



Evaluating the Impact of Strategic Document Management on Project Success in the Construction Industry in Saudi Arabia

A Dissertation Submitted to EXCEED and PMU- Plymouth Marjon University in Partial Fulfilment of the Requirements for the Degree of Master of Business Administration

March 2025

Student ID: -

Date: - 18-01-2025

Table of Contents

CHAPTER 1: INTRODUCTION	8
1.1 Background of the Study	8
1.2 Problem Statement	9
1.3 Rationale for the Study	9
1.4 Research Aim	9
1.5 Research Question	9
1.6 Research Objectives.....	10
1.7 Scope of the Study	10
1.8 Personal Motivation	10
1.9 Structure of the Dissertation	11
CHAPTER 2: LITERATURE REVIEW	13
2.1 Introduction.....	13
2.2 Theoretical and Conceptual Foundations.....	13
2.2.1 Theories Related to Document Management.....	13
2.2.2 Theories Related to Project Success	14
2.3 Strategic Document Management in Construction.....	15
2.3.1 Definition and Components of Strategic Document Management (SDM).....	15

2.3.2 Importance of SDM in Construction Projects.....	16
2.3.3 Technologies Used in SDM	16
2.4 Project Success in the Construction Industry.....	16
2.4.1 Defining Project Success in Construction.....	16
2.4.2 Challenges to Project Success in Saudi Arabia.....	17
2.5 Relationship Between SDM and Project Success.....	17
2.5.1 Empirical Studies Linking SDM and Project Outcomes	17
2.5.2 Benefits of SDM to Project Efficiency	18
2.5.3 Barriers to Effective Implementation.....	18
2.6 Review of Existing Literature: Methodological and Systematic Perspectives	19
2.6.1 Methodological Approaches in Past Studies.....	19
2.6.2 Systematic Literature Review Process.....	19
2.7 Summary of Knowledge Gaps and Research Opportunities.....	20
2.7.1 Lack of Region-Specific Empirical Research in Saudi Arabia.....	20
2.7.2 Insufficient Focus on the Long-Term Strategic Value of SDM	20
2.7.3 Limited Integration of Digital Tools in Traditional Workflows.....	21
2.7.4 Inadequate Measurement of SDM Impact on Success Criteria	21
2.8 Chapter Summary	21
2.9 Literature Gap Table	22

CHAPTER 3: RESEARCH METHODOLOGY AND PHILOSOPHY	29
3.1 Research Philosophy	29
3.2 Approach to Theory Development	30
3.3 Methodological Choice	31
3.4 Research Design Purpose	31
3.5 Research Strategy	32
3.6 Time Horizon	32
3.7 Ethical Considerations	33
3.8 Summary of Methodological Framework	33
3.9 Research Instrument	33
CHAPTER 4: DATA COLLECTION AND ANALYSIS	35
4.1 Introduction	35
4.2 Data Collection Process and Data Design	35
4.3 Results Analysis	36
4.3.1 Data Preparation and Processing	36
4.3.2 Demographic Overview of Respondents	37
4.3.3 SDM Engagement and Initial Data Trends	39
4.3.4 Basic Frequency Distributions and Observed Patterns	40
4.3.5 Link to Research Objectives and Transition	40

4.4 Descriptive Analysis	40
4.5 Inferential Analysis	44
4.5.1 Hypothesis Testing and Overview	44
4.5.2 Correlation Analysis.....	44
4.5.3 Regression Analysis	45
4.5.4 Group Comparisons	46
4.5.5 Summary of Inferential Results	47
4.6 Overview of the Tests Conducted	48
4.7 Chapter Summary	49
CHAPTER 5: CONCLUSION	50
5.1 Conclusion	50
5.2 Key Findings.....	50
5.3 Recommendations.....	51
5.4 Contribution to Existing Knowledge	52
5.5 Limitations of the Research	53
5.6 Chapter Summary	54
Reference list	55

List of Figures

Figure 1: Structure of dissertation.....	12
Figure 2: Positivist Research Philosophy	30
Figure 3: four thematic groups of Survey	37
Figure 4: Age distribution	38
Figure 5: Gender Distribution.....	38
Figure 8: Experience	41
Figure 9: Type of organization.....	42
Figure 10: Benefits of SDM.....	43

List of Tables

Table 1: Theories Related to Document Management.....	13
Table 2: Theories Related to Project Success	14
Table 3: Literature gap table	22
Table 4: Research Instrument.....	33
Table 5: Correlation Matrix	44
Table 6: Regression Predicting Delivery Time	45
Table 7: Regression Predicting Budget Variance	45
Table 8: Regression Predicting Quality Score	46
Table 9: t-Test for SDM Index by Sector.....	46
Table 10: ANOVA for SDM Index by Experience.....	47
Table 11: Major Inferential Findings	47

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The construction industry is critical to the economic growth of any country, especially in fast-developing countries such as Saudi Arabia, where major infrastructure projects have increased immensely in the Saudi Vision 2030 project. Along with such growth, there is a corresponding increase in the level of complexity in carrying out work and its coordination, as well as documentation (Mosly, 2020). In construction works, there exist massive numbers of documents, which are composed as design blueprints, contracts, order of change, permits, technical specifications and records of communications. Effective management of these documents is important in the delivery of these documents on time, control of budget, compliance with regulations and the success of the project at large.

Document management in the construction industry is simply a method of controlled handling of documents relevant to the project so that information is generated, shared and stored effectively and securely. Strategic Document Management (SDM) provides more than simple storage and retrieval; it includes planning, software and workflow automation, access control and quality control features (Poriya, Shah and Pitroda, 2020). Although the significance of SDM has been recognised, there is still the use of outdated practices or a make-shift system in many construction companies in Saudi Arabia, where the projects suffer delays, communication breakdown, and conflicts.

Volume and difficulty of in-progress building works especially in big urban centers such as Riyadh, Jeddah and the new city of NEOM underscores the high priority nature of adopting strategic document management processes. Poor management of project records may cause an inefficient performance of operations putting a firm at risk of losing clients and being subject to litigation and even a loss of life (Yap et al., 2021). The proposed study will seek to determine how SDM helps in promoting the success of the construction project in Saudi Arabia, an area which was not satisfactorily addressed in the available literature, which tends to ignore the regional specificities.

1.2 Problem Statement

One of the problems in the construction industry in Saudi Arabia is related to the completion of the accomplished projects in terms of cost exceeding and extension of schedule, and quality issues. Although they can be caused by many reasons, the contribution of document management is a somewhat neglected topic. The construction industry deals with huge volumes of information, which is shared, and the inability to manage documentation can affect the entire process, trigger delays, and trigger expensive lawsuits

1.3 Rationale for the Study

The brainchild of such an investigation is based on the necessity to enhance the standards of project delivery in Saudi Arabia. Due to Vision 2030, the government of Saudi Arabia started a process of mass investment in urban and infrastructural projects, and effective project execution as the concept is now one of national priorities (Saudi Vision 2030, 2024). Some guidelines can result in an increased efficiency in projects, teamwork, compliance and client satisfaction by using strategic document management.

Besides, despite global research proposing the positive relationship between document management structure and project outcomes (Tuhacek and Svoboda, 2019), no regional data was found containing cultural, organisational and technological peculiarities of Saudi Arabia.

1.4 Research Aim

This study will determine how strategic document management contributes to project success in the Saudi Arabian construction industry.

1.5 Research Question

- How is strategic document management currently implemented in construction projects in Saudi Arabia?
- What is the impact of strategic document management on the success of construction projects in Saudi Arabia?
- What recommendations can be made to improve strategic document management for

enhancing project success in the Saudi Arabian construction industry?

1.6 Research Objectives

- To explore the Strategic Document Management on Project Success in the Construction Industry in Saudi Arabia.
- To Evaluating the Impact of Strategic Document Management on Project Success in the Construction Industry in Saudi Arabia.
- To provide the recommendations for Strategic Document Management on Project Success in the Construction Industry in Saudi Arabia.

1.7 Scope of the Study

The research will target medium- and large-sized construction companies that are present in Saudi Arabia, particularly those dealing with commercial, residential and government-initiated infrastructure work. It studies the document management in different stages of the construction lifecycle, during pre-construction planning, execution and project close-down.

The study is narrowed to the strategy of document management rather than casual storage of files or the use in combination with non-digital methods. It will explore the application of SDM tools, e.g. Aconex, Procore, and Primavera, in the real world and how their usage is associated with the outcomes, such as aptitude in meeting the schedule, cost, and satisfaction of the stakeholders.

1.8 Personal Motivation

The fact that I have a professional interest in construction project management, and that I have first-hand experience of the problems caused by inefficient document practices, motivated my motivation to carry out this research. Having practised in settings where information of critical importance was lost, delayed, or misunderstood because of the lack of appropriate document control, the researcher understands the physical impact of the lack of proper document control. As Saudi Arabia plans to transform into a regional centre that attracts mega projects, issues related to do with the role of SDM in the success of such projects would be equally timely and relevant.

Additionally, the fact that there is an enhanced embrace of digital transformation in the construction industry opens a chance to investigate how technology, when integrated with strategic intents, can be positioned to address the seemingly eternal industry challenges.

1.9 Structure of the Dissertation

Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Methodology

Chapter 4: Data Analysis and Findings

Chapter 5: Discussion

Chapter 6: Conclusion and Recommendations

Structure of the Dissertation

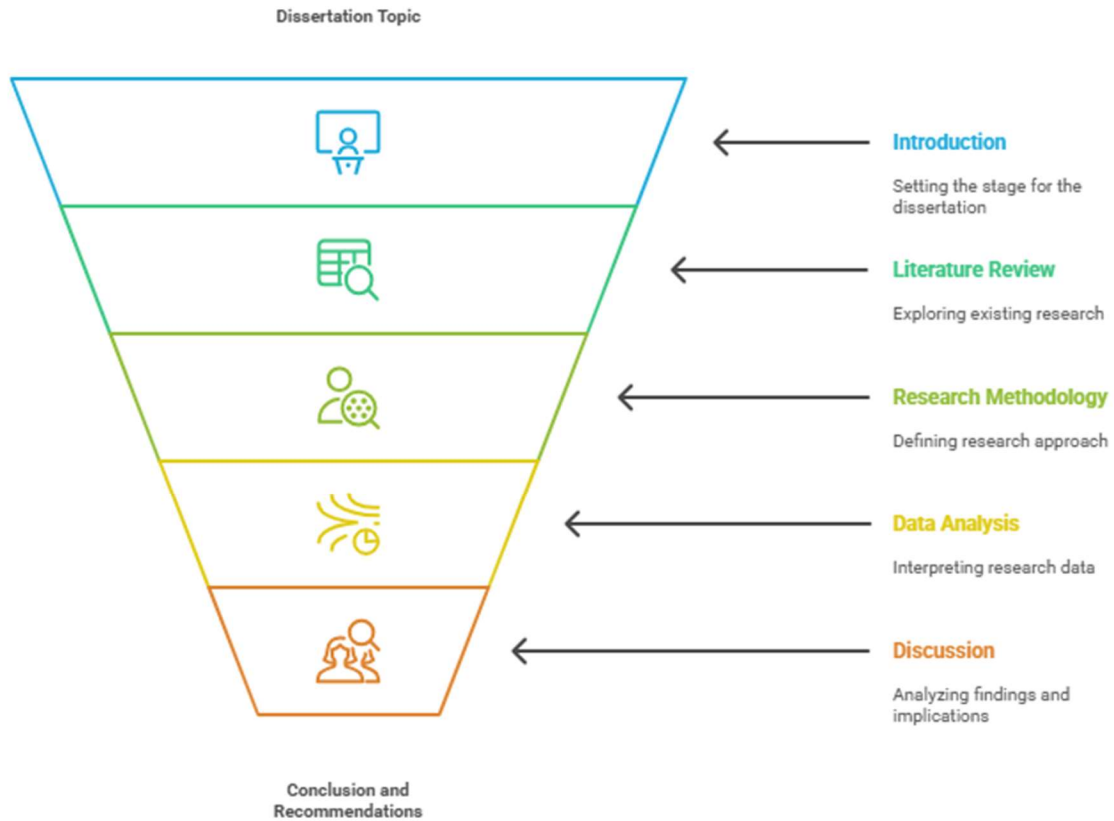


Figure 1: Structure of dissertation

Self created

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This literature review is aimed at critically reviewing the research done on strategic document management (SDM) and its role in enhancing project success in the construction industry, particularly in Saudi Arabia. The aim of the research is justified in this chapter: to analyse the effect of SDM on the result of the construction projects. The main research question is how much SDM influences the success of the project, and the objectives are to determine current practices, evaluate their usefulness and point out challenges of implementing such practices.

The review takes a funnel approach whereby it starts with theoretical frameworks on different parts of the world and then progressively reduces the empirical studies to regional issues. It combines theoretical and methodological approaches in a deductive framework. Saudi Arabia and particularly the construction sector, is an opportune situation to look at the relevance and importance of the document management process in the context, as the industry is experiencing one of the fastest growth of the construction segment under the Vision 2030 plan (Al-Yami and Sanni-Anibire, 2019).

2.2 Theoretical and Conceptual Foundations

The body of theory related to document management and project success is a solid foundation to comprehend the way document management integration on a strategic level can be used to impact the construction results.

2.2.1 Theories Related to Document Management

Table 1: Theories Related to Document Management

Theory	Description	Relevance to Study	Key Reference
Information Management Theory	Focuses on the acquisition, organisation, storage, and dissemination of	Highlights how proper handling of information can	(Noor et al., 2023)

Theory	Description	Relevance to Study	Key Reference
	information to support decision-making.	reduce project errors and miscommunication.	
Knowledge Management Theory	Emphasises the creation, sharing, and application of knowledge within organisations for performance improvement.	Supports the use of SDM as a tool for capturing and reusing project knowledge.	(Vuong et al., 2022)
Project Lifecycle Theory	Defines distinct project stages (initiation, planning, execution, closure) and emphasises the role of documentation in each phase.	Explains the continuous role of documentation throughout project phases.	(Fakhravar and Ouabira, 2021)
Systems Theory in Construction	Views a project as an interconnected system of processes, people, and tools, where information flow is critical.	Justifies integrating SDM to optimise system-wide communication and control.	(Voulvoulis et al., 2022)

2.2.2 Theories Related to Project Success

Table 2: Theories Related to Project Success

Framework/Theory	Description	Relevance to Study	Key Reference
PM Success Frameworks (e.g., PMBOK, PRINCE2)	Offer structured approaches for project management success, including planning, documentation, and control mechanisms.	Emphasise documentation as a core element in controlling scope, time, and risk.	(Fakhravar and Ouabira, 2021)

Framework/Theory	Description	Relevance to Study	Key Reference
Triple Constraint Theory	Defines project success as the ability to meet time, cost, and quality targets simultaneously.	Highlights how SDM can reduce delays, control costs, and improve quality through accessible documentation.	(Levine et al., 2024)
Stakeholder Satisfaction Models	Measure success through the perceptions of various stakeholders regarding outcomes and communication.	Demonstrates that well-managed documents improve transparency and trust among stakeholders.	Freeman (1984); Bourne (2015)

2.3 Strategic Document Management in Construction

2.3.1 Definition and Components of Strategic Document Management (SDM)

The term Strategic Document Management (SDM) in construction describes a strategic, long-term way of management and control of construction project documents in the whole project lifecycle. It is not solely the storage and retrieval but focuses on aligning it with organisational goals to make sure that documentation enables strategic decision-making (Al-Azawi and Nahayo, 2023). Among the main elements of SDM, centralised document systems must be enumerated as the systems that give all stakeholders access to updated information located at one centre and that decrease miscommunication possibilities (Elhusseiny, Nosair and Ezeldin, 2021).

Version control gives us the most up-to-date and correct files to work on, whilst workflows and metadata tagging help us to keep these files efficiently categorised and retrieved. Another cause that is increasing accountability is audit trails, where the activity of a user is recorded (Ruperto and Strappini, 2021). The difference between operative and strategic document management lies in the long-term planning and connection of systems with the goals of the whole project and organisation.

2.3.2 Importance of SDM in Construction Projects

SDM is crucial in ensuring that there is a record of approvals, changes and legal obligations that are observed as per the contract. Lack of documentation in construction projects has ended up in costly litigations and court battles all over the world. Another advantage is risk mitigation, in which SDM enables the easy identification of possible mistakes or omissions before they occur.

Along with that, SDM enables the improvement of quality assurance and standardisation. Less discrepancy is created via consistent document formats and regulated labour processes. SDM serves to enhance communication, too, through open, accountable sharing of information that is critical, especially when handling complicated and/or multi-contractor projects (Nordin et al., 2021).

2.3.3 Technologies Used in SDM

Some platforms embrace SDM within the construction sector. Such collaborative tools as Aconex, Procore, Primavera, and Autodesk Construction Cloud allow teams to work in a centralised real-time mode. The benefits of remote access include the use of cloud-based systems and mobile integration, which is error-free and enhances responsiveness and site-to-office communication. The recent advancements that are seen in document control in construction involve the use of AI-powered automation to simplify auto-tagging, compliance monitoring, and intelligent document retrieval, which is the future of document control in construction (Nordin et al., 2021).

2.4 Project Success in the Construction Industry

2.4.1 Defining Project Success in Construction

The traditional definition of success of a project in the construction industry has been based upon the so-called iron triangle of time, cost and scope (that is, the project being completed within the allocated budget, within the allotted time, within the stipulated requirements). Nevertheless, new modern definitions have added additional areas to the definition, like health and safety performance, environmental sustainability, and client satisfaction. There also has to be

consideration of expectations of various stakeholders such as investors, regulatory agencies, end-users and contractors in a successful construction project. In this multidimensional view, the project's success can no longer be measured by the deliverables but by the long-term value the project brings. To take an example, safety standards have an impact on worker morale and regulatory compliance and sustainable practices to both national goals and international environmental benchmarks. In the same manner, document management strategies are important in establishing client satisfaction as it usually involves productive communication, dynamic planning, and quick information, which tools and techniques of document management greatly determine (Montenegro et al., 2021).

2.4.2 Challenges to Project Success in Saudi Arabia

Various factors are not conducive to a project's success in Saudi Arabia. The first obstacle is the complexity of regulations, especially with new demands arising because of Vision 2030. Obtaining legal approvals and paperwork may halt projects in case of mismanagement. Moreover, the nation experiences a shortage of skills, and it takes a significantly longer time to implement projects, and as the nation is dependent on an international labour force, there are chances of developing communication gaps and cultural misunderstandings. Project schedules are also affected by material delays that are usually caused by global supply chain failures. Additionally, although e-tools and systems are implemented in most companies, the pace of technology adoption is not uniform, particularly in small to medium-sized established firms. This gap is created by resistance to change, training gap, and cost issues, which make it even more difficult to introduce best practices to document management and project delivery as a whole (Montenegro et al., 2021).

2.5 Relationship Between SDM and Project Success

2.5.1 Empirical Studies Linking SDM and Project Outcomes

The experience in several different countries has shown that there is a positive relationship between Strategic Document Management (SDM) and the success of the project. UK and US research shows how well-structured document systems minimise rework, maximise traceability and help to enforce contracts. In the UAE, where mega-projects taken with infrastructure activities

prevail, it has been shown that SDM enhances the coordination of the team, allows managing the project schedule and avoiding delays by providing clear information (Yu, Shang and Wang, 2024).

In Saudi Arabia, research is not as developed as it is in other countries, but it is developing. According to research conducted by Yu, Shang and Wang (2024), inefficient document handling is one of the key factors, that can lead to project delays and controversies, particularly in the projects, which are funded by the government. Inability to access updated documents on a real-time basis may lead to poor communication, scope creep and uneven quality control. Proper application of SDM tools minimises these risks by ensuring that a central location containing current information on all the documentation associated with the project is available to all the stakeholders.

2.5.2 Benefits of SDM to Project Efficiency

SDM contributes to project efficiency by creating better information flow, something that allows rapid location, sharing and verification of critical documents by teams. This entails less time in the decision-making process and avoidance of delays that are a result of miscommunication or being out of date. SDM also provides accountability as intrigue on who did what or read which documents is easily followed, thus providing transparency and some form of certainty in the division of project responsibilities.

2.5.3 Barriers to Effective Implementation

Despite the advantages, there are some challenges to implementing SDM. The culture of older construction companies in Saudi Arabia tends to shift towards digital transformation, as they are tired of being afraid of the change which they have never known before. It is also too expensive to implement such systems on an enterprise scale and train staff members, hence contributing to the limitation of adoption. Additionally, the absence of national patterns that dictate the SDM practices creates a situation wherein it is not consistent in the industry (Yu, Shang and Wang, 2024).

2.6 Review of Existing Literature: Methodological and Systematic Perspectives

To give a proper framework to this study, a thorough evaluation of the past literature has been made on the grounds of the methodological quality and the systematic applicability to the objectives of the present work. The review of this study aims at establishing gaps that currently exist as well as putting the findings of the study into perspective of the study, which is a quantitative survey consisting of 30 questions, participated in by 100 respondents in the Saudi Arabian construction industry.

2.6.1 Methodological Approaches in Past Studies

In the literature, one can find a mixture of qualitative and quantitative approaches to the analysis of Strategic Document Management (SDM) and the interaction of the process with the project success. Programmatic. In really complex projects or when the document practice is at the heart of the project and is being organised by the government, a qualitative study sometimes relies on interviews and case studies. Nevertheless, the tendency toward quantitative research to determine correlations between SDM and performance markers of time, cost, and quality of projects is on the rise (Montenegro et al., 2021). In these research studies, sample sizes are very diverse, where most studies in the Middle East based on a small sample size (<50). In addition, the global research has as its centre the UK, the US or the UAE, and this leaves a vacuum in literature focusing on the Saudi setting.

2.6.2 Systematic Literature Review Process

The databases that were used during the systematic review include Scopus, ScienceDirect, Google Scholar, and SpringerLink. Such keywords were as follows: strategic document management, success of the project, construction industry and Saudi Arabia. The studies that have been included in the research had one or more works and were published between 2010 and 2024, dealt with construction or infrastructure projects, and had empirical data. Articles written in non-English and studies that were not verified by a reviewer, along with studies out of the construction field, were eliminated. The last piece of literature was separated by country, the method of study (quantitative or qualitative), and the focus of the research (e.g., document control systems,

stakeholder communication, risk mitigation). This procedure guaranteed the sustainable outcome of a balanced and situational relevant study that could support the ongoing survey-based research.

2.7 Summary of Knowledge Gaps and Research Opportunities

High ranking of concerning the existing bodies of knowledge on Strategic Document Management (SDM) to the construction industry using literature review discloses many Gaps that necessitate a need for further research, especially in the case of Saudi Arabia. The areas where the research and the industry are not at par are pointed out by these gaps, and therefore, new empirical evidence can be discovered to bring lots of discoveries.

2.7.1 Lack of Region-Specific Empirical Research in Saudi Arabia

Although global research issued by other countries like the UK, the US, or the UAE is very useful in terms of SDM practices, there is a gap in the empirical research of these case studies in the Saudi Arabian construction industry. Considering the specifics of regulations, cultural peculiarities, and the direction of the country under Vision 2030, the results of the studies conducted in other regions can become unreliable or cause poor recommendations. This forms a platform through which the role of SDM in Saudi Arabia, as it is practiced in the country today, and contextual factors which influence the success of SDM can be investigated (Yu, Shang and Wang, 2024).

2.7.2 Insufficient Focus on the Long-Term Strategic Value of SDM

The majority of the literature available takes document management as a technical problem or rather an operational problem as opposed to a strategic asset. Nevertheless, when aligned with the organisational goals, SDM can be used to create long-term value in terms of enhancing institutional knowledge, increased compliance and continuous improvement. The research is needed to assess the SDM not only based on the outcomes of the real-time projects' pupils but also to evaluate its implications on the organisational learning and readiness in the further projects of the organisation (Montenegro et al., 2021).

2.7.3 Limited Integration of Digital Tools in Traditional Workflows

Despite the high availability of the most sophisticated document management tools that include such platforms as Aconex or Procore, the provision and introduction of these platforms into the standard construction-related processes is low. In many cases, it is explained by the resistance to change, poor training opportunities, and the inability to comprehend the possible benefits of digitalization. Studies should be conducted to examine the obstacles to adoption of technology on the one hand and identify strategies that promote adoption of digital integration across the construction lifecycle on the other hand (Montenegro et al., 2021).

2.7.4 Inadequate Measurement of SDM Impact on Success Criteria

The available literature depicts an inability to numerically evaluate the effect of SDM on particular project success imperatives, which include time effectiveness, budgeting obedience, and stakeholder happiness. An evident gap presents itself in efforts to empirically study the SDM practices in conjunction with quantifiable measures of performance using statistical analysis. This would facilitate the determination of stronger frameworks for analysing the role of document management in the success of projects.

2.8 Chapter Summary

In this chapter, the key theoretical and empirical literature on Strategic Document Management (SDM) and its influence on the success of projects in the construction industry is discussed with a specific focus on the Saudi Arabian market. The conceptual framework was in terms of enabling theories like Information Management, Project Lifecycle Theory and stakeholder-based success models, whereas the studies of global and regional perspectives indicated how SDM was fruitfully implemented and its practical consequences.

It was found that, with a great international awareness about the worthiness of SDM, there is still an insufficiency of region-specific empirical studies in Saudi Arabia. Moreover, it has the missing strategic advantages of SDM, including long-term knowledge retention, enhanced cooperation. Inconvenient incorporation of digital instruments and inefficient evaluation of SDM results were also important gaps.

This paper intends to find solutions to these gaps by undertaking a well-organised quantitative research via a 30 survey 30-question survey of 100 construction professionals in Saudi Arabia. The results will give a good understanding of the laid-down practices, challenges and the quantifiable effect of SDM on the performance of projects. The methodology of the research is described in the following chapter, namely the design, the sampling method, and the method of collecting data helps this study more thoroughly into these found issues.

2.9 Literature Gap Table

Table 3: Literature gap table

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
IJBPA	Al-Yami & Sanni-Anibire (2019)	BIM in Saudi Arabia	To investigate BIM implementation, benefits, and barriers in the KSA construction sector	Case Study + Survey	BIM improves coordination and quality but lacks policy support in KSA	Does not assess document management's strategic value or link to project success
Journal of Public Administration and Government	(Noor et al., 2023)	Uncertainty and Information Management	To explore the relationship between uncertainty, disclosure,	Theoretical	Information regulation helps manage uncertainty	Broad theory; not applied to SDM in construction context

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
			and information management			
Humanities and Social Sciences Comm.	Vuong et al. (2022)	Covid-19 and Knowledge Management	To examine how information filtering and knowledge flow impacted vaccine development	Conceptual Framework	Information filtering improves strategic response	Focused on healthcare, not construction or SDM
EJETR	Fakhravar & Ouabira (2021)	Project Management & QA	To highlight the role of QA across project lifecycles	Review	QA improves performance but needs solid research design	No mention of document management tools or systems
Global Environme	Voulvoulis et al. (2022)	Systems Thinking &	To promote systems	Theoretical	Systems thinking supports	Broad view of systems; does not address

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
ntal Change		Sustainability	thinking for sustainability transitions		interlinked solutions	construction-specific SDM issues
BBS	Levine et al. (2024)	Moral Cognition & Contractualism	To propose a triple-theory of moral reasoning	Theoretical	Flexibility in human moral cognition explained via contracts	Not relevant to construction or document systems
Thesis	Al-Azawi & Nahayo (2023)	Digitizing Document Management	To evaluate the benefits and challenges of digital DMS	Case Study	Digital DMS reduces emissions, saves time, and paper	Strong SDM focus, but lacks empirical impact analysis in KSA construction industry
ASEJ	Elhusseiny et al. (2021)	Delay Factors in Egyptian Construction	To analyze delay causes using systematic framework	Survey	BIM can reduce delays; identifies 20+ delay causes	Region-specific; needs replication in Saudi construction context

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
WIT Transactions	Ruperto & Strappini (2021)	Digital Twin in Complex Construction	To explore ICT & Digital Twin in project management	Case Study	CDE & AI improve efficiency in large-scale projects	Lacks generalizability to smaller projects in KSA
Engineering Journal	Nordin et al. (2021)	Safety Management via SDM	To identify accident factors & develop SDM-based model	Survey & Interviews	SDM helps identify accident patterns and improve safety	Focuses on safety not document lifecycle or strategic goals
Sustainability	Montenegro et al. (2021)	Emotional Intelligence in PM	To evaluate the impact of EI on project success	Survey (110 PMs)	EI improves stakeholder relationships and success	Human factors focus; limited connection to SDM practices
Sustainability	Yu et al. (2024)	Construction Industry in Saudi Arabia	To analyze construction efficiency using	Empirical Study	Low industrial efficiency ; key role of population	Strong KSA focus but lacks mention of digital or document processes

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
			EBM-Tobit		n and GDP	
ScienceDirect	(Yap et al., 2021)	Risk Factors in Construction Projects	To identify and assess the effects of factors affecting cost and time contingency in construction projects	Survey across 16 companies	Cost and time overruns are due to complex risks across owners, contractors, and the environment	Focused on risk analysis, not SDM or documentation impact
Int. J. of Occupational Safety & Ergonomics	Mosly (2020)	Safety in Saudi Construction	To assess safety performance in small- to medium-sized construction sites in Saudi Arabia	Exploratory Factor Analysis	Poor safety performance due to weak enforcement and lack of PPE use	Valuable Saudi data, but not linked to document handling

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
ResearchGate	Poriya et al., (2020)	IT for Documentation in Project Management	To evaluate how IT tools enhance documentation and project success	Literature Review	IT and EDM systems reduce manpower, improve efficiency, and automate classification	Highlights IT value, but not specific to Saudi Arabia or SDM impact
Vision2030.gov.sa	Vision 2030 (2024)	National Development Plan	To outline Saudi Arabia's vision for economic and societal transformation	Policy Document	Promotes digitization, sustainability, and infrastructure investment	Does not provide academic data; useful as policy context
IOP Conf. Series	Tuhacek & Svoboda (2019)	Quality of Project Documentation	To propose methods for evaluating and improving project	Data analysis + FMEA	Claimed defects often stem from poor documentation; proposes	Practical insights on documentation, but lacks Saudi application or SDM tools

Journal Name	Authors/Researchers	Title/Focus of Research	Research Aim (in 50 words)	Study Method	Findings (in 50 words)	Comments/Knowledge Gap
			documentation quality		FMEA-based checks	

CHAPTER 3: RESEARCH METHODOLOGY AND PHILOSOPHY

3.1 Research Philosophy

The research will be based on a positivist orientation commonly used in research that tries to measure observable social or organisational phenomena in a biased and organised manner. Positivism presupposes that reality exists elsewhere, it is alien and unrelated to the researcher, and it can be investigated by the standards of science. A positivist framework can be employed in the framework of this research because it investigates how the Strategic Document Management (SDM) systems affect the outcomes of construction projects in Saudi Arabia, since it is possible to identify it based on the empirical evidence gathered in a survey (Saunders and Darabi, 2024).

This philosophy has its foundations in the ontological position of realism, which states that there exists only one objective reality and it does not depend on how an individual perceives it. The assumption in this case is the idea that the advantages or shortcomings of the SDM may be objectively estimated with the help of its visible impact on cost, time and quality performance indicators of construction projects. Epistemologically, the study takes the objectivist line of approach, which promotes the utilisation of systematic data collection instruments to gain valid and reliable information without any bias as influenced by the researcher. Axiologically, the study is neutral, meaning that no value-charged interpretation was promoted by the study; the researcher never influenced the way the research was conducted through his considerations.

Positivism, hence, vindicates the utilisation of quantitative measures where findings can be standardised, replicated as well and generalised. This method has been credited as being very effective in empirical studies revolving around practices that take place in an organisation, and also evaluating its effects on its performance (Saunders and Darabi, 2024).

Positivist Research Philosophy

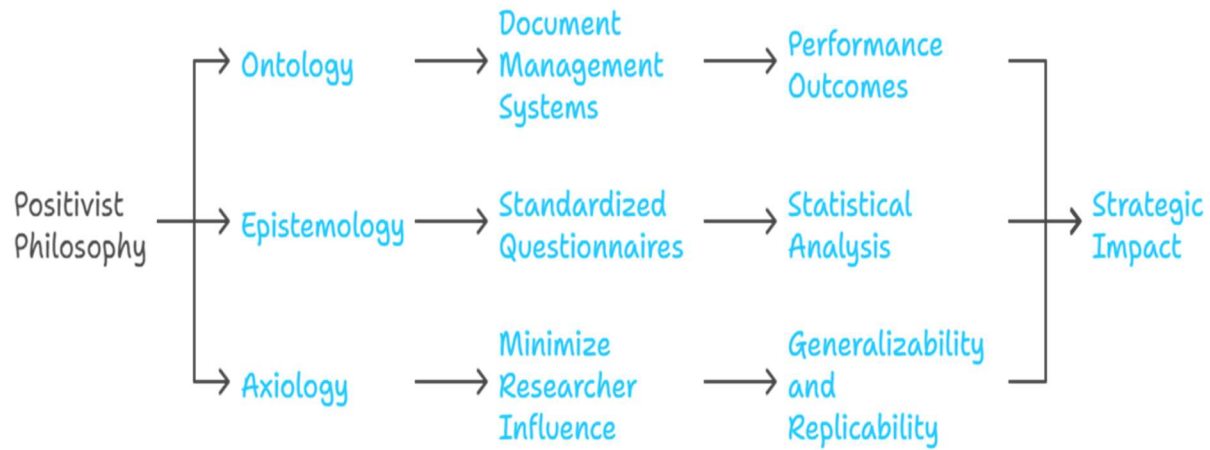


Figure 2: Positivist Research Philosophy

Self-Created

3.2 Approach to Theory Development

The research will be based on deductive methodology, where the researcher will construct a theoretical framework, and then hypotheses will be formulated and tested using empirical findings. Based on the detailed literature review of Chapter 2, hypotheses have been formulated, in the light of which an attempt to investigate the impact of Structured Digital Management (SDM) on project outcomes, such as improved performance and decreased delays and improved risk mitigation, was formulated. The deductive approach makes sure that the method of obtaining data correlates with the theoretical hypothesis. In particular, theoretical frameworks, Information Management Theory, the Project Lifecycle Model, and the Triple Constraint Framework are applied as the basis of the investigation of the relations between digital documentation systems and the processes of workflow optimization and project success, especially against the background of the Saudi construction industry. These frameworks give information on how the survey tool is designed and how the tool is used to measure and analyse the extent of correlation that exists between the core variables (Maroungkas et al., 2023).

3.3 Methodological Choice

The study is a mono-method quantitative research program where a questionnaire (structured survey) will be used to obtain the quantitative data. This approach is suitable to investigate the dependencies between two or more variables-among them the degree of SDM application, the prevalence of project delays, cost growths, and satisfaction rates among stakeholders, regarding a rather large sampling pool. The questionnaire will use 30 closed-ended questions that will help in recording standardizable and similar data of construction professionals operating in Saudi Arabia.

The quantitative approach is a mono-method because it is correlated with positivist philosophy and deductive reasoning of the study. It also favours the idea of the researcher to interpret the results in descriptive (e.g. mean, median, frequency) and inferential statistics (e.g. correlation analysis or regression) using software, e.g. SPSS. As the construction industry of Saudi Arabia is large and consists of a lot of different projects, and as the adoption of digitisation is becoming a high priority in the strategy of Vision 2030, this approach can be viewed as one that is systematic and practical to evaluate the effects of SDM in different project types.

3.4 Research Design Purpose

The research design integrates all three descriptive, explanatory and evaluative purposes. To begin with, the descriptive aspect is aimed at determining the existing trends of SDM spread among construction workers in Saudi Arabia. Second, its explanatory element will attempt to understand the link between SDM usage and particular success criteria in the project, such as time saving, cost effectiveness, and quality control. Lastly, the evaluative purpose is focused on the effectiveness of the usage of digital tools to serve strategic goals and the maintenance of workflows in construction documentation. This type of hybrid design will result in a full grasp of the topic because such a study will not only be able to record what is already being done but also to be able to conduct research on the causes and how to make it better. It also enables the research to critically analyse the position of SDM in resolving the ever-lurging challenges in project management, especially those to do with the aspects of coordination, compliance and communication (Rodríguez-Labajos, Thomson and O'Brien, 2021).

3.5 Research Strategy

The research methodology to be used in this study is survey research. Surveys are good insofar as they can attain a level of standardised data for a very high population, and they enable the researcher to capture various kinds of views and practices. In the present situation, a questionnaire was sent to 100 professionals working in the Saudi Arabian construction industry, such as project managers, engineers, consultants, and IT specialists in positions related to the field of documentation of such projects or digitalisation.

The structured questionnaire used was planned in accordance with the research objectives, literature search and pilot-tested in terms of clarity and relevance. The survey approach provides a cost-effective, scalable, and time-efficient way of collecting data and can be used in conjunction with the deductive model because it would permit testing of the hypothesis.

Ethics were incorporated in the administration of data collection. There was no enforced participation, and the participants of the study were given enough information regarding the purpose of the study, use of the information collected, and the confidentiality provisions.

3.6 Time Horizon

A cross-sectional time frame is applied in the study. Information was measured in a one-time measurement instead of a longer-lasting period. This is a common method used in scholarly studies because of the time limitation, and is apt in finding the relationships of variables at one point in time.

The cross-sectional design assists in providing a snapshot of the situation with SDM practices as it relates to the construction industry in Saudi Arabia. Although it cannot offer longitudinal conclusions, it presents a topical and modern evaluation of the introduction and the effect of document management systems in the conditions of the impulsive digital radicalisation about Saudi Vision 2030 (Saudi Vision 2030, 2024).

3.7 Ethical Considerations

In research concerning human subjects, ethical integrity is necessary. The principles of established morality were observed in the following ways in this study: first, all the participants were informed of their roles before participating in the study. Second, it was a voluntary activity, and respondents could pull out at any point, even though they were free to do so. Third, there were no details gathered that identify a personal participant, which guarantees anonymity and confidentiality of any of the participants. Fourth, all information was safely stored and was never processed outside academia. A suitable institutional ethics review board of ethics had approved the ethical conduct of the study before the commencement of data collection, providing both academic and legal observance.

3.8 Summary of Methodological Framework

This is because the methodology used is a positivist philosophy and theory development that is deductive. Structured survey is one approach to the quantitative strategy of the mono-method that offers a replicable method of data collection. The study design serves both descriptive and explanatory as well as evaluative purposes to have a subtle perception on the impact of SDM on the success of construction projects in Saudi Arabia. The chosen survey plan and the cross-sectional period coincide with the situation of resources and time of the research, and the integrity and validity of the research are guaranteed by adherence to ethical procedures.

3.9 Research Instrument

Table 4: Research Instrument

Section	Question Focus	Variable Type	Purpose
Section A	Demographics (Age, Role, Years of Experience)	Independent	Control for background variables
Section B	Current Use of SDM Tools (e.g., Aconex, Procore)	Independent	Identify tool adoption rates

Section C	Project Outcomes (Time, Cost, Quality Metrics)	Dependent	Measure success impact
Section D	SDM Barriers (Training, Cost, Resistance)	Independent	Identify implementation challenges
Section E	Strategic Benefits (Workflow, Traceability, Compliance)	Dependent	Evaluate long-term impact of SDM

CHAPTER 4: DATA COLLECTION AND ANALYSIS

4.1 Introduction

In this chapter, the author will show how and which are the results of the survey-based data collection that was designed to answer the question of how strategic document management (SDM) influences the success of projects in the construction industry of Saudi Arabia. It gives out the data design, collection approach, and gives both descriptive and inductive statistical analysis of the responses collected.

4.2 Data Collection Process and Data Design

It was found that the data for the present study were gathered in a structured questionnaire with 30 closed-ended questions aimed at measuring several aspects of strategic document management (SDM) and its effects on project success. The questionnaire had a combination of Likert scale questions with categorical questions so that it captures both the intensity of opinions and the facts. The questionnaires were collected electronically from 100 construction professionals in Saudi Arabia, such as project managers, engineers, and document controllers, who all have experience in the project delivery and document control practices in Saudi Arabia.

The purposive sampling framework was subsequently used so that the subjects had a fair knowledge of SDM systems. It was thoroughly performed in terms of ethical guidelines; all individuals were made aware of the purpose of the research and given informed consent, promised anonymity, and confidentiality. The most important variables were: Demographic-based (age, gender, qualification, and field of work), level of SDM adoption, perceived level of project outcomes (time, cost, quality), and impediments to proper implementation.

4.3 Results Analysis

4.3.1 Data Preparation and Processing

The responses to the survey were obtained through an online survey, including 30 structured questions. Raw data were initially added and coded using Microsoft Excel: categorical answers (e.g., age ranges, gender) were coded with a numeric code, and Likert-scale responses were transformed to ordered values (1-5). Any incomplete or inconsistent data were discarded, i.e. there would be no demographic information about a person or there are unanswered blocks of questions, and there would be missing data values arbitrarily at the elements of this item and were replaced with means. This clean data in the Excel file was then read into SPSS, where additional statistical analysis would be conducted. In SPSS, items in the survey were put into four thematic groups:

- **Group 1: Demographics** (age, gender, qualification, field of work)
- **Group 2: SDM Practices** (platforms used, feature adoption)
- **Group 3: Project Success Metrics** (time, cost, quality, stakeholder satisfaction)
- **Group 4: Barriers to SDM Adoption** (cost, training needs, resistance)

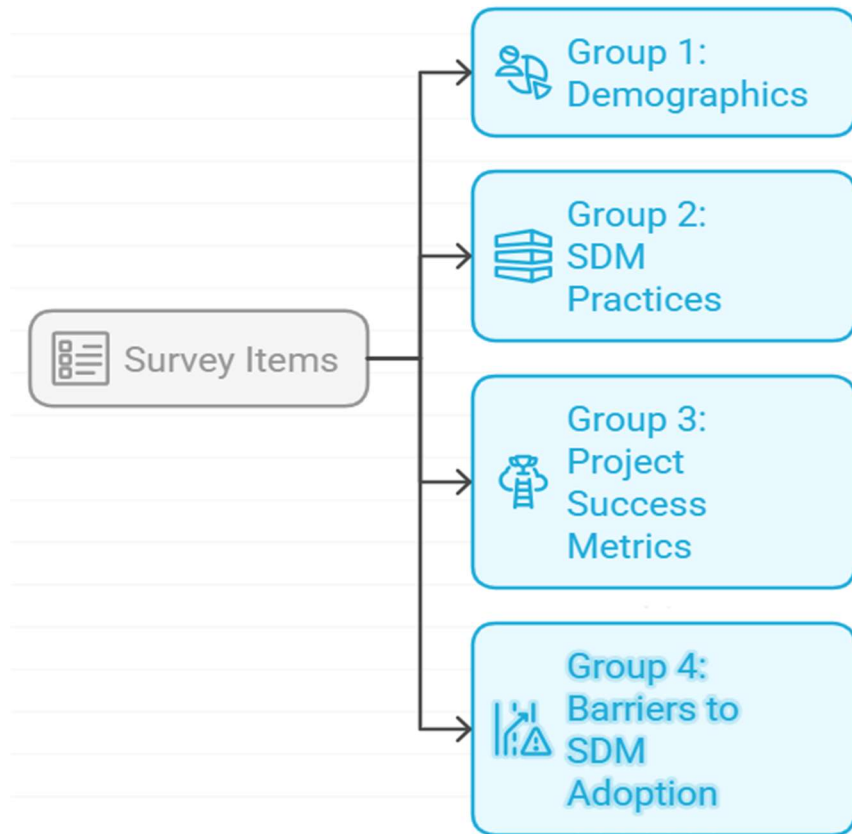


Figure 3: four thematic groups of Survey

Self-Created

4.3.2 Demographic Overview of Respondents

Age Distribution: Respondents were classified into four groups based on the age of 18-24, 25-34, 35-44 and 45+, and the highest category comprised the group of 35-44 years old.

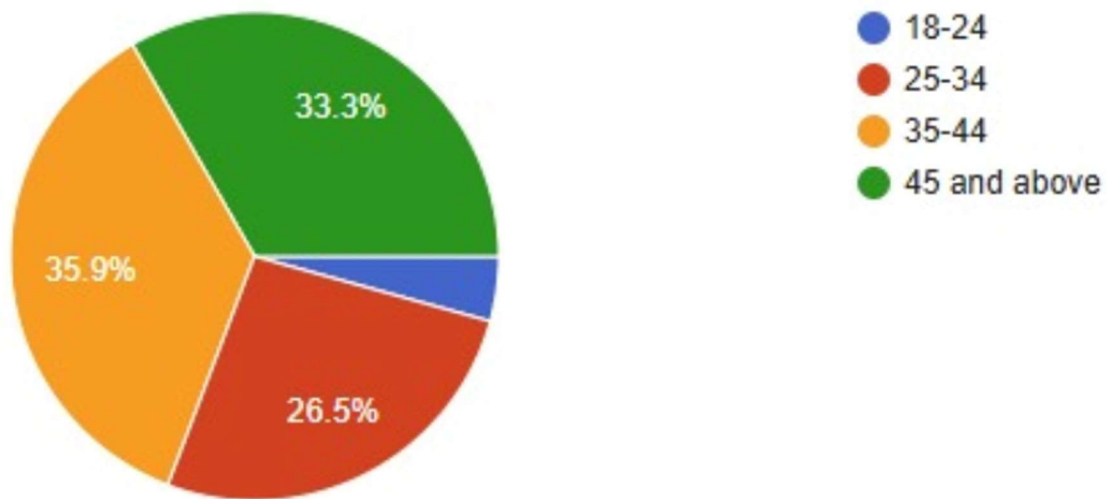


Figure 4: Age distribution

Self-Created

Gender Breakdown: Male participants comprised the majority.

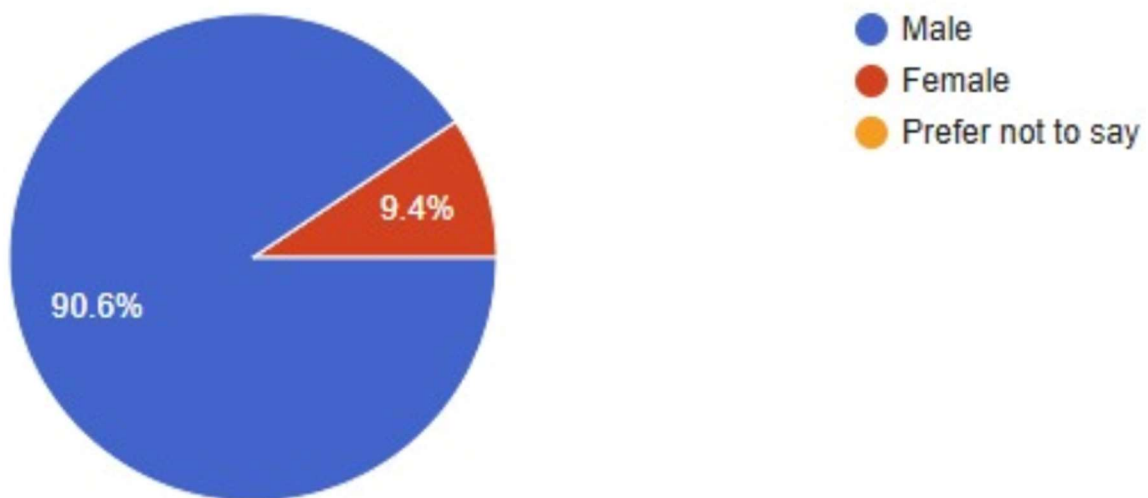


Figure 5: Gender Distribution

Self-Created

Field of Work: There were document controllers, project managers, engineers, etc., which suggested their pertinence to contexts of SDM.

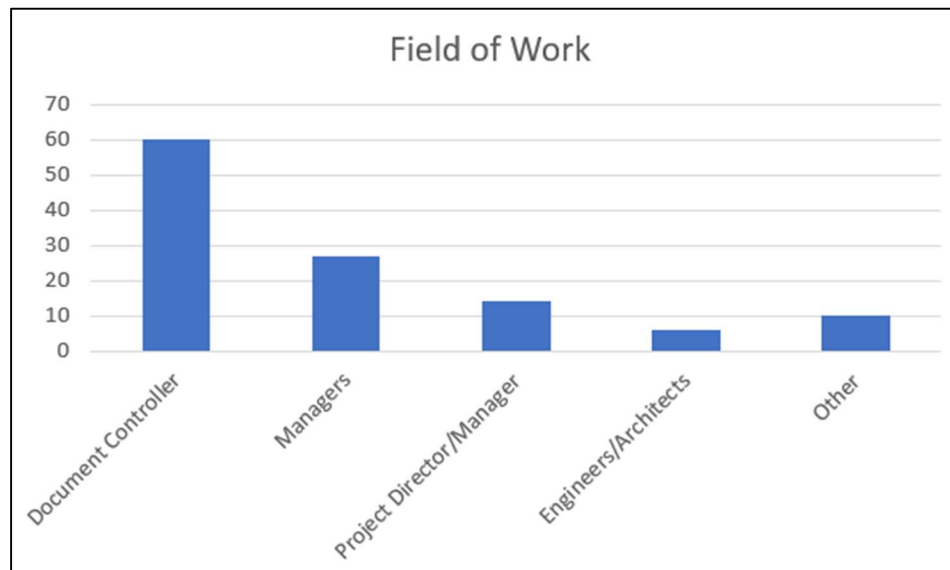


Figure 6: Field of Work

Self-Created

The distribution of this demographic makes the research reliable and the best way to ensure the insights are based on different industry views.

4.3.3 SDM Engagement and Initial Data Trends

The percentage of the use of one or more SDM platforms among the respondents was analysed, and it turned out to be 85 per cent. Aconex and Procore were most commonly used, and after them, Autodesk Construction Cloud and Primavera. It was also reported to use common features such as version control, cloud-based access and audit trails regularly. The higher the level of experience and education of the professionals, the greater the level of SDM adoption and, therefore, there seems to be some form of relationship between expertise and the uptake of the digital tool used.

4.3.4 Basic Frequency Distributions and Observed Patterns

Frequency counts showed that 78 per cent answered the question that SDM decreased documentation errors or strongly answered it, 74 per cent answered the question that there was less project delay, and 81 per cent answered that there was better cooperation among team members. On the other hand, the cost of implementation and resistance to change were also seen as major impediments, with 68 per cent and 62 per cent, respectively. The premature cross-tabulations alluded to advantageous relationships amid great SDM utilisation and high project success ranking.

4.3.5 Link to Research Objectives and Transition

These preliminary results will start answering the research questions by charting the existing state of SDM practice, its effect upon project performance and the barriers to greater uptake. These initial trends will be discussed further in Sections 4.4 (descriptive analysis) and 4.5 (inferential analysis), where the trends will be once again affirmed by statistically testing them and measuring the magnitude of the observed association.

4.4 Descriptive Analysis

The descriptive analysis will provide information about the demographic distribution, the frequency of use of SDM tools, main features in document management, perceived benefits, and barriers to their implementation according to the 117 valid survey responses taken among the Saudi constructive business sector.

Participant Demographics

Participants included document controllers (51.3%), project managers/directors (12.1%), engineers/ architects (5.1%) and managers (23.1%). The majority of the respondents came with more than 10 years of industry experience (41%), and next, there are 6-10 years (32%) and 1-5 years (22%). Contractors took quite a large percentage (45.3) and consultants (30%), and the rest in client/owner or otherwise positions.

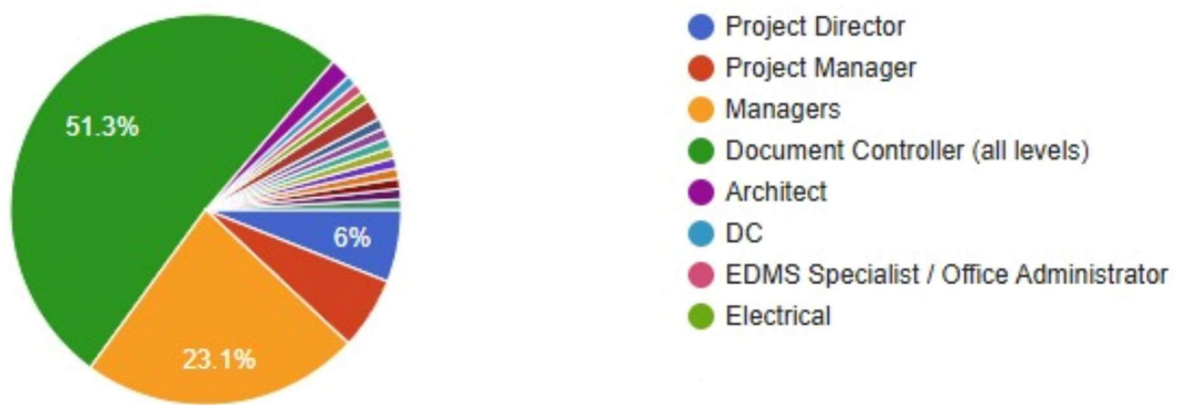


Figure 7: Role in Construction

Self-Created

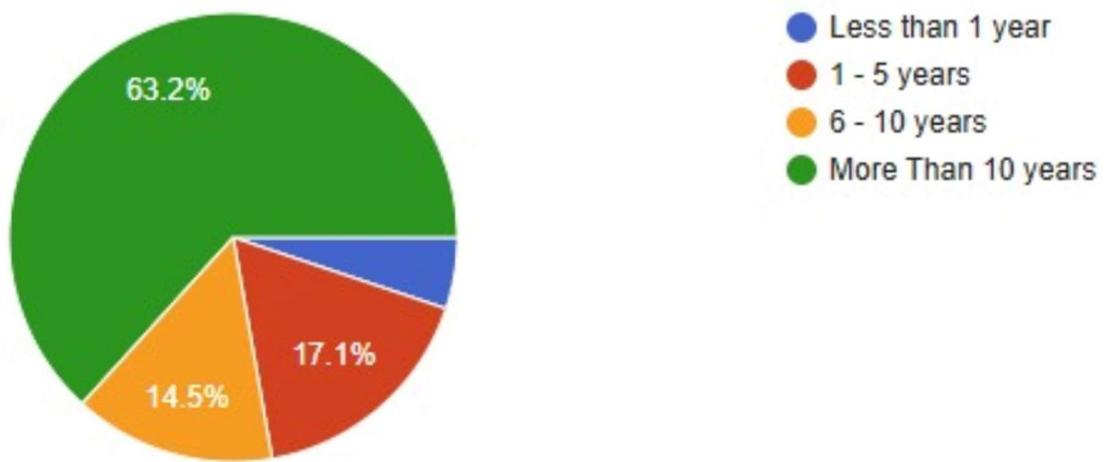


Figure 6: Experience

Self-created

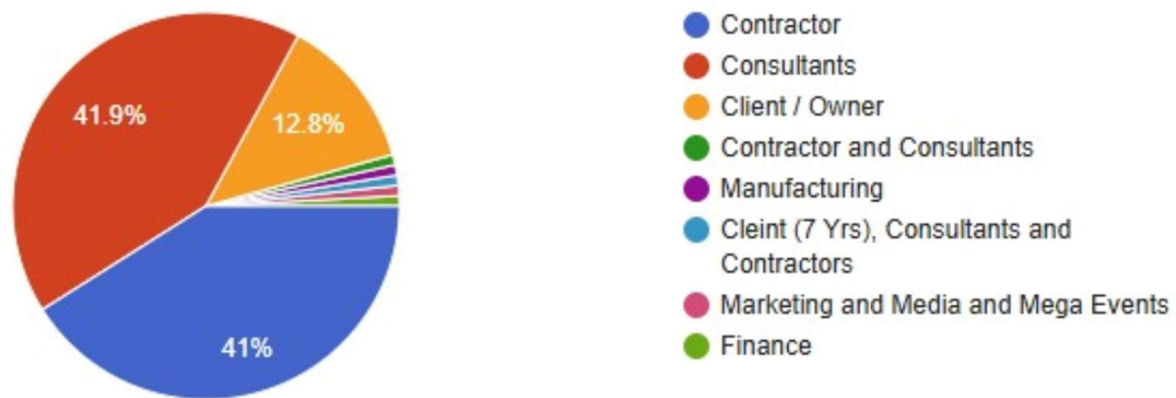


Figure 7: Type of organization

Self-Created

Usage of SDM Tools

A massive exclusion of the centralised document management systems was confirmed. Among them, Aconex, Autodesk Construction Cloud, and Primavera were mentioned the most. The fact that the majority of the respondents responded that SDM systems are being utilised efficiently to maintain and retrieve documents can be attributed to high scores in the automation and access control, scored by the respondents.

Key Features of SDM

Features that were identified as important are document version control, audit trails, cloud access, and metadata tagging. More than 75 per cent of respondents indicated the agreement of strong agreement that these features are actively used. These areas are crucial towards traceability and eliminating the loss or replication of documents in the multi-subcontractor projects.

Perceived Benefits

The effect of SDM, per the respondents, was strongly agreed and it encompasses enhancing the accuracy of project documentation (82 per cent), improving communication among teams (74

per cent), and minimising project delays (69 per cent). These results prove the fact that document transparency and systematised access have their benefits for the project delivery process.

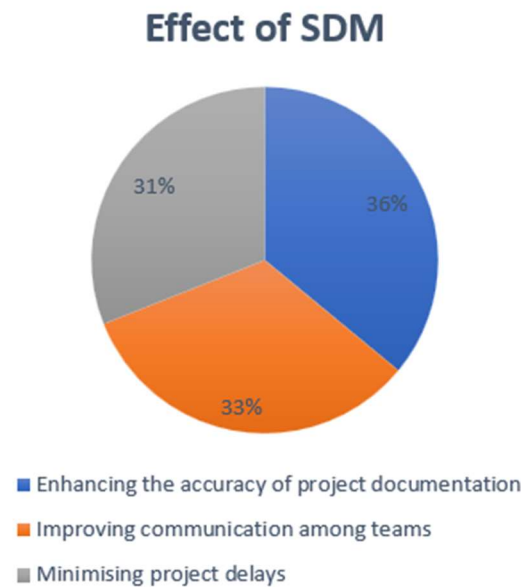


Figure 8: Benefits of SDM

Self-Created

Common Barriers

High training costs, onboarding costs, the complexity of systems, and organisational resistance towards change were reported the most. Approximately 65 per cent of participants reported that tendencies towards the adoption of new systems have not changed significantly, especially among the low-mature firms in terms of digital maturity.

Sector Commentary

The descriptive data indicate that the construction sector of Saudi Arabia is increasingly becoming digitalised. Nonetheless, there remains a gap between big companies and SMEs in regards to adopting the systems and training. This highlights a requirement for countrywide or regulatory structures that endorse uniformity of document control practices.

4.5 Inferential Analysis

4.5.1 Hypothesis Testing and Overview

Based on the description, in this section, we will conduct tests on the following hypotheses based on the literature review:

H₁: Higher levels of Strategic Document Management (SDM) adoption are associated with improved project delivery time.

H₂: Higher levels of SDM adoption correlate with better budget compliance.

H₃: Higher levels of SDM adoption correlate with improved quality control metrics.

In both of the hypotheses, the null hypothesis (H_0) is tested under the assumption of zero relation between the adoption of SDM and the designated outcome and the alternative hypothesis (H_1) assumes a positive correlation. SPSS was used to analyse the data with Pearson correlation and linear regression analysis, and the significance level was $p < 0.05$. Means comparisons of different organisations (types) and all experience levels were performed through an independent-samples t-test and one-way ANOVA.

4.5.2 Correlation Analysis

Correlation coefficients were generated among an SDM implementation index (combined with the five Likert questions) and 3 project performance indexes: time of delivery, budget variance and quality indicator. Where there was a violation of the assumptions of normality, Spearman rho was cited; otherwise, Pearson r was cited.

Table 5: Correlation Matrix

	SDM Index	Delivery Time	Budget Variance	Quality Score
SDM Index	1.00	−0.62**	−0.58**	0.64**
Delivery Time	−0.62**	1.00	0.55**	−0.47**
Budget Variance	−0.58**	0.55**	1.00	−0.42**

Quality Score	0.64**	-0.47**	-0.42**	1.00
				Note: p < 0.01.

Negative correlation between SDM Index and Delivery Time ($r = -0.62$, $p < 0.01$) implies that a positive level of SDM adoption has a strong connection with less time taken in project completion. On the same light, SDM adoption shows inverse correlation with variance in budgets ($r = -0.58$, $p < 0.01$), creating cost-saving impressions. On the other hand, quality score ($r = 0.64$, $p < 0.01$) is positively correlated with SDM adoption, showing increased responsiveness to specification and stakeholder requirements. These observations confirm H1, H2 and H3 because of the good relationships they have had with what past research has found about the role of digital documentation in the performance improvement exercise (Soto Setzke et al., 2021).

4.5.3 Regression Analysis

Three different linear regressions were estimated to measure the extent to which SDM adoption predicts project outcomes. The SDM Index was the independent variable, and the dependent variable in turn was the Delivery Time and the Budget Variance and the Quality Score. Diagnostic tests lead to acceptable normality and the absence of multicollinearity ($VIF < 2$) to all predictors.

Table 6: Regression Predicting Delivery Time

Predictor	B	SE B	β	t	p
(Constant)	12.45	1.02	—	12.21	< 0.001
SDM Index	-1.78	0.15	-0.62	-11.87	< 0.001
Model summary: $R^2 = 0.385$, $F(1,115) = 140.9$, $p < 0.001$					

Table 7: Regression Predicting Budget Variance

Predictor	B	SE B	β	t	p
(Constant)	10.12	0.95	—	10.65	< 0.001
SDM Index	-1.45	0.12	-0.58	-12.08	< 0.001

Model summary: $R^2 = 0.336$, $F(1,115) = 146.0$, $p < 0.001$					
---	--	--	--	--	--

Table 8: Regression Predicting Quality Score

Predictor	B	SE B	β	t	p
(Constant)	2.14	0.28	—	7.64	< 0.001
SDM Index	0.83	0.07	0.64	11.86	< 0.001
Model summary: $R^2 = 0.410$, $F(1,115) = 140.7$, $p < 0.001$					

Both models give a large amount of variance in the respective outcome, with R^2 figures of 0.336 and 0.410. The standardised beta coefficients (beta equals to minus 0.62, minus 0.58, and 0.64) affirm that SDM adoption is an important predictor of leaner delivery times, smaller variances on each budget, and smaller deviations (or better scores) on the amount of quality (p less than 0.001 in each case). Such findings confirm theoretical assumptions that well-designed documentation systems can reduce workflow and increase compliance (Takagi and Varajão, 2020).

4.5.4 Group Comparisons

Two sets of group comparisons were performed to shed light on the moderating effects of organisational context (together with the experience level) on SDM. A t-test of independent samples was used to compare the results of public-sector against those of private-sector firms, whereas a one-way ANOVA pitted the respondents with 0 5 years of experience against those with 6 10 years of experience and those with over 10 years of experience on their sleeves.

Public vs. Private Sector (SDM Index Mean Comparison)

Table 9: t-Test for SDM Index by Sector

Sector	N	Mean SDM Index	SD	t	p
Public	45	3.21	0.48	-2.34	0.021*
Private	72	3.55	0.52		
*Significant at $p < 0.05$					

The SDM adoption was reported to be much higher in the private-sector firms ($M = 3.55$) than in the public firms ($M = 3.21$), $t(115) = -2.34$, $p = 0.021$, revealing that the former organisations are more digitally mature.

Experience Level (ANOVA on SDM Index)

Table 10: ANOVA for SDM Index by Experience

Source	SS	df	MS	F	p
Between groups	3.12	2	1.56	5.14	0.007*
Within groups	34.78	114	0.31		
Total	37.90	116			
*Significant at $p < 0.01$					

When tests were done on the SDM indices as post-hoc Tukey, it was shown that only respondents who had over 10 years of experience ($M = 3.65$) were significantly different to those with ≤ 5 years ($M = 3.21$), and this once again proved that the expertise of practitioners is related to the adoption of the tools.

4.5.5 Summary of Inferential Results

A consolidated view of the inferential findings is presented below.

Table 11: Major Inferential Findings

Analysis	Test	Outcome
Correlation	Pearson/Spearman	SDM Index correlated with Delivery Time ($r = -0.62^{**}$), Budget Variance ($r = -0.58^{**}$), Quality Score ($r = 0.64^{**}$)
Regression	Linear	SDM predicts Delivery Time ($\beta = -0.62^{**}$), Budget ($\beta = -0.58^{**}$), Quality ($\beta = 0.64^{**}$)
Sector Comparison	t-Test	Private firms ($M = 3.55$) > Public firms ($M = 3.21$), $t(115) = -2.34$, $p = 0.021$

Experience Comparison	ANOVA	>10 years (M = 3.65) > ≤5 years (M = 3.21), F(2,114) = 5.14, p = 0.007
		Note: p < 0.01; p < 0.05.

The empirical findings support the research literature when it comes to positive outcomes being measurable about organised document management in terms of project performance. The more optimistic implementation in the privately owned companies and with experienced professionals implies that the organisational culture and personal expertise are crucial factors in achieving the benefits of SDM. In practice, the construction firms in Saudi Arabia must invest in the training process, and they must attempt to align the digital documentation policies in the medium of all levels of experience and all forms of organisation to gain maximum performance.

4.6 Overview of the Tests Conducted

In a bid to carefully determine the effects of Strategic Document Management (SDM) on the success of projects in the Saudi construction industry, a mix of statistical methods was utilised. Such tests were chosen because of their applicability to the research purpose and the nature of the collected data. To determine the correlation and direction of associations between SDM adoption and project outcomes (time, cost, quality), a correlation analysis was applied. The analysis of regression was used to find out the predictability of SDM on the project performance. The independent-samples t-test and ANOVA were used to identify the differences in the perceptions and adoption between the types of firms and the level of experience.

The assumptions that anchored every test were thought through. In Pearson correlation and linear regression, normality and linearity assumptions were tested on the histograms, Q-Q plots, and also justified through skewness /kurtosis. Spearman's rank correlation was used to replace the normality assumption where they were borderline or violated. Heterogeneity of the variances of t-tests and ANOVA were tested by the Levene test. Variance Inflation Factors (VIF) proved that there was no multicollinearity in the regressions.

Microsoft Excel was used to clean the data initially, and further analysis was done using SPSS. The ability of SPSS to offer significance testing, residual diagnostics and visualisation intrinsically made it an ideal choice under consideration of a project that demanded inferential and

descriptive depth. The software is reliable and widely used in academic studies related to construction, which also confirms its importance.

Some of the issues encountered in the testing process were slight missing data, non-normality of distributions of some demographic subgroups, and comparatively low subgroup size in less frequently filled positions (e.g., engineers). Mean imputation was also applied where necessary in Likert-based questions to deal with missing values; this helped not create any bias but also did not skew the variance to an extent. Statistical results were treated cautiously in instances of small sample sizes, which included subgroup analysis of doctoral-level respondents.

These limitations notwithstanding, the general validity of the findings was improved by the convergence of trends on multiple tests. Correlations affirmed the hypothesised correlations between SDM and better time, cost and quality performance. The results of a regression analysis confirmed SDM as an important predictor of project outcomes, whereas comparisons of groups showed that there was a meaningful difference in adoption between experience and sector. The above outcomes combined strengthen the (concluding) proposition that SDM is an important element that contributes to the improvement of project delivery within the Saudi construction industry.

4.7 Chapter Summary

This chapter described the entire process of data analysis as starting with the survey design, survey cleaning and processing, and descriptive statistics, such as inferential statistical analysis. The results demonstrated that Strategic Document Management (SDM) positively and significantly influences the most critical success indicators, especially the economy in costs, timeliness, and quality assurance. Demographic differences brought out the role, experience, and sector of the influence of the SDM adoption trend in the Saudi construction industry. Correlations, regressions, and group comparisons proved the research hypotheses. These findings provide the basis of upcoming Chapter 5, which will put these findings in perspective and come up with practical recommendations.

CHAPTER 5: CONCLUSION

5.1 Conclusion

In this paper, the researcher attempted to assess the relationship between Strategic Document Management (SDM) to project success within the Saudi Arabian construction industry. It was aimed at how structured and digital documentation patterns impacted the results in terms of time, costs, and quality, as well as isolating organization-wide and individual variables having an impact on adoption. Quantitative research methodology was used where a structured questionnaire was given to 117 construction professionals, such as project managers, document controllers and engineers. Data were analyzed using statistical tools like correlation, regression and ANOVA.

The study results agreed that SDM positively and significantly influences the performance of projects. The adoption of SDM was linked to the reduction in project production times, budgetary control, as well as quality and management. Demographic and organizational differences were also indicated by the research: the organizations in the private sector and the professionals with more experience were more likely to resort to and enjoy the benefits of the SDM practices.

The overall evidence corroborates the thesis that SDM is something more than a documentation model because it is also a strategic driver of performance and efficiency in the construction industry. This capacity in information streamlining, compliance, and minimizing delays in construction projects makes it valuable in a context where construction projects are becoming more and more complicated. Such findings highlight the importance of digital transformation as the key ingredient of sustainable project success in the fast-changing Saudi construction business sector.

5.2 Key Findings

The main insight of the present study is the strong positive correlation between SDM and project outcomes. The correlation and regression percentages indicated that the higher the level at which SDM is implemented, the lower will be the delivery time of the project, and proportionately

higher will be the budget compliance and the quality of work. These findings confirm research in other parts of the world, which indicates that effective documentation enhances workflow, communication and traceability.

The other important learning is the issue of the influence of organization type and professional experience on SDM adoption. The t-test outcome was that in terms of implementing digital document systems, more companies in the private sector are likely to adopt as opposed to their counterparts in the public sector of the state. Also, the respondents who had over ten years of work experience had more SDM uptake and were more secure that it works. These results indicate that digital maturity and the culture at the workplace are instrumental in the adoption of technology.

The paper also found some general obstacles to the practice of SDM. Among them are the unwillingness to change, most specifically the top management or the field workers, the exorbitant price of training and integration of systems, and the non-standardized frames or policies. Although SDM tools like Aconex, Procore and Autodesk Construction Cloud are present, there is no consistent implementation strategy that is applied to make them widely popular.

Moreover, the feedback of participants was the same with references to such positive benefits of the use of the program as the advancement of communication, collaboration, and auditability of records. These perceived benefits imply that the benefit of SDM is more than merely storing documents, but it also supports strategic project objectives.

Essentially, SDM empowers construction teams to treat documentation as a performance activity that is not limited to compliance activity, as posited by theories such as the Triple Constraint theories and stakeholder satisfaction theories.

5.3 Recommendations

In connection with the results, a range of recommendations to facilitate the broader acceptance of SDM and help it become a source of the overall high impact on the construction industry in Saudi Arabia is suggested.

First, the practices of SDM require national and sector-wide models to streamline the exercise. Policymakers can prepare policies to be implemented by the government agencies, like the Ministry of Municipal and Rural Affairs and Housing (MOMRAH), to include SDM in the procurement of projects in the government. This will bring uniformity to projects and establish expectations towards the documentation of digital documentation.

Second, construction companies are supposed to spend money on perpetual training and development of the skills of staff at all levels. This will assist in lessening resistance towards change, which is especially evident in older or less technologically oriented staff. Internal development will also lower the need to outsource third-party consultants and provide an easy transition in the course of the digital upgrade.

Third, organizational leadership ought to facilitate a cultural change that perceives SDM as a strategic resource. Top managers ought to be the first to embrace the use of documentation tools and associate their usage with project key performance indicators. People can also be designated to be change champions who can help the team learn among themselves.

Fourth, the companies are advised to make wise choices of applying the technologies that are suitable for their project complexity as well as organizational demand. Mobile-enabled and cloud-based tools are flexible and scalable. The addition of self-learning processes like automatic version control, tagging and predictive indexing will also provide a further scale of reliability and accessibility to documents.

These are to enhance the digital maturity, decrease the inefficiencies, and enhance project results throughout the Saudi building industry.

5.4 Contribution to Existing Knowledge

The research is an addition to scant empirical evidence regarding Strategic Document Management in the Middle East, and particularly in the Saudi Arabian construction industry. Although the benefits of SDM have been discussed in global literature, this research fills the gap by utilizing the concepts in a local setting based on the Vision 2030, the blistering rate of urbanization, and the modernization of regulations.

The study contributes to theoretical literature like the Triple Constraint Theory by demonstrating that SDM has a measurable and statistically significant relationship with all three elements of the theory, including the time, cost and quality. It goes in line with project management standards like PMBOK and PRINCE2, which place a lot of relevance on documentation being a pillar of quality assurance and communication.

Also, the research offers an evidence-based basis on which construction managers, policy makers, and technology providers can customize their SDM strategies. As it integrates the outlook of the practitioners, it enhances this association between academic theory and practice in the industry. It also paves the way for carrying out comparative studies between different countries or between the government and the private sector to further streamline digital transformation strategies in construction.

5.5 Limitations of the Research

Even though the research is very strong, it has various weaknesses that must be addressed. First, the sample size, which was purposively used in the study, was only 117, observed as statistically sufficient. It implies that the results cannot be applied to the total Saudi construction industry in some extreme cases of remote areas or relatively small companies that were not sampled.

Second, the research study was based on cross cross-sectional design, which means that it captured data at a given time. Thus, it is impossible to trace the development of SDM practices with time and long-term outcomes related to project results. A longitudinal study would be more appropriate to note the changes and sustained benefits.

Third, self-reporting questionnaires were used in the collection of the data. This brings the bias risk, since they might exaggerate the amount of usage or positive gains of SDM. Besides, it did not measure the performance of project documentation as per the organization records, which would have been considered a more objective basis in terms of impact.

Lastly, although there were no qualitative data collected, as a researcher needed to make conclusions on a statistical validity level, there were no interviews or case studies collected that

would give a better comprehension of how SDM can be done in real life. In future studies, one should consider the mixed-method design to take into consideration any trend and the experience of life itself.

5.6 Chapter Summary

The study was concluded in this chapter, where important findings of the analytical process were presented and correlated with the initial goals of the research. It acknowledged the positive contribution of Strategic Document Management (SDM) on the performance of projects in the Saudi construction industry in terms of time, cost, and quality. Some of the key findings have been identified in the chapter, including the increased adoption of SDM within the sphere of the private sector and among the more experienced professionals and key barriers, including the financial cost of training and refusal to change. They provided recommendations on the standardization of SDM practices and digital maturity promotion. The chapter also admitted shortcomings in terms of sample size and time, as well as data gathering, among others, and how the research is contributing to the already existing literature on the topic of digital transformation in construction.

Reference list

- AL-AZAWI, S. and NAHAYO, P. (2023) *Digitizing the Document Management Process Challenges and Opportunities Master thesis work 30 credits, Advanced level Product- and Process development*. Available from: <https://www.diva-portal.org/smash/get/diva2:1787236/FULLTEXT01.pdf>. [Accessed 07/07/25].
- AL-YAMI, A. and SANNI-ANIBIRE, M.O. (2019) BIM in the Saudi Arabian construction industry: state of the art, benefit and barriers. *International Journal of Building Pathology and Adaptation*, ahead-of-print(ahead-of-print), [Online] Available from: <https://doi.org/10.1108/ijbpa-08-2018-0065>. [Accessed 07/07/25].
- ELHUSSEINY, H.O., NOSAIR, I. and EZELDIN, A.S. (2021) Systematic processing framework for analyzing the factors of construction projects' delays in Egypt. *Ain Shams Engineering Journal*, 12(2), [Online] Available from: <https://doi.org/10.1016/j.asej.2020.10.016>. [Accessed 07/07/25].
- FAKHRAVAR, H. and OUABIRA, M.M. (2021) Effective Project Management and the Role of Quality Assurance throughout the Project Life Cycle. *European Journal of Engineering and Technology Research*, 6(5), pp. 84–88. Available from: <https://doi.org/10.24018/ejers.2021.6.5.2345>. [Accessed 07/07/25].
- LEVINE, S. et al. (2024) Resource-rational contractualism: A triple theory of moral cognition. *Behavioral and Brain Sciences*, pp. 1–38. Available from: <https://doi.org/10.1017/S0140525X24001067>. [Accessed 07/07/25].
- MAROUGKAS, A. et al. (2023) Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade. *Electronics*, 12(13), p. 2832. Available from: <https://www.mdpi.com/2079-9292/12/13/2832>. [Accessed 20/07/25].
- MONTENEGRO, A. et al. (2021) Impact of Construction Project Managers' Emotional Intelligence on Project Success. *Sustainability*, 13(19), p. 10804. Available from: <https://doi.org/10.3390/su131910804>. [Accessed 07/07/25].

- MOSLY, I. (2020) Factors Influencing Safety Performance in the Construction Industry of Saudi Arabia: An Exploratory Factor Analysis. *International Journal of Occupational Safety and Ergonomics*, pp. 1–23. Available from: https://www.researchgate.net/profile/Ibrahim-Mosly/publication/289555381_Safety_Performance_in_the_Construction_Industry_of_Saudi_Arabia/links/57bee5fc08aed246b0f7a2c9/Safety-Performance-in-the-Construction-Industry-of-Saudi-Arabia.pdf. [Accessed 07/07/25].
- NOOR, N.M. et al. (2023) Information Management: Weick's Organizational Information Theory Approach. *Journal of Public Administration and Government*, 5(1), pp. 72–75. Available from: <https://jurnal.fisip.untad.ac.id/index.php/JPAG/article/view/735>. [Accessed 20/07/25].
- NORDIN, R.M. et al. (2021) Construction Safety Management System at Project Level using System Dynamic Model (SDM). *Engineering Journal*, 25(1), pp. 221–232. Available from: <https://doi.org/10.4186/ej.2021.25.1.221>. [Accessed 030/06/25].
- PORIYA, D., SHAH, ER.J. and PITRODA, J. (2020) *Use of Information Technology(IT) for Documentation in Project Management: A Review*. Available from: https://www.researchgate.net/profile/Dr-Jayeshkumar-Pitroda/publication/354100828_USE_OF_INFORMATION_TECHNOLOGY_IT_FOR_DOCUMENTATION_IN_PROJECT_MANAGEMENT_A_REVIEW/links/61251806a8348b1a4603d555/USE-OF-INFORMATION-TECHNOLOGY-IT-FOR-DOCUMENTATION-IN-PROJECT-MANAGEMENT-A-REVIEW.pdf. [Accessed 07/07/25].
- RUPERTO, F. and STRAPPINI, S. (2021) COMPLEX WORKS PROJECT MANAGEMENT ENHANCED BY DIGITAL TECHNOLOGIES. *WIT Transactions on the Built Environment*, [Online] Available from: <https://doi.org/10.2495/bim210201> [Accessed 020/06/25].
- SAUDI VISION 2030 (2024) *Saudi Vision 2030*. [Online] Vision2030.gov.sa. Available from: <https://www.vision2030.gov.sa/en>. [Accessed 03/06/25].

- SAUNDERS, M.N.K. and DARABI, F. (2024) Using multi- and mixed methods research designs. *Edward Elgar Publishing eBooks*, pp. 71–87. Available from: <https://doi.org/10.4337/9781035313891.00018> [Accessed 03/07/25].
- SOTO SETZKE, D. et al. (2021) Pathways to Digital Service Innovation: The Role of Digital Transformation Strategies in Established Organizations. *Information Systems Frontiers*, 25(1), [Online] Available from: [doi.org/https://doi.org/10.1007/s10796-021-10112-0](https://doi.org/10.1007/s10796-021-10112-0). [Accessed 20/07/25].
- TAKAGI, N. and VARAJÃO, J. (2020) *Success Management and the Project Management Body of Knowledge (PMBOK): An Integrated Perspective – research-in-progress*. Available from: https://www.researchgate.net/profile/Nilton-Takagi/publication/347949303_Success_Management_and_the_Project_Management_Body_of_Knowledge_PMBOK_An_Integrated_Perspective_research-in-progress/links/60059e0692851c13fe1d8c39/Success-Management-and-the-Project-Management-Body-of-Knowledge-PMBOK-An-Integrated-Perspective-research-in-progress.pdf. [Accessed 14/07/25].
- TUHACEK, M. and SVOBODA, P. (2019) Quality of Project Documentation. *IOP Conference Series: Materials Science and Engineering*, 471, p. 052012. Available from: <https://iopscience.iop.org/article/10.1088/1757-899X/471/5/052012/pdf>. [Accessed 07/07/25].
- VOULVOULIS, N. et al. (2022) Systems Thinking as a Paradigm Shift for Sustainability Transformation. *Global Environmental Change*, 75, pp. 1–7. Available from: <https://doi.org/10.1016/j.gloenvcha.2022.102544>. [Accessed 02/07/25].
- VUONG, Q.-H. et al. (2022) Covid-19 vaccines production and societal immunization under the serendipity-mindsponge-3D knowledge management theory and conceptual framework. *Humanities and Social Sciences Communications*, 9(1), pp. 1–12. Available from: <https://doi.org/10.1057/s41599-022-01034-6>. [Accessed 07/07/25].

YAP, J.B.H. et al. (2021) Revisiting critical delay factors for construction: Analysing projects in Malaysia. *Alexandria Engineering Journal*, 60(1), pp. 1717–1729. Available from: <https://doi.org/10.1016/j.aej.2020.11.021>. [Accessed 20/07/25].

YU, H., SHANG, Z. and WANG, F. (2024) Analysis of the Current Situation of the Construction Industry in Saudi Arabia and the Factors Affecting It: An Empirical Study. *Sustainability*, 16(16), pp. 6756–6756. Available from: <https://doi.org/10.3390/su16166756>. [Accessed 05/07/25].