EDMS appeared to have limited awareness of the existence of audit trail functionalities. These functionalities performance precisely contribute towards the document management systems effectiveness, consequently, track data access, ensure ongoing regulatory compliance, and manage functional controls to determine users' access levels to specific documents. Therefore, the user of EDMS at the government agencies required to utilise the audit trails functionalities in the EDMS to track and record all user actions and system operation as well as any modifications or access to the confidential.

Future work shall consider exploring the indirect benefits of security and audit trail functionality, such as their impact on user trust and compliance outcomes, to better understand their role in enhancing system effectiveness. While the EDMS may technically secure documents and track changes, users may not perceive this functionality as directly improving task performance or satisfaction. Security is often considered a background functionality, important for compliance but less visible to daily users. Low user awareness or engagement with audit functionality may lead to insignificant correlations with system effectiveness. However, under the Sarawak initiatives, Sarawak focusses on regulatory compliance in research, infrastructure, and public service projects provides an avenue to enhance awareness and usability. Functionality such as automated audit alerts, risk dashboards, and AI-based anomaly detection can make security and audit trails more actionable and relevant to users. Although security and audit trail functionalities are essential for risk mitigation, their direct influence on perceived system effectiveness may be less salient to users. Users may perceive these features as background support rather than drivers of performance, indicating a potential gap between system capabilities and user awareness or appreciation.

Support and administer compliance is the last item of EDMS functionalities that significantly contribute to the effectiveness of the document management system in this study. The capability of Electronic Document Management System (EDMS) to execute support and administer compliance functionalities ensure backup and disaster recovery compliance. The mean score in the finding of this study showed that user of EDMS at government agencies is able to identify and manage regulatory risks effectively. The findings have also shown that the mean score demonstrated the effectiveness of Electronic Document Management System (EDMS) functionalities in support and administer compliance, particularly in enhancing security measures within government agencies processing procedures. It emphasizes that these functionalities contributed significantly to the performance of document management systems effectively. It highlights how EDMS enables users at the government agencies implement controls, thereby preventing organizations from regulatory risks. The mean score for the support and administer compliance in EDMS confirms the initial hypothesis. This finding addresses the performance of these functionalities, contributing to the effectiveness of the documentation management system. These results aligned with the previous studies conducted by Kassab et al. (2019), supporting the notion that the organization manages data and documents through the control of the documents cycle and administrative procedures. This encompasses the monitoring of procedures and ensuring their secure implementation, as well as providing backup and disaster recovery compliance. The significant effect of compliance management underscores that functionalities supporting regulatory adherence and risk mitigation improve IS effectiveness. According to DeLone and McLean (2003), system quality that ensures governance and control contributes to net benefits, while Sesson (2002) identified the management of compliance as enhancing performance impact. In the Sarawak context, EDMS features that allow monitoring, reporting, and controlling of regulatory compliance strengthen accountability and organizational performance, demonstrating strategic value beyond individual user satisfaction.

Comparative insights from the international EDMS implementation, National Archives of Australia emphasized on retention or disposal procedures, audit trails, and governance frameworks as essential for system effectiveness (Abdulkadhim et al., 2015; Wilkins et al., 2007). In Australia, the National Archives of Australia defined EDRMS as systems that manage born-digital information, digitized records, or physical records transferred into digital formats. Such systems are expected to support classification, retrieval, storage, disposal, access and security controls, and audit trails. Australian government guidance emphasised that EDRMS should integrate with enterprise-wide information management architecture, support retention or disposal, ensure integrity and authenticity of records for compliance, and provide secure access. These situations underline the notion that system capability must align with organization wide governance, processes, and compliance frameworks for long-term effectiveness. In Singapore, an example EDMS transformation by a government agency shows the value of integrating AI driven classification, automated metadata tagging, secure archival, and lifecycle management, enabling compliance, efficient retrieval, and scalable recordkeeping workflows.

Meanwhile in Sarawak, workflow automation and archival functionality are consistent with these standards, yet security and audit trail functionalities require further integration with governance protocols. Therefore, the findings are aligned with the current practice in the government agencies. Sarawak's ongoing digital transformation initiatives offer multiple avenues to enhance these functionalities. AI integration, predictive automation, and user-centered design can bridge the gap between system capabilities and actual user experience. Aligning EDMS functionalities with the Sarawak initiatives not only improves system effectiveness but also reinforces the broader strategic objective of digital governance and innovation in Sarawak. These results extend Seddon's (1997) model by showing that functional features that provide tangible benefits are significant determinants of system effectiveness, particularly in advanced and cloud supported digital ecosystems.

6.3 Recommendation based on Systematic Literature Review

In the review considering the contribution of Electronic Document Management Systems (EDMS) in the public sector, a systematic literature review (SLR) and bibliometric analysis of the effectiveness of EDMS in the public sector show that Sarawak's public sector benefits the most. For Sarawak's public sector, the following should be prioritized based on the existing gaps in the areas of systems functionality, policies, users, technology, and culture.

6.3.1 Strength Policy Integration and Governance Focus

The review demonstrated the impact of EDMS System Documentation Management on the accomplishment of work in organizations, thus praising its effectiveness (Ab Aziz et al., 2017; Ziemba et al., 2022). For harmonization and accountability, suggestions put forth are as follow:

a) To ensure uniformity in the use of EDMS, the management of documents in one's possession throughout the life cycle of a document, management of access rights, and management of documents across multiple agencies; provide a new policy (first draft, its purpose) for EDMS.

b) Compliance with Document Management Systems Policy should be legally obligatory for government Controlling Agencies and Local Government.
c) Advanced Digital Governance and policies for EDMS usage should be dynamically reviewed and updated in a timely manner.

Predictably, the governance mitigates policies inconsistencies and strengthens adherence.

6.3.2 Enhancement of Technological Infrastructure and System Integration

Effective EDMS implementation needs good infrastructural support. A number of studies pointed out system integration constraints, network capacity, and technical issues (Sunindyo et al., 2014; Nugraha et al., 2019). To mitigate these issues, it is necessary to:

a) modernize network infrastructure so that access to the EDMS is fast, reliable and uninterrupted among all agencies;
b) introduce a centralized cloud storage, well encrypted and disaster recovery;
c) ensure that it is compatible with existing systems to facilitate a gradual transition to avoid interfering with the prevailing workflows; and
d) encourage open-source and scalable platforms such as the ones detailed by the Alfresco-based systems, which are flexible and cost-effective.

These improve the technical stability, futureproofing, and security of EDMS

6.3.3 Inter-Agency Collaboration and Standardization

The literature indicates that disintegration and non-standardization of document practices are barriers to EDMS efficiency. Better collaboration ensures consistency in the systems, minimizes redundancy, and empowers the digital ecosystem. Hence, to improve system coherence, it would be necessary to:

a) implement uniform standards of document classification in all state agencies.

b) use a centralized EDMS hub where various departments are integrated together on a common platform to communicate and exchange of data easily; and
c) promote cross-agency digital governance committees to organize the best practices, address interoperability issues, and enable ongoing learning.

6.3.4 Pervasive System Assessments and post-implementation review

The SLR shows that there are no quantitative post-implementation evaluations in the existing literature. Periodic review makes EDMS responsive, functional, and organization focused. Hence, to address this gap, it would be necessary to:

a) establish performance metrics which include retrieval time, reduction of errors, satisfactions of users and efficiency of the workflow.
b) carry out regular evaluations on a regular basis and review system performance.
c) utilize comparison with other EDMS models in governments to determine best practices and areas of improvement; and
d) make use of analytics dashboards to track the usage patterns, bottlenecks, and trends of user behaviour in real time in the system.

6.3.5 Encourage Innovation by High-End Emerging Technologies

Some articles highlight a helpfulness of emerging technologies (data mining, AI, blockchain) when it comes to improving the efficacy of EDMS (Istratova and Sin, 2022; Nugraha et al., 2019). Technological innovation brings the EDMS to the next level, transforming it from a mere storage tool into a powerful instrument of digital transformation. Thus, these render for efforts to:

a) get acquainted with AI classification and predictive search in order to enhance decision-making and decrease the number of manual operations;
b) use blockchain or smart-contract modules when processing highly sensitive documents that need the utmost integrity and transparency;

c) make EDMS mobile friendly to have the flexibility of working and timely decision-making; and promote potential solution with regard to R&D alliances with university and technology firms to test new EDMS innovations customized to the needs of Sarawak.

Altogether, the SLR results highlight that the effectiveness of the EDMS in the Government Sector of Sarawak is reliant on the interrelationship of the technological preparedness, policy support, the capacity of users, and the organizational culture. The Sarawak government can make significant improvements in its digital administrative potential, as well as service delivery, outcomes by enhancing system functionalities, user engagement, advanced technology integration, and instituting strong governance frameworks. The following recommendations can be seen as a roadmap to the attainment of greater degrees of efficiency, transparency and digital maturity due to the optimised use of EDMS.

6.4 Recommendation based on Supported Hypotheses and Rejected Hypotheses

Table 6.4
Recommendation for Supported Hypotheses

Dimension	Recommendation	Sarawak Context
Information Quality (H1 & H2)	Improve with AI-assisted data validation, maintain metadata management, and periodic data quality audits.	SAIC AI, SarawakPass, cloud storage.
System Quality (H3 & H4)	Expand predictive AI search, cross-agency integration.	Support government wide data accessibility
Storage & Archival (H9)	Implement secure, redundant, compliant storage.	Long-term preservation and disaster recovery.
Automated Workflow (H10)	Streamline processes through automation.	Enhances public service efficiency and productivity.
Support & Compliance (H12)	Strengthen user support, monitoring, and compliance	Maintains trust and adherence to policies.

Dimension	Recommendation	Sarawak Context
	reporting.	

Table 6.5
Recommendations for Rejected Hypotheses

Dimension	Recommendation	Sarawak Context
Automated Information Capture (H5)	Raise user awareness on how automated capture supports data integrity and analytics.	Training and awareness campaign.
Collaborative Tools (H7)	Promote EDMS collaboration features and integrate with workflows.	Encourage adoption for cross-agency coordination.
Hierarchical Indexing & Classification (H8)	Educate users on the relevance of classification for governance.	Combine traditional classification with AI tagging.
Security & Audit Trail (H11)	Make security features more visible through dashboards and feedback.	Reinforce trust and highlight compliance value.

6.5 Contribution of the Research

This study provides valuable contribution in three categories namely, empirical contribution, theoretical contribution, and practical contribution. Empirical contributions conduct thorough data analysis, while theoretical contributions involve discussions on new frameworks. Last but not least, practical contribution is evident in the application of research findings. This subtopic presents a detailed explanation of each of these contributions of this study.

This research contributes to the understanding of effectiveness of EDMS as integrated functional systems as opposed to being merely peripheral technical systems. In contrast to other studies concentrating mainly on adoption and/or overall system success, this study has analyzed the impact of particular EDMS on effectiveness outcomes. The study is not weakened by the rejection of some hypotheses. On the contrary, it depicts the situational nature of EDMS effectiveness in the public sector, where the organizational processes, compliance, and user interactions govern the outcomes of the technologies. This study underscores the importance of addressing the system development, governance of the system, and user adoption and skill enhancement in order to achieve the benefits of digital document management systems.

6.5.1 Empirical Contribution

Electronic Document Management System (EDMS) is part of the government initiative involved in the development of digital governance. The COVID19 pandemic in early 2020 highlighted the importance of electronic transactions due to social distancing measures and the establishment of Electronic Sarawak Government Activities Ordinance, 2022 under the Laws of Sarawak, also to fulfil the needs of implementation of EDMS amongst users at the government agencies. This was crucial for government operations, both internally among government agencies and outside for public services. Therefore, it is important to conduct research on electronic document management system (EDMS), in particular the functionalities and the effectiveness of the system. As mentioned in Chapter One, there is limited study on Electronic Document Management System (EDMS) effectiveness in the government sector, and a research gap exist with regard to the implementation of EDMS in public administration (Linh Thuy Nguyen et al., 2008). Furthermore, most of the study done highlighted the bulk of existing research on Electronic Document Management System (EDMS) that primarily delves into the system's features rather than specifically examining the effectiveness of EDMS from the user's perspective, particularly within the public administration (Lawellen, 2015; Chiong, and Bao, 2016).

However, the empirical evidence of the study is almost non-existence, particularly when it involves the effectiveness of EDMS functionalities and the government agencies public service. Therefore, **this study has provided empirical evidence** on this issue. This study has utilized a scientific approach involving the formulation of hypotheses, comprehensive research methodology, systematic analysis, and multiple publication for validation; all of which aim to provide substantial empirical evidence. As the topic relatively unexplored within the electronic document management system in the government sector, the **validation analysis of the instrument** and **results of the hypotheses testing seem to** offer valuable guidance for developing a proper research instrument to effectively explore in the study of this topic. This is due to the acceptance of the instrument validation data to be published in a prominent publication. Additionally, the data has been presented in the scholarly conferences.

The conceptual framework between electronic document management systems functionalities and the information system effectiveness has not been previously tested. Therefore, this study has **provided evidence of the new construct for research** on the contribution of the functionalities within the electronic document management system to the information system effectiveness. Even though countless studies on electronic documents management system have been conducted, some researchers are not aware of the functionalities of electronic documents management systems element as a new dimension to study the information system effectiveness in the government agencies. Compared to other studies, information systems effectiveness or electronic documents management systems, are not new research in government sector.

Furthermore, this study has proven that **the demographic characteristics of the research setting** contributed to the empirical evidence, offering insight into the effectiveness of electronic document management system within the government sector agencies in Malaysia or Southeast Asia. A study exploring on functionalities of the electronic document management system within the government sector is imperative to contribute substantively to the body of research in this field.

In conclusion, this study has **the potential to inspire and guide for future research or study** on electronic document management system within the government sector. Other researchers may consider conducting a similar study involving different categories of respondence in the government sector, thereby broadening the scope and applicability of the findings. Not only among the users of electronic documents management system at the government agency level, but it can also be extended to test the relationship of dimension at the government linked companies, government-linked investment companies and many more.

6.5.2 Theoretical Contribution

This study highlights electronic document management system functionalities and its contribution towards the information system effectiveness. Besides various dimensions to measure the effectiveness of information systems, this study has proven that electronic documents management system functionalities play a significant role towards the effectiveness of information systems. In the context of this study, electronic documents management system functionalities have the significant effect towards the information system effectiveness. Accordingly, not much literature on any platforms discussed in detail the functionality of electronic documents management system in this study. Not only that, but there is also an absence of specific theories or previous model that present the actual phenomena related to the electronic documents management system functionalities in this study.

Hence, the main theoretical contribution of this study is the **establishment of an empirical validated based framework** on determining the electronic documents management systems functionalities towards the information system effectiveness. Previous studies were unable to provide sufficient evidence to support the establishment of an empirically validated framework applicable to this study. The proposed conceptual framework for this study is adapted from various theories and model including by Delone and McLean (1992) for DeLone and McLean Information System Success (Information Quality; System Quality) and (Information Quality; System Quality; user satisfaction and perceived usefulness) from Seddon (1997). The framework is also based on the Electronic Document Management System Functionalities which cover Automated Information Capture; Federated Search and Retrieval; Collaborative Tools; Hierarchical File Indexing and Classification; Storage and Archival Method; Automated Workflow; Security and Audit Trail; and Support and Administer Compliance. Other supporting models that were referred for connecting EDMS functionalities and information system effectiveness are Updated DeLone and McLean Information System Success Model by Delone and McLean (2003); Gable et al. (2008); Gable et al., (IS-Impact) Model and Integrated Success Model (ISM). The finding from the preliminary study helps the researcher to improve the conceptual definition of the original dimension in the framework. Besides that, this study provides sufficient evidence and trusted sources to strengthen the development of the framework.

In the context of this study, its new dimension is the relationship between Electronic Document Management System Functionalities with Information System Effectiveness to investigate the perceived effectiveness of EDMS functionalities and their relationship with information quality, system quality, perceived usefulness, and user satisfaction. Perceived effectiveness of information system was examined, namely, information quality, system quality, user satisfaction, and perceived usefulness. While EDMS functionalities (automated information capture; federated search and retrieval; collaborative tools; hierarchical file indexing and classification; storage and archival method; automated workflow; security and audit trail; and support and administer compliance) are the new potentials to measure the information success of an EDMS used by government agencies public service. Henceforth, information quality and system quality are also linked to system satisfaction.

Accordingly, the study reveals that the functionalities of electronic document management system have contributed towards the effectiveness of information system. Enhanced information quality and system quality have a positive correlation with user satisfaction, indicating that higher levels of both have led to increase user satisfaction with the system. The higher the quality of the information and system, the more likely the user would be satisfied with the system. Enhanced electronic document management system (EDMS) functionalities, enhanced system quality, and information quality in the EDMS are linked to higher user usage and satisfaction. Consequently, users perceive the system as more useful, believing that their job performance is positively regarded when they extensively utilize the system's functionalities. Therefore, the electronic document management system is considered as a contribution to the study on information system effectiveness as a finding in this study. The study supplements the existing literature on electronic documents management system functionalities in the information system effectiveness framework. The study on electronic documents management system functionalities in the government sector though limited; the validated framework has been promoted via the concepts among government service. Figure 6.1 shows the complete conceptual framework of electronic documents management system functionalities and information systems effectiveness.

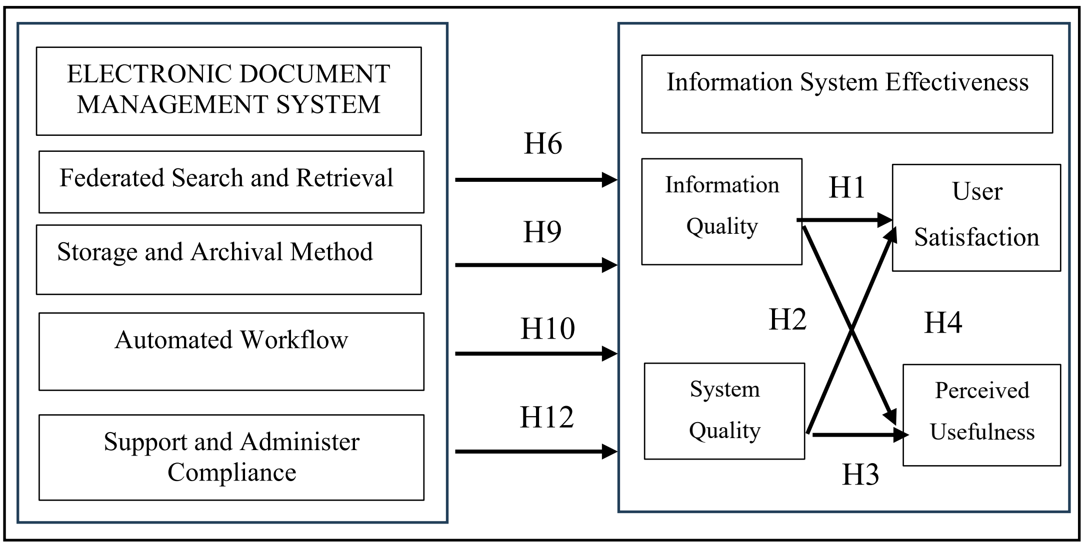

Figure 6.1 The Complete Conceptual Framework Effectiveness of Electronic Document Management System Functionalities

6.5.3 Practical Contribution

The study provides evidence-based insights for Sarawak government to optimize EDMS functionalities, enhance workflow efficiency, ensure compliance, and support Sarawak state-wide digital initiatives. One of the outcomes of this study is a comprehensive instrument to measure the effectiveness of EDMS functionalities and their relationship with information quality, system quality, perceived usefulness, and user satisfaction. In the context of this study, the instrument developed was the survey questionnaire, which has been developed based on the proposed conceptual framework. The instruments development process consisted of multiple steps that have then produced a reliable instrument for measuring dimensions. Therefore, this has improved the overall quality and validity of the instruments for the study. It involves several pre-testing sessions with several experts. The next phase involved pilot testing the instruments to determine the Cronbach's alpha value for each dimension. The findings indicated that the instrument has been adequately suited to accurately represent the nature of the study. Furthermore, numerous publications have been disseminated across various journals and conference proceedings to validate the instrument. For this reason, the questionnaire is significant to be used as an instrument to measure the electronic document management system functionalities and the information system effectiveness in a different research setting.

While the primary focus of this study is on government agencies' civil service utilizing the electronic document management system, it is important to note that the instrument is also applicable to users within non-government organizations, governmentlinked companies, and government-linked investment companies. Nevertheless, the instrument can also be proposed to be fit enough to be used by other categories of electronic documents management system users in the private sector or for educational purposes. Besides that, the instrument can also be used among other professions such as the information system analyst or the chief information officer for various organizations. In order to align with the working environment, enhancements can be made to the electronic document management system functionalities according to the study's requirements.

The items in the questionnaire can be adapted to a separate study to identify the specific factors that involved in the selected dimensions. This is because, the instrument developed may reduce the potential problems related to the electronic document management system functionalities. The instrument can also be embedded in all state's electronic document management system in order to enhance or to do the assessment of the system throughout the state. The information quality and the system quality system quality, in the EDMS contributed to higher user usage of the system and increase user satisfaction. This contributes to the effectiveness of performance among the government civil service in the agencies.

6.6 Limitation and Suggestion for Future Studies

The study has accomplished its research objectives, nevertheless, there is no denying the existence of a limitation. As mentioned in various chapters, the intention of the research is to examine the relationship between EDMS functionalities (Automated Information Capture, Federated Search and Retrieval, Collaborative Tools, Hierarchical File Indexing and Classification, Storage and Archival Method, Automated Workflow, Security and Audit Trail, and Support and Administer Compliance) and the dimensions of information systems success measured in terms of information quality, systems quality, perceived usefulness, and user satisfaction. Therefore, the coverage of the literature search is limited towards the EDMS functionalities. The measurements used in the study are based on self-evaluation using a questionnaire.

The main limitation and challenges in this study are to find suitable literature that relate to the study of the performance of electronic document management system functionalities in the government agencies; the effectiveness of the document management systems used in the government sector; and the influence of the functionalities' performance on the effectiveness of the electronic document management systems. The number of literatures in the above area fields are very limited. No established theories and model found proposed or developed both, neither in information system field nor in the government sector field. Furthermore, there is no empirical evidence related to the proposed dimension in this study has been found.

The foundation of the EDMS dimension in this study has been narrowed down to effectiveness of functionalities of the EDMS including Automated Information Capture, Federated Search and Retrieval, Collaborative Tools, Hierarchical File Indexing and Classification, Storage and Archival Method, Automated Workflow, Security and Audit Trail, and Support and Administer Compliance. However, the dimensions proposed in this framework are factors related to system effectiveness, in terms of information quality, system quality, satisfaction, and perceived usefulness, in determining the effectiveness of information system. The proposed dimension primarily emphasizes measuring information and system quality, as well as the general perceptual measurement of perceived usefulness and user satisfaction. The study neglected to measure the net benefit of information system use by individual, organization, and society specifically. Therefore, future study can consider the net benefit to these three dimensions. Minimal modification to the framework may be necessary to enhance the net benefit of information system use for individual, organization, and society.

Next limitation is the categories of respondents and the sample size. The users of electronic document management system were the main respondents for this study. This is because the number of users from various electronic documents management systems are greater than the number of users in the private sector. Moreover, the study deemed new because it has not been conducted previously with respondents from the government sector. Additionally, the anticipation of the government's preparedness to handle the electronic document management system in the administration and paperless is somewhat demanding and fascinating. The study focused on users of the electronic document management system from various levels of public service but did not have an equal distribution of job titles among the respondents answering the questionnaire.

Further study may include the comparison of study between categories of the government agencies or significant of the electronic documents management system in qualitative perspective. The sample size of respondents can be greater than this study. Therefore, the dimensions of electronic document management system functionalities are not sufficient enough to measure the behaviour of the electronic document management system's users in terms of expectation about the net benefit and information system use of electronic documents management systems. To address these issues, the researcher might broaden the framework and measure the individual, organizational, and social impacts of using an electronic document management system. Hence, incorporating all these dimensions in the next study undoubtedly enhances its interest and depth.

6.7 Future Direction Research

Further developing the findings of this study, several future research directions are suggested. First, future research could also build upon the current framework by considering the net benefits dimension or net benefits in DeLone and McLean's Information Systems Success Model that can be updated. Although this research posited the information quality, system quality, user satisfaction, and perceived usefulness, the addition of net benefits would account for a more comprehensive assessment in the evaluation of the effectiveness of the EDMS.

Second, future research could also employ a mixed-method research design that would combine the quantitative results from this research with qualitative results from interviews or focus groups. This would help to gain a more complete understanding of the reasons automated information capture, collaborative features, secure, and audit trail functions of an EDMS, even with solid theoretical justification, had no positive effect. Such qualitative research may focus on the underlying issues of system usage involving organizational, cultural, or behavioural issues.

Thirdly, to achieve a more comprehensive understanding of the findings, it is suggested that the value of the findings could be significantly enhanced by conducting the study in different states, and in different government agencies, or in different sectors such as government linked companies/private organizations. In cross sector comparison, it would be possible to identify the contextual differences within EDMS adoption.

The fourth possible research stream focuses on the potential benefits of automation through the application of emerging technologies on EDMS, particularly in the context of integration with digital governance and Sarawak's digital and AI initiatives. Technologies such as AI, machine learning, and blockchain may increase efficiency in automated EDMS.

The fifth emerging area of research suggested by the current study is the application of EDMS and its impact on organizational productivity, improvement of decision making, and responsiveness of service delivery outcomes. These potential studies would focus on when system optimization would occur, beyond peripheral productivity. These studies would hold great benefits in understanding how system effectiveness changes with users and system maturity over time.

6.8 Mapping of the Research Objectives and Research Findings

This chapter synthesized and interpreted the empirical findings of the study in relation to the research objectives and theoretical framework. Drawing on the DeLone and McLean Information Systems Success Model and Seddon's framework, the discussion demonstrated how specific EDMS functionalities influence information system effectiveness through information quality, system quality, user satisfaction, and perceived usefulness. The results revealed that not all EDMS functionalities contribute equally to system effectiveness, emphasizing the importance of workflow automation, federated search and retrieval, storage and archival methods, and compliance support as key drivers of effectiveness in the Sarawak government context. Table 6.5 shows the mapping research objectives and research findings for this study.

Table 6.6
Mapping of Research Objectives and Research Findings

Research Objective	Research Finding		
	Hypothesis	Results	Contribution
To examine the effectiveness of the document management systems used in Sarawak State Government	H1: Information quality has a significant positive relationship with satisfaction	Supported (t - 0.000, $p < 0.05$)	Empirical Theoretical Practical
	H2: Information quality has a significant positive relationship with perceived usefulness	Supported (t - 0.000, $p < 0.05$)	Empirical Theoretical Practical
	H3: Systems quality has a significant positive relationship with satisfaction	Supported (t - 0.047, $p < 0.05$)	Empirical Theoretical Practical
	H4: Systems quality has a significant positive relationship	Supported (t - 0.000,	Empirical Theoretical

Research Objective	Research Finding		
	Hypothesis	Results	Contribution
	with perceived usefulness	$p < 0.05$)	Practical
To assess the performance of the services provided by the document management systems	H5: Automated information capture has a significant positive relationship with information systems effectiveness	Rejected ($t - 1.413$, $p < 0.05$)	Empirical Theoretical Practical
	H6: Federated search and retrieval has a significant positive relationship with information systems effectiveness	Supported ($t - 5.309$, $p < 0.05$)	Empirical Theoretical Practical
	H7: Collaboration Tools has a significant positive relationship with information systems effectiveness	Rejected ($t - 0.854$, $p < 0.05$)	Empirical Theoretical Practical
	H8: Hierarchical file indexing and classification has a significant positive relationship with information systems effectiveness	Rejected ($t - 0.376$, $p < 0.05$)	Empirical Theoretical Practical
	H9: Storage & archival method has a significant positive relationship with information systems effectiveness	Supported ($t - 0.002$, $p < 0.05$)	Empirical Theoretical Practical
	H10: Automated Workflow has a significant positive relationship with information systems effectiveness	Supported ($t - 8.132$, $p < 0.05$)	Empirical Theoretical Practical
	H11: Security & Audit Trail has a significant positive relationship with information	Rejected ($t - 0.940$, $p < 0.05$)	Empirical Theoretical Practical

Research Objective	Research Finding		
	Hypothesis	Results	Contribution
	systems effectiveness		
	H12: Support & Administer Compliance has a significant positive relationship with information systems effectiveness	Supported (t - 0.026, $p < 0.05$)	Empirical Theoretical Practical
To assess the influence of the functionalities' performance on the effectiveness of the electronic document management systems	NA	NA	Empirical Theoretical Practical

6.9 Chapter Summary

The main objective of this study is to examine the relationship between EDMS functionalities (Automated Information Capture, Federated Search & Retrieval, Collaborative Tools, Hierarchical File Indexing & Classification, Storage & Archival Method, Automated Workflow, Security & Audit Trail, and Support & Administer Compliance) and the dimensions of information systems success measured in terms of information quality, systems quality, perceived usefulness, and user satisfaction. In responding to this, the researcher had referred to Delone and McLean (1992) and Seddon (1997). Further details, the foundation of the research model is adapted from various previous studies that were referred for connecting EDMS functionalities and information system effectiveness are Updated DeLone and McLean Information System Success Model by Delone and McLean (2003), DeLone and McLean (2016) Gable et al., (2008) (ISImpact) Model as well as the Integrated Success Model (ISM). To facilitate a clearer understanding of the topic, the researcher conducted a preliminary study to define the research problem for this study. Various sources including online databases, journals, unpublished thesis and dissertation, conferences and proceedings, electronic articles, as well as both printed and online research materials, have informed and guided the researcher to structure the Chapter Two (the literature review) and Chapter Three (the theoretical framework). Three specific research objectives were developed to guide the research process. As a result, 12 hypotheses were formulated based on the previous study, literature reviews and several empirical studies.

Questionnaires were distributed to a group of selected experts for pre-testing the instrument. Subsequently, the feedback received from the experts was considered, leading to necessary modifications to align the instrument with the nature of the study. Following that, the subsequent step involved pilot-testing the instrument. A set of questionnaires was distributed among staff who utilized the electronic document management system from selected government agencies in Sarawak. The finding from the pilot-testing facilitated the subsequent actual data collection. Considering the larger population of civil service within the Sarawak government, specific agencies and departments utilizing the electronic document management system were chosen as participants in this study. A total of 500 questionnaires were distributed to State Ministries, Chief Minister's Department, State Departments, Resident Offices, District Offices, State Statutory Bodies in the state government of Sarawak. A total of 293 survey was returned. All responses were coded into Statistical Package for Social Science (SPSS) version 22 for descriptive statistics of research variables. For the assessment of the structural model analysis, the researcher employed Partial Least Square Structural Equation Modelling (Smart PLS-SEM) version 3.

The data analysis results have illustrated the effectiveness of the electronic document management system in terms of its functionalities performance. The first objective of the study has been successfully achieved. The functionalities of electronic documents management systems used by the staff at the government agencies in Sarawak play a significant role to the effectiveness of the information system. Secondly, the study has also successfully assessed the performance of the service provided by the document management system. This objective was successfully fulfilled, demonstrating the effectiveness of the service provided by the electronic document management system. The last objective for this study was to assess the influence of the functionalities' performance on the effectiveness of the electronic document management systems. This objective indicates the performance of these electronic document management system functionalities, contributing to the effectiveness of the documentation management system. These results have introduced a new perspective on functionalities in electronic document management system, suggesting that the functionalities of electronic document management in this study should be regarded as essential components in any state developed electronic document management system.

Multiple publications were released to validate the empirical data of the research findings. The empirical, theoretical, practical, and methodological contributions of this study have been identified and are presented in Chapter Six. The primary contribution of this study lies in the development of an instrument comprising various dimensions. Besides that, the proposed conceptual framework was the first study that involved the functionalities of electronic document management system in measuring the effectiveness of information system.

The study acknowledged various limitations, and recommendations for future research on the topic, being proposed to guide subsequent researchers. Consideration should be given to a larger sample size and the inclusion of personnel from various categories in government or non-government agencies utilizing the electronic document management system. The researcher anticipated that this study has inspired numerous additional investigations into electronic document management systems in Malaysia. In conclusion, this study has reiterated that the functionalities of the electronic document management system (EDMS) have been enhanced, as evidenced by the determination of their effectiveness. The study has also confirmed that user perceptions of EDMS effectiveness are influenced both by visible, value-adding functionalities and by the context of technology maturity, providing actionable insights for policymakers, system designers, and records management professionals in Sarawak.

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