Assessing the readiness of construction industry stakeholders to adopt FIDIC 2017

By

Shehroz Inam

2023-NUST-MA-CE&M 00000450395

Department of Construction Engineering and Management

School of Civil and Environmental Engineering

National University of Sciences & Technology (NUST)

Islamabad, Pakistan

(2024)

Assessing the readiness of construction industry stakeholders to adopt FIDIC 2017

By

Shehroz Inam

2023-NUST-MS-CE&M 00000450395

A thesis submitted to the National University of Sciences and Technology, Islamabad,

in partial fulfillment of the requirements for the degree of

Master of Science

in

Construction Engineering and Management

Supervisor: Dr. Muhammad Usman Hassan

School of Civil and Environmental Engineering

National University of Sciences & Technology (NUST)

Islamabad, Pakistan

(2024)

THESIS ACCEPTANCE CERTIFICATE

THESIS ACCEPTANCE CERTIFICATE

It is certified that Mr. Shehroz Inam, Registration No. 00000450395, of MS Construction Engineering and Management of batch 2023 has completed his thesis work and submitted final copy which was evaluated and found to be complete in all aspects as per policy of NUST/Regulations, is free of plagiarism, errors and mistakes and is accepted as partial fulfillment for award of MS degree. It is further certified that necessary amendments as pointed by GEC members of the scholar have been incorporated in the said thesis.

Signature: ______________

Supervisor: Dr. Muhammad Usman Hassan

Date: 28/01/2025

Signature: ______________

Head of Department: Dr. Muhammad Usman Hassan

Date: 28/01/2025

Signature: ______________

Associate Dean: Dr. S. Muhammad Jamil

Date: 28.1.2025

Signature: ______________

Principal & Dean (SCEE-NICE: Prof. Dr. Muhammad Irfan

Date: 03 FEB 2025

Certificate of Approval

Certificate of Approval

This is to certify that the research work presented in this thesis, entitled "Assessing the readiness of construction industry stakeholders to adopt FIDIC 2017" was conducted by Mr. Shehroz Inam under the supervision of Dr. Muhammad Usman Hassan.

No part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the National University of Sciences and Technology (NUST) in partial fulfillment of the requirements for the degree of Master of Science in the field of Construction Engineering and Management from NUST institute of Civil Engineering (NICE), School of Civil and Environmental Engineering (SCEE), NUST

Student Name: Shehroz Inam Signature:

Examination Committee:

a) GEC Member 1: Dr. Khurram Iqbal Ahmad Khan Signature
Associate Professor (SCEE, NUST)
Department of Construction Engineering and Management (CE&M)

b) GEC Member 2: Dr. Khursheed Ahmad Signature
Assistant Professor (SCEE, NUST)
Department of Construction Engineering and Management (CE&M)

Supervisor Name: Dr. Muhammad Usman Hassan Signature: ______________

Name of HOD: Dr. Muhammad Usman Hassan Signature: ______________

Name of Associate Dean: Dr. S. Muhammad Jamil Signature: ______________

Name of Principal & Dean: Prof. Dr. Muhammad Irfan Signature: ______________

Principal & Dean
SCEE, NUST

TH - 4 Form

Form TH-4

National University of Sciences and Technology

MASTER'S THESIS WORK

We hereby recommend that the dissertation prepared under our Supervision by: Shehroz Inam, Regn no. 00000450395 Titled: "Assessing the readiness of construction industry stakeholders to adopt FIDIC 2017" be accepted in partial fulfillment of the requirements for the award of degree with B+ Grade.

Examination Committee Members

1. Name: Dr. Khurram Iqbal Ahmad Khan   Signature: ______

2. Name: Dr. Khursheed Ahmad   Signature: ______

Supervisor's name: Dr. Muhammad Usman Hassan   Signature: ______

Head of Department

(Associate Dean)

COUNTERSIGNED

Date: 03 FEB 2025

Principal & Dean SCEE
PROF DR MUHAMMAD IRFAN
Principal & Dean
SCEE, NUST

Author's declaration

Author's declaration

I hereby state that my MS thesis titled "Assessing the readiness of construction industry stakeholders to adopt FIDIC 2017" is my own work and has not been submitted previously by me for taking any degree from National University of Sciences and Technology (NUST) or anywhere else in the country/ world. At any time if my statement is found to be incorrect even after I graduate, the university has the right to withdraw my MS degree.

Name of Student: Shehroz Inam

Date: 24/01/25

Plagiarism undertaking

Plagiarism undertaking

I solemnly declare that research work presented in the thesis titled "Assessing the readiness of construction industry stakeholders to adopt FIDIC 2017" is solely my research work with no significant contribution from any other person. Small contribution/ help wherever taken has been duly acknowledged and that complete thesis has been written by me. I understand the zero-tolerance policy of the HEC and the National University of Sciences and Technology (NUST) towards plagiarism. Therefore, I as an author of the above titled thesis declare that no portion of my thesis has been plagiarized and any material used as reference is properly referred/cited. I undertake that if I am found guilty of any formal plagiarism in the above titled thesis even after award of MS degree, the University reserves the rights to withdraw/revoke my MS degree and that HEC and the University has the right to publish my name on the HEC/University website on which names of students are placed who submitted plagiarized thesis.

Student/Author Signature: ____________

Name: Shehroz Inam

ACKNOWLODGEMENT

This thesis is dedicated to my parents, my siblings & my friends for their efforts and support throughout my life.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

The FIDIC 2017 framework agreements claims to transform construction operations through updated mechanisms for dispute settlement alongside strategies to handle current industry obstacles. The analysis examines how prepared global construction organizations are to implement FIDIC 2017 through evaluation of stakeholder knowledge while identifying compatibility perceptions among these businesses. Through the application of Structural Equation Modeling (SEM) statistical techniques on survey results this study identifies essential links between different variables. Data analysis shows organizational preparedness depends greatly on socio-economic understanding along with organizations' views about how well FIDIC 2017 integrates with current methodologies. The current challenges impeding effective transition stem from ongoing resistance to change together with critical shortages in specific technical capabilities. The recurring obstacles faced by organizations highlight the necessity for specific training purposes as educational programs that improve stakeholder technical and managerial skills. Construction companies can achieve necessary alignment with FIDIC 2017 standards by bridging existing operational gaps which will produce better organizational efficiency and more innovative approaches to conflict resolution. Through its research findings this study delivers applicable recommendations for both government officials and industry executives that highlight the necessity of collaborative networks and knowledge exchange structures during this transitional phase. The presented research delivers insights into worldwide construction contract management discussions through a practical strategy to implement the FIDIC 2017 guidelines. Once the industry resolves its readiness challenges and taps into the suite's full capabilities it can build an operational framework that assures sustainable efficiency and positions itself for success in today's ever-changing complex environment.

Keywords: FIDIC, Knowledge, Readiness, Implementation, Conditions of Contract.

CHAPTER 1: INTRODUCTION

Infrastructure building enables economic development worldwide which positions the construction sector as leader in advancing both economic progress and societal betterment (Musarat et al., 2024). The construction field depends on contracts to direct project results because they establish clear expectations and provide mechanisms to resolve disputes (Alotaibi et al., 2024). FIDIC conditions represent the global standard that drives all industry contracts for construction work. Long-term development of FIDIC contracts demonstrates their commitment to finding solutions for recent problems in construction projects (Kunj, 2024). According to Çoban's 2020 research the 2017 advancements of FIDIC contracts brought procedural clarity to DAABs while defining engineer responsibilities. Additional evaluation is required regarding how developed the developing world construction sector participants are in terms of the adoption of the FIDIC's 2017 update. Main construction sector elements needed for the adoption of FIDIC Red book 2017 standards are investigated (Çoban, 2020).

1.1. Background:

The construction industry is an important part of industry expansion and the progress of a community; therefore, throughout the world, the construction industry highly contributes to the growth of the world's economic development (Hussain, 2024). The construction field produces both critical large-scale public projects and residential and commercial spaces but together with this it produces massive quantities of jobs. Due to the complexity created by having multiple stakeholders combined with complex contracts and widely different technical demands, projects within the industry operate in an intrinsically complex environment. Complex industry dynamics often cause conflicts or result in delays and excess budgets that severely prevent project success(Jünger, n.d.).

A group of highly respected contracts launched by the International Federation of Consulting Engineers (FIDIC) did help with acceptable best practices to solve many of these problems in the infrastructure sector. Over the years, the FIDIC contracts have evolved to keep pace with industry leading practice and to include various elements which achieve fair risk allocation (Ndekugri & Mcdonnell, 1999) and provide for a 'smooth' project implementation process. FIDIC 2017 suite of contracts constitutes the latest revision by providing a more lucid rendering of existing contract features, bolstered dispute prevention tools and updated terms considering modern construction project demands (Mohammadi et al., 2024).

While modern improvements have been made to FIDIC 2017, organizations as well as regions implement to different degrees. Construction industry stakeholders rely on the past, seeking familiarity in their 1987 edition and 1999 supplement, since they know and prefer them, and they care not for what has come since or refuse the opportunity of the updated system (Scheepers et al., 2022). Transition to FIDIC 2017 requires technical understanding and willingness to follow the newly based normal contractual procedures. The readiness for these transitions is highly dependent on organizational ability to implement new mandates in conjunction with stakeholder awareness of the devised revisions.

When implementing FIDIC 2017, evaluation of the construction industry parties for readiness to implement should continue to create a joint work environment that maximizes project productivity (Zhao, 2022). The correct understanding of the stakeholder readiness elements reveals barriers to new contract adoption pathways but facilitates acceptance of the modern contract standards implying improved global construction industry performance. In the above investigation, transitional dynamics showed up to be the main drivers and the obstacles when the transition to FIDIC 2017 standards occurred (Zoo et al., 2017).

1.2. Current practices:

The use of the FIDIC 2017 contract suited for the construction of projects shows an approach where classic construction methodologies are merged with new project managements strategies to better manage risk. As a stakeholder one is used to FIDIC 1987 and 1999 and tends to remain with them rather than migrating to more recent ones. Apart from advanced features such as improved risk sharing frameworks and dispute avoidance board procedures, FIDIC 2017 has a superior functionality compared to previously introduced versions, but they get uneven implementation rates. FIDIC agreements are customized by the stakeholders to suit the local requirements and demands of the project by reducing unintentionally the uniformity FIDIC intends to achieve. However, despite the substantial potential that the new FIDIC 2017 offers, its full potential is unaware due to the barriers that unproductive crew and complex project environment impose on important resource allocation and scheduling practices.

Adoption stakeholders provide training programs as well as offering certification and implement digital tools such as building information modeling and contract management software. These programs provide both a treasure trove of knowledge for organization members and an act of alignment governed by the FIDIC 2017 principles. There are problems such as lack of awareness among customers, resistance to new ways besides non-uniformity of technological integration. FIDIC 2017 can be effectively adopted through a combination of technical modifications as well as a cultural movement towards modern contract methodology and stakeholder collabora-tion. However, only by relieving these knowledge gaps will this sector fully realize the total potential benefits to the global construction practice offered by FIDIC 2017.

1.3. Problem statement:

Research on practical applications of the FIDIC 2017 template has not yet emerged within the construction industry though the template integrates several beneficial changes. Research in progress remains limited to FIDIC 1999 provisions concerning dispute resolution together with project administration and claim resolution approaches (Puri et al., 2023). The 2017 FIDIC version advances construction contracts which now include enhanced accountability with digital solutions not found in previous editions. Construction industry participants remain unfocused about their understanding level of these advanced procedures. We lack essential research about organizational and stakeholder readiness which prevents us from understanding how FIDIC 2017 functions in practical applications (Awwad et al., 2016). Through our research we identify factors that influence the adoption of FIDIC 2017 in Pakistan's construction industry and provide strategies to boost organizational readiness.

1.4. Research gap:

Authors currently lack comprehensive research to determine how prepared stakeholders are to implement the FIDIC 2017 contract framework. Stakeholders, including contractors and consultants, face challenges in readiness for the enhanced risk sharing mechanisms of FIDIC 2017 which remains insufficiently analyzed. The construction industry shows a deficiency of exploratory work regarding its factors permitting successful implementation of FIDIC 2017. The existing research gap offers experts the vital chance to investigate adoption processes while discovering methods to address implementation obstacles and achieve successful FIDIC 2017 incorporation throughout the construction industry worldwide.

1.5. Research objectives:

The primary objectives of this research are:

- To Identify factors influencing adoption of FIDIC 2017.
- To quantify the impact of identified factors on FIDIC 2017 adoption.
- To recommend strategies to enhance FIDIC 2017 adoption.

1.6. Significance of Research:

Consequences for the development of industry theory and for professional practice follow from the results of this study. Organizations transition to the FIDIC 2017 framework in order to realise a project performance enhancement, and reduction of construction risk and improved stakeholder relationships (Berhe, 2021). It is crucial that key stakeholders (contractors along with consultants and clients) display appropriate readiness as they transfer their activities from the methods of previous contracting to full implementation of FIDIC 2017. In this regard, our study investigates drivers of stakeholder preparedness for the adoption of FIDIC 2017 such that knowledge-based guidance for improved FIDIC 2017 adaptation in the construction industry can be created (Li et al., 2019).

This study allows industry professionals to use practical guidance in managing effective updates to their contract systems with up-to-date frameworks. This stakeholder readiness research will direct stakeholders in understanding essential implementation elements such as training processes, knowledge sharing and institutional infrastructures. According to updated FIDIC 2017 provisions, organizations will benefit by having enhanced risk administration and conflict reduction leading to improved efficiency in project execution. This research will smooth construction sector practices and propel contractors globally to embrace standard contract management procedures (Sutrisno et al., 2024).

1.7. Scope of the Research:

In this research, we investigate what elements influence the construction industry stakeholders' preparation to implement FIDIC 2017 and assess their transition readiness to this upgraded contract formation (Farooqui et al., 2008). To this end, we will evaluate how contractors, consultants and clients will demonstrate their comprehension of FIDIC 2017 and their familiarity with the standard as well as how they apply its principles to contemporary practice. Survey methods are used to collect quantitative data that guides analysis of stakeholder readiness factors for the adoption of FIDIC 2017.

Through Structural Equation Modeling (SEM) this study examines connections between essential constructs and their indicators to determine which factors determine adoption readiness (Hidayat-ur-Rehman & Alsolamy, 2023) employed only quantitative analysis methods while excluding qualitative techniques and interviews. The research findings will reveal stakeholders' adoption capacity for FIDIC 2017 together with guidelines to optimize deployment tactics in worldwide construction circles.

1.8. Research Framework:

To quantitatively assess the factors which affect the adoption of FIDIC. The hypotheses framework shown in Figure 1 shows the steps to achieve the objectives of the research. Firstly, the factors is identified from the previous studies are presented. This is followed by the hypothesis's framework. The data collection and analysis methods are addressed (see Figure 1). The key findings of the research are presented and discussed and at last the recommendations based on the key findings of the study are provided to facilitate the stakeholders to adopt FIDIC 2017 red book.

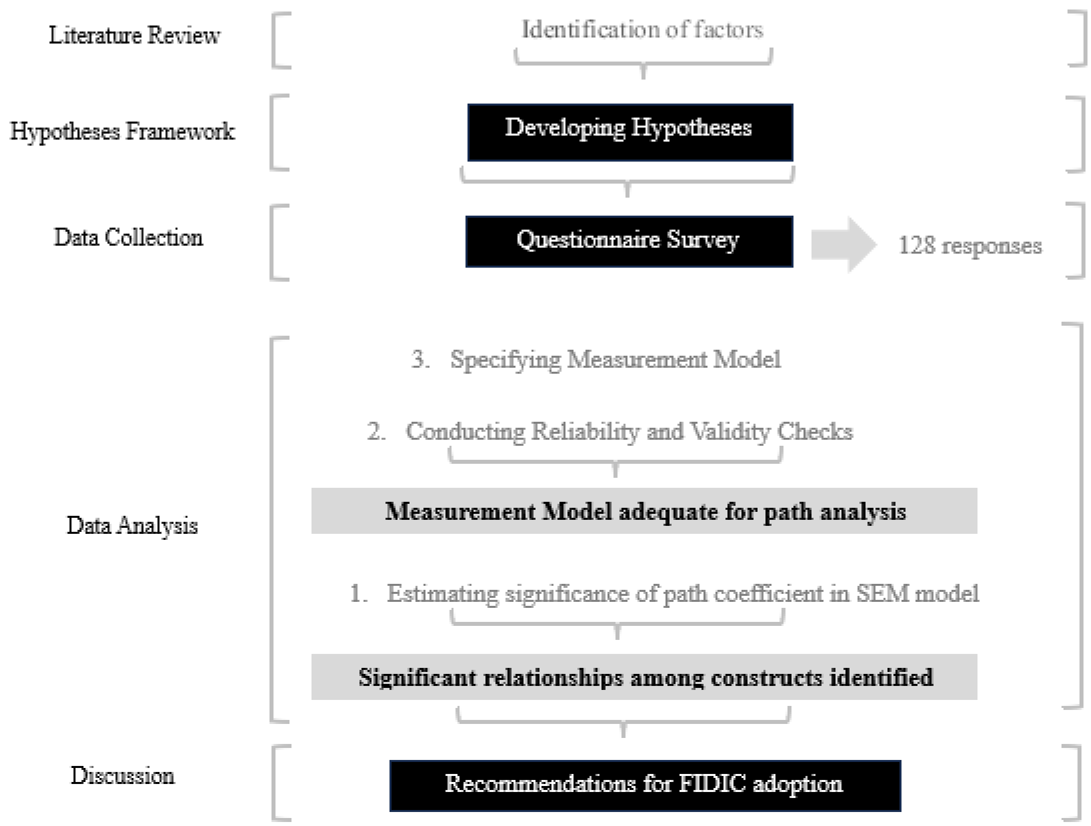

Figure 1: Research Framework

1.9. Thesis organization:

- **Chapter 1:**

The introduction chapter explores baseline background information about society's current practices and identifies research problem objectives while defining both study significance and research boundaries.

- **Chapter 2:**

The chapter reviews all essential literature concerning FIDIC 2017 introduction elements as well as construction industry adoption issues while exploring stakeholder readiness factors and how past research has approached construction contract frameworks implementation.

- **Chapter 3:**

The methodology section of this chapter details both the study approach and framework methodology.

- **Chapter 4:**

The current chapter demonstrates research outcomes by analyzing survey data together with SEM model application to determine factors influencing FIDIC 2017 adoption.

- **Chapter 5:**

The research findings and subsequent recommendations for future work are presented in this chapter.

CHAPTER 2: LITERATURE REVIEW

2.1. Scientometric analysis:

The scientometric analysis seeks to create an organized overview of research concerning FIDIC 2017 adoption while revealing important research areas and their connections in the construction industry domain. Creating visual relationship structures between basic concepts including "FIDIC," "knowledge," "readiness," "shift" as well as related elements "implementation" and "contract management" provides analytical clarity on their researched interactions. The visualization system presents keyword prominence through node size yet graphical representation of word associations happens via line thickness between nodes. The findings unveiled separate research categories which investigate "readiness" with "adoption" together and examine "dispute resolution," "legal challenges," as well as "jurisdiction" in another distinct group. Our analysis exposes essential research voids while advancing knowledge about the ongoing discussions concerning FIDIC 2017 adoption together with its construction industry impacts (Elashmawy et al., 2024).

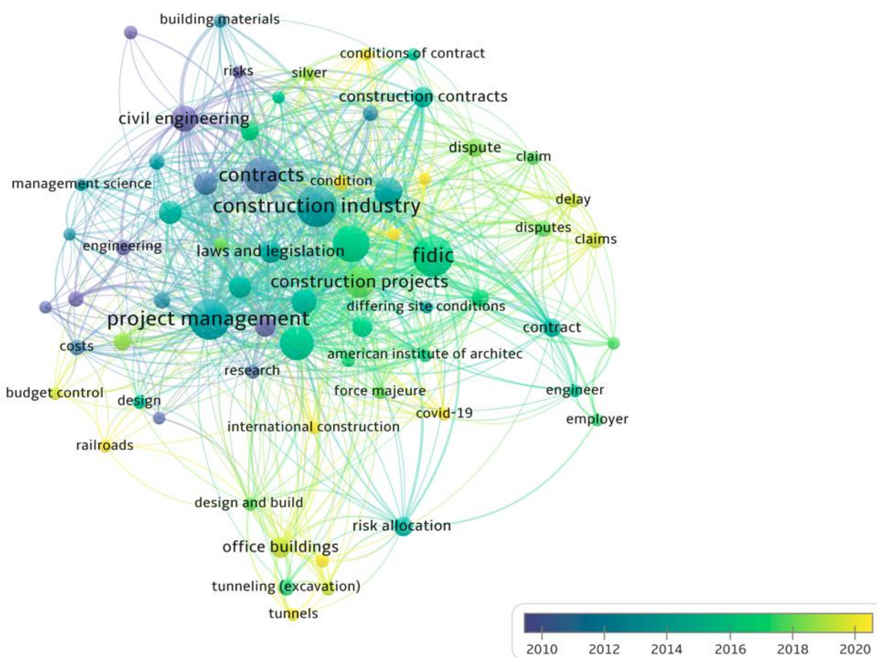

Figure 2: Co-occurrence of keywords more than 5

2.2. Contract Management and Dispute Resolution in Construction Projects

Both the complexities of contract administration and dispute resolution methods during construction projects have been heavily researched. (Mohamed Abdel-Hamid & Alaa El-Din Mostafa, 2023) present their 2023 investigative work of an Egyptian case which shows how negligent contract management practices led to extensive operational dysfunction that required the attention of the law. The analysis proves that arbitration costs amounted to 74 billion Egyptian pounds over ten years that validate the necessity of effective contract administration. (Barakat et al., 2020) deals with the recent changes which affect dispute resolutions specific to FIDIC contracts. The improved claims and dispute protocols engineers take through improve operational efficiencies for employers, shortening the resolution periods and improving the consultation value. According to (Barakat et al., 2020), the engineers have new responsibilities both regarding mediation and in court as judges in court cases. For engineers to be fair in the conflict's resolution processes their professional actions must remain unbiased. Practical viewpoints are incorporated by (Fawzy & El-adaway, 2012) to describe how World Bank funded project contractors resolve disputes through FIDIC contract terminologies and important site conditions management guidelines as well as force-majeure incidents and construction slowdown.

2.3. Barriers to Contract Adoption and Project Implementation Challenges

Research in this field has identified many roadblocks in construction contract implementation. analysis of contract clause clarity of Sri Lankan infrastructure projects indicates that with more poorer design choices, potential legal disputes are likely to escalate by contract adjustments ambiguities. According to the research, it is necessary to have standardized terminology in contractual documents to avoid misunderstanding between involved parties. (Zhao, 2022) pushes the envelope into analysis methods for proving loss of productivity in FIDIC construction agreements by providing action ready guidelines for operational contract assessment. (Kunkcu et al., 2023) showed that technology system challenges together with financial limitations and digital security threats are among the 20 factors stopping the implementation of smart contracts in construction projects. Specifically, the work shows how clearing such obstacles is a critical step in making smart contracts that simplify contract management and boost project efficiency.

2.4. Technological Innovations and Their Role in Transforming Construction Practices

The primary area of research is BIM, smart contracts and blockchain as transformation tools in construction practices (Alnaser et al., 2024) created an SEM framework for assessing how ready the construction companies are to integrate BIM and DT in the sustainable building of methodologies. In examining factors that were examined to show the adoption of BIM-DT system, the research noted correct cost control approaches and methods of resource distribution and team willingness to change as essential factors. With smart contracts, blockchain technology, (Weerapperuma et al., 2023a) developed research that extends blockchain applications, providing a strategic framework to enable construction companies to overcome blockage barriers and pursue digital transformation. The innovative NLP system developed by (Shuai, 2023) is designed to expose contractual risk shifts in the contracts (engineering contracts) to help contractors understand possible risks and reduce possible risks while (Saqib et al., 2023) further explores critical factors facilitating the adoption of E-IRS technology in developing countries amongst construction companies to advance construction companies' modernization efforts of successful E-IRS technology adoption and which suggests that ease of use along with trust and perceived social influence of most importance.

2.5. Social and Organizational Dynamics in Project Management

Construction projects depend on social and organizational elements such as trustworthiness, teamwork cooperation and efficient communication for their successful outcomes (Hashim et al., 2022) analyze the influencing factors trust and opportunism have on team cooperation during projects. According to their results team member trust leads to greater cooperation but client manipulation results in reduced team cooperation. The research promotes building trust among participants to strengthen project coordination mechanisms while (Rashed & Mutis, 2023) into Integrated Project Delivery systems shows that project success depends on effective participation and communication along with the integration of construction processes. Successful IPD implementation requires team member involvement as the most significant component. An SNA study conducted by (Alnaser et al., 2024; Bolhassan et al., 2022; Ghaly et al., 2024) examines construction project management issues to show that inadequate planning systems financial limitations together with flawed managerial decisions represent primary barriers to project success. Application of Social Network Analysis (SNA) might generate crucial knowledge for solving project management challenges alongside boosting team collaboration capacity according to the study.

Table 1: Constructs with their indicator

Construct	ID	Variables	Source
Organizational preparedness and available support (OPAS)	V2	Client organizations are showing leadership and management commitment to adopting the contract framework.	(Alnaser et al., 2024; Bolhassan et al., 2022; Ghaly et al., 2024)
	V3	Top management support.	(Shang et al., 2024)
	V5	Organization is motivated to adopt contractual framework.	(Rashed & Mutis, 2023)
	V20	Consensus (fear, anxieties) regarding the influence of conditions of contract implementation on the role of client, consultant and contractor.	(P. Singh et al., 2024)
	V21	Consensus regarding stakeholders regarding contract framework implementation.	(A. K. Singh et al., 2024)
Perceived compatibility (PC)	V11	Stakeholder technical expertise to adopt conditions of contract.	(Kunkcu et al., 2023)
	V13	Conditions of contract are compatible with current process and practices in organization.	(Weerapperuma et al., 2023a)
	V14	Conditions of contract are aligned with the needs of organization.	(Kunkcu et al., 2023)
	V15	Conditions of contract are consistent with your organization's work practices.	(Weerapperuma et al., 2023a)
	V22	Resistance to change among stakeholders when adopting conditions of contract.	(A. K. Singh et al., 2024)
Awareness of socio-economic	V8	Stakeholders are aware of the economic benefits of adopting conditions of contract.	(Weerapperuma et al., 2023a)

benefits (ASEB)	V9	Stakeholders are aware of the social benefits associated with the contract conditions.	(Ghaly et al., 2024; A. K. Singh et al., 2024)
	V10	Stakeholders are interested in adopting contract conditions for financial benefits.	(Rashed & Mutis, 2023)
Perceived ease and process related benefits (PEPRB)	V7	Contract conditions are relatively easy to understand and implement.	(Alnaser et al., 2024; Bolhassan et al., 2022; Hussain, 2024)
	V12	Project in region which has used contract conditions and can serve as an example for future projects.	(Weerapperuma et al., 2023a)
	V16	The use of contract framework enhances the auditability.	(Weerapperuma et al., 2023a)
	V17	The use of contract framework improves accountability.	(Ameyaw et al., 2023; Badi et al., 2021; Boadu et al., 2020; Bolhassan et al., 2022; Gurgun & Koc, 2023; Kunkcu et al., 2023)
	V18	Use of conditions of contract leads to increased efficiency and effectiveness in project execution.	(Weerapperuma et al., 2023a)
	V19	Stakeholders understand time-saving advantages from contract framework adoption.	(Kunkcu et al., 2023)
Resources available for adoption (RAA)	V1	Adequate resources and funding available to facilitate contract adoption.	(Badi et al., 2021)
	V4	Government support is available for the adoption of forms of contract.	(Alnaser et al., 2024; Shang et al., 2024)
	V6	The organization is willing to invest in staff training.	(Lau et al., 2019)

Moderating Variable (MV)	Y1	Respondents' Years of Professional Experience

2.6. Hypothesis framework:

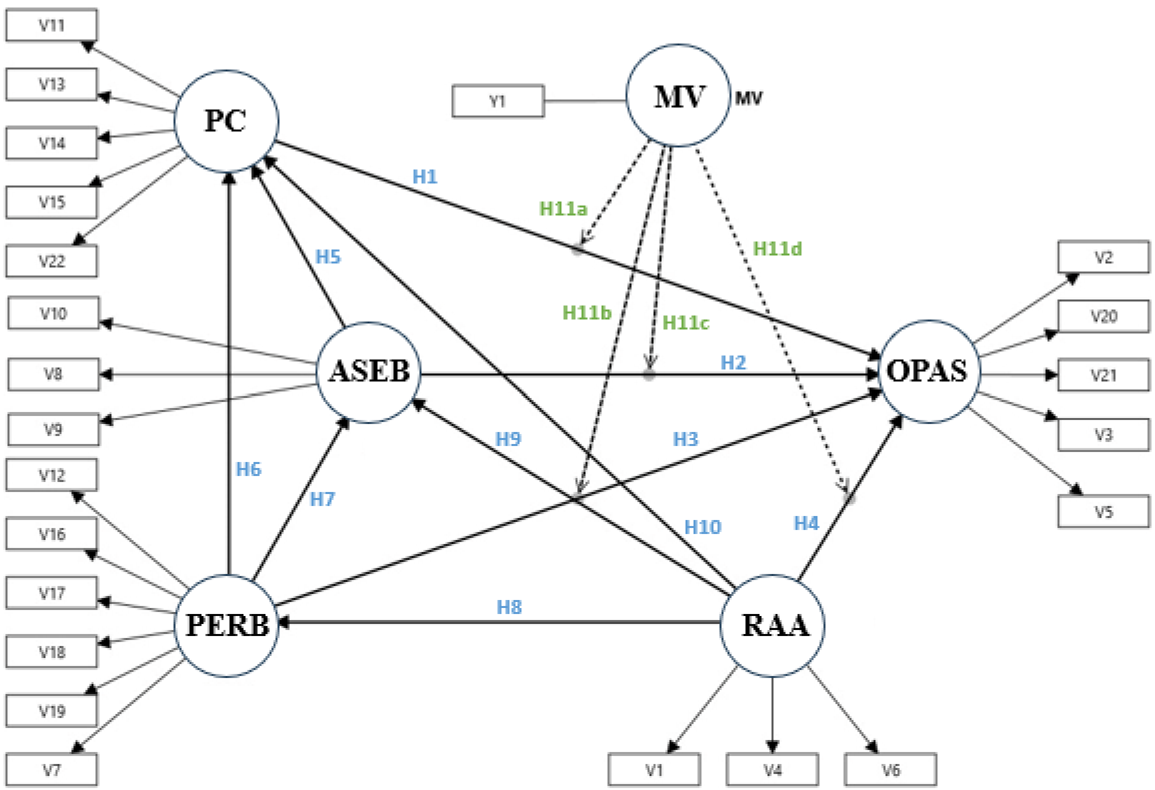

Figure 3: Hypothetical model.

The TOE framework establishes a solid theoretical basis for exploring adoption factors of FIDIC 2017 within the construction industry. This framework consists of three critical dimensions: Each dimension of FIDIC 2017 critical acceptance assessment which includes technological organizational and environmental influences considerable stakeholder readiness toward innovation (Malik et al., 2021).

The scope of the technological analysis (Al Hadwer et al., 2021) explores which technological aspects drive adoption. Regarding the compatibility with FIDIC 2017 and contemporary technologies, current available technological systems, needed software infrastructure and digital complexity, FIDIC 2017 is evaluated. While the stakeholder can implement FIDIC 2017 through their operations effectively, it heavily depends on the availability of technical assistance, FIDIC 2017 knowledge and training solutions. Assessing stakeholder readiness to enact FIDIC 2017 hinges completely on comprehending the mentioned technology requirements.

Organizational dimension within organizations and other stakeholder groups is defined by internal company aspects as well as stakeholder organization practices. One view of organizational culture indicates that it speaks of the level at which an organization welcomes change and innovation. Financial reports, human resources capabilities and physical assets form process resources, but also need management levels of support throughout the adoption implementation. Adoption organizations need strong leaders who can demonstrate unwavering commitment when new frameworks are added to the technology platform. Employees skilled and knowledgeable in the 2017 edition of the FIDIC are crucial drivers of successful FIDIC 2017 implementation. Insights from the organizational factors examined give insights into stakeholders' preparedness to adopt the new process.

The environmental dimension refers to factors indigenous to the external environment that provoke organizational choice to practice FIDIC 2017. Both governmental and industry bodies enforce regulatory pressure through specific mandates to require adoption of framework and therefore the resulting frameworks are standardized(Weerapperuma et al., 2023). Major influences on competitive advantage include both industry movement toward standardized construction contracts and market competition forcing firms to adopt new frameworks. External stakeholders that campaign for the adoption of FIDIC 2017, as with clients and contractors, and in the background, business partners, create choices in the adoption of the contracts.

The TOE framework allows for detailed analysis of technological elements, organizational structures and elements of environment which has an impact on determining stakeholders' readiness to FIDIC 2017 adoption (Awa et al., 2017). These connected factors are important to decision-makers and stakeholder preparedness because they should be examined comprehensively since they all have a collective impact. To identify the factors guiding the construction businesses' adoption of FIDIC 2017, the process of adoption is examined, uncovering internal organizational skills, as well as external industry pressures.

CHAPTER 3: METHODOLOGY

This investigation addresses the preparation of Construction Industry stakeholders to move towards the adoption of FIDIC 2017 standards, through a structured research design. The research team conducts an initial study segment that includes foundational research with gap analysis, to provide problem statements and objective research specification. Researchers performed a literature analysis to determine theoretical foundations and relevant factors within the field of study first through critical appraisal of the existing literature as well as using scientometric methods. The identification of factors involves the development of questions with follow-on polling adjustments. After this, researchers create a hypothetical model by conducting both data screening steps and gathering inputs through administered survey instruments. Quantitative analysis of relationships among different variables to base up SEM. enables measurement models (Hair & Alamer, 2022). This research shows strategies for implementing FIDIC 2017 after studying results and forging discussions on actionable recommendations.

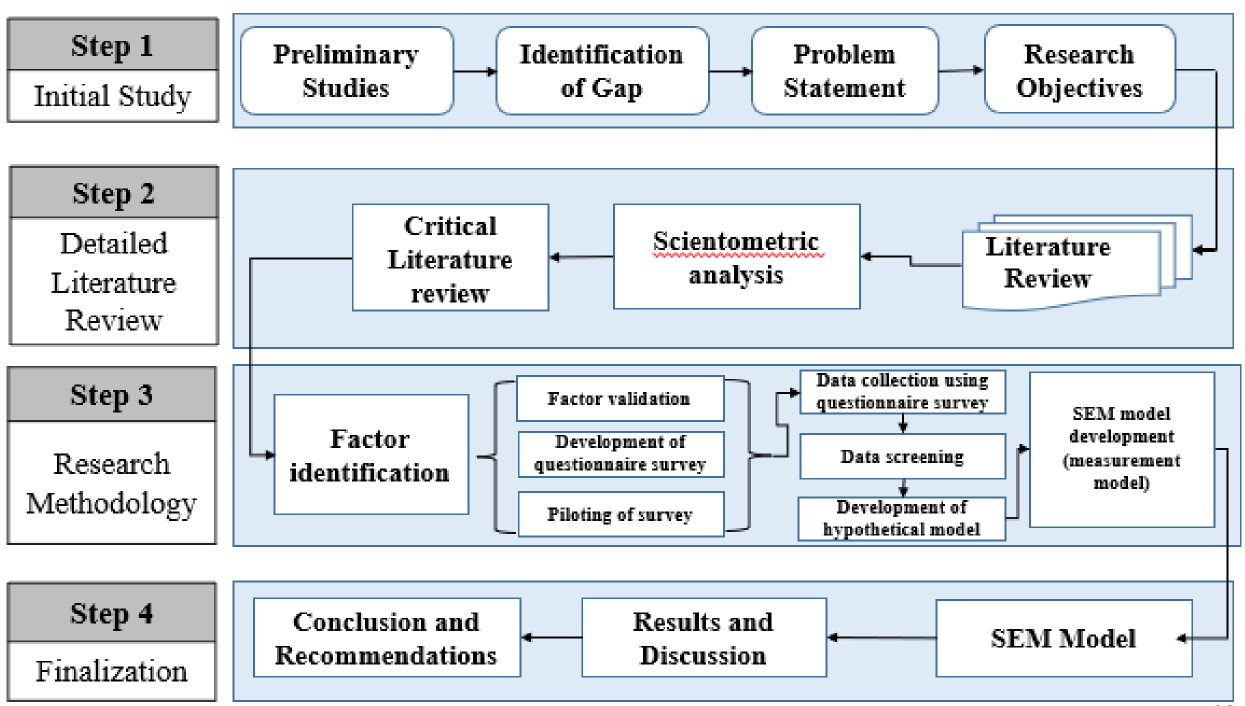

Figure 4: Flowchart of Research Methodology

3.1. Data collection:

This research employs a data collection strategy which validates the study results and satisfies its objective of evaluating construction industry stakeholders' preparation to implement FIDIC 2017. Researchers created a structured questionnaire based on findings from a thorough literature review which identified essential readiness factors. The structured instrument investigates stakeholder viewpoints about FIDIC 2017 across five dimensions including awareness levels alongside perceived benefits and organizational capacity followed by legal compatibility and training requirements. Researchers implement a preliminary test of the questionnaire using a limited stakeholder subset to evaluate reliability and clarity levels. The instrument design is enhanced for better accuracy and clarity by examining feedback from the pilot survey.

The research focuses on important construction industry members including contractors alongside consultants and owners and overseeing regulatory organizations. The study team selected participants who possess relevant FIDIC contract experience through purposive sampling techniques. The research required sufficient sample size that fulfills SEM needs which supports accurate model development. The survey reaches a vast range of connected professionals when it's distributed across LinkedIn, Quora and email networks. Researchers give clear directions to participants while promising confidentiality so they will provide complete honest survey information. After all data collection effort concludes experts perform thorough evaluations of data to confirm its completeness along with its consistent and accurate structure. We address incomplete and incorrect data entries then process all data through statistical software to create SEM-capable datasets.

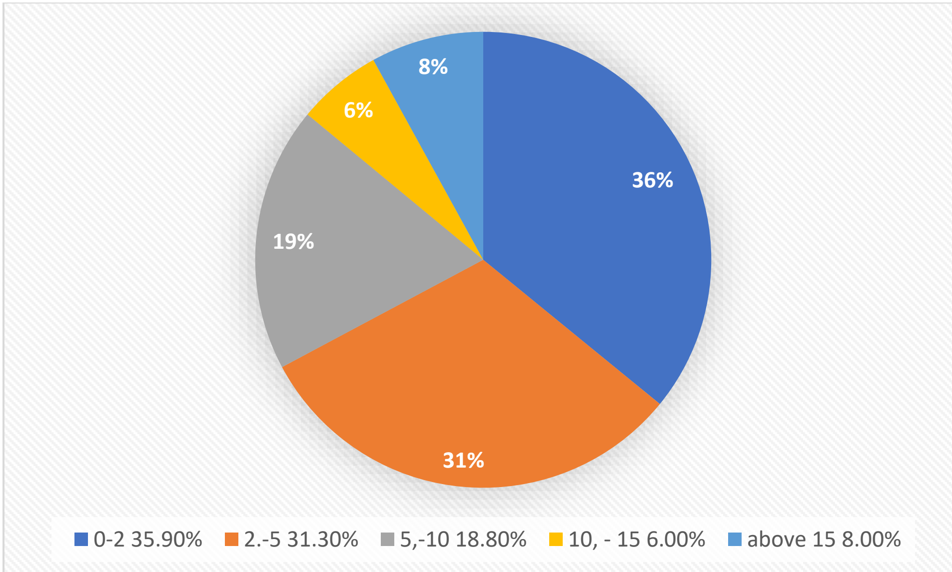

Figure 5: Respondents' current role in the construction industry.

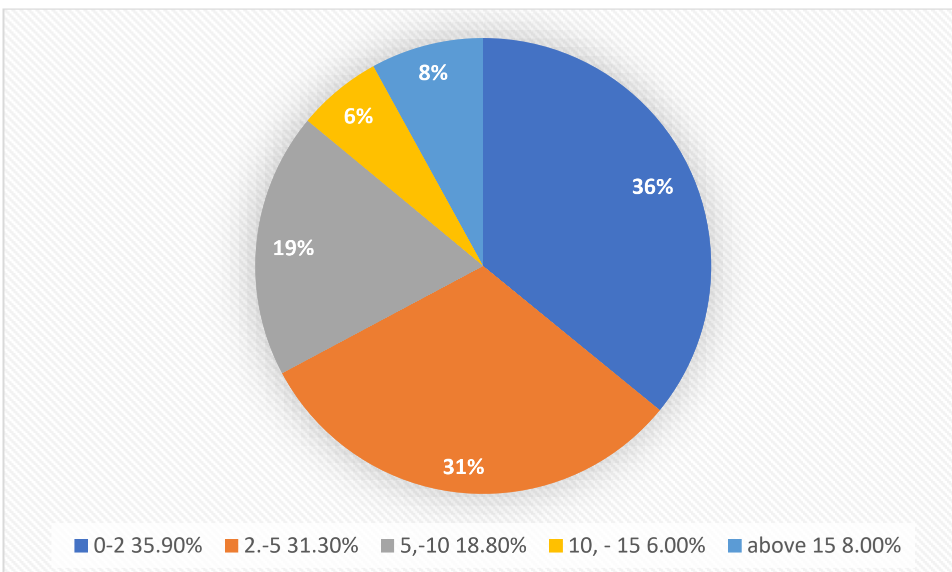

Figure 6: Years of experience of respondents.

3.2. Data analysis:

The research study analyzed data using Partial Least Squares Structural Equation Modeling (PLS-SEM) because this powerful statistical method investigates intricate dataset connections. The study selected PLS-SEM for its ability to analyze multiple relationships between variables (Hair & Alamer, 2022) at once since this functionality suits well the evaluation of construction industry stakeholders' preparedness for FIDIC adoption. The study evaluated variables of awareness and training as well as organizational culture and legal environment and perceived benefits which researchers selected from past findings due to their impact on stakeholder readiness. The study employs PLS-SEM because it accurately represents the interconnected variables and together generates a complete perspective on their effects regarding stakeholder readiness. Traditional methods such as simple regression and descriptive statistics do not consider measurement error (Bagozzi & Phillips, 1982), yet PLS-SEM integrates its solution which achieves improved accuracy and reliability in results. In this research false readings could occur during surveys making it imperative to assess measurement errors in data collection to achieve reliable survey results. PLS-SEM conducts exhaustive model fit examinations for researchers to judge how proposed models match observed data improving both validity and reliability of the results. Through simultaneous equation estimation PLS-SEM examines reciprocal associations between variables which may influence each other. The study shows bidirectional relationships between variables like awareness and training with stakeholder readiness which PLS-SEM captures successfully. PLS-SEM enables researchers to model direct alongside indirect variable relationships which helps to investigate the mediating and moderating roles among different variables.

PLS-SEM stands out for the study because it can manage complex models that contain both multiple constructs and indicators for better analysis of stakeholder readiness within its many dimensions. PLS-SEM demonstrates strength with limited sample sizes typical of construction industry research while providing suitable tools for exploratory studies that seek to define unclear variable relationships (Darko et al., 2018). The research analysis first verified construct reliability and validity by evaluating the measurement model. The study analyze internal consistency reliability by utilizing Cronbach's alpha and composite reliability while confirming convergent validity using average variance extracted (AVE), and discriminant validity through the Fornell-Larcker criterion and heterotrait-monotrait (HTMT) ratio. The research analyzed the connections between the constructs through structural model testing during the investigation process. Statistical analysis began with the estimation of path coefficients to measure relationship strength and significance then the evaluation of predictive power through the determination of coefficient R^2 while the model for potential mediating and moderating effects testing continued when applicable. To confirm robust results from the analysis researchers utilized bootstrapping across 5000 samples. The bootstrapping technique produces precise estimates for both standard errors and confidence intervals about path coefficients to guarantee dependable findings. Bootstrapping performs well with PLS-SEM since it functions without normal data distribution assumptions.

Bootstrapping analysis was used to calculate path coefficients and significance levels which evaluated study-generated hypotheses regarding stakeholder readiness influenced by awareness levels and training and legal conditions (Hair Jr et al., 2014). The PLS-SEM analysis results supplied practical information to improve stakeholder readiness which called for specific training programs, awareness initiatives and policy interventions. The research investigated how awareness about FIDIC 2017 positively impacts stakeholder readiness together with training effects on preparedness and organizational culture plus legal environment compatibility on adoption. Research results combined to form a full understanding of stakeholder readiness determinants, and they set up foundational measures that facilitate professional construction industry acceptance of FIDIC 2017. Applying PLS-SEM and a bootstrapping method with 5000 samples enabled strong result reliability on which this study establishes its meaningful impact among construction management researchers focused on contract adoption.

The study uses Table 1 for presenting measurement model variables alongside structural model constructs. The researcher must evaluate both reliability and validity of observable variables when measurement and structural models become established (Hair Jr et al., 2014). The measurement model verification ensures correct application during path analysis procedures. The analysis of internal consistency reliability and both convergent and discriminant validity for measurement models shows results in Table *2*.

Table 2: Checks related to reliability and validity of measurement models.

Checks	**Measures used**	**Recommended values**
Internal consistency reliability	Cronbach's alpha coefficient	0.6-0.8
	Composite reliability scores	>0.70
Convergent validity	Factor loading	=>0.70
	AVE (average variance extracted)	=>0.5
Discriminant validity	Construct's variance with its observable variables should	

	be greater than its variance with any other construct	
	Observable variable's loading on its corresponding construct should surpass the cross loadings on other constructs	

The hypothesized relationships between constructs are represented through path coefficients (Hair & Alamer, 2022) research needs to validate path coefficient significance through estimation once measurement models show proven reliability and validity to properly evaluate structural model hypotheses. The bootstrapping technique served our requirement for distribution estimation because the method allows prediction of statistics distribution independently of the underlying population distribution. The research implemented 5,000 bootstrap subsamples to match the total number of responses which equaled 102 cases following (Hair Jr et al., 1986) recommendations. Our two-tailed test employed critical t-values of 1.96, 2.58 and 1.65 to reflect significance levels of 5%, 1%, and 10% correspondingly according to (Hair Jr et al., 2014). We present and analyze data from our study in the following sections.

CHAPTER 4: RESULTS AND DISCUSSION

4.1. General

Results from the research methodology which assessed construction industry stakeholder readiness for FIDIC 2017 adoption are shown in this study. We gathered data concerning awareness levels organizational capacity compatibility of existing laws benefits perceptions and training requirements using a survey tool created from comprehensive literature research. Through Structural Equation Modeling using Smart PLS researchers removed variables with factor loadings below 0.70 to maintain measurement model accuracy. A structural coefficient reliability measurement attained an R^2 score of 0.72 which explains how 72% of stakeholder readiness variation could be traced back to the behavioral model. Bootstrapping provided evidence of path coefficient significance which established the necessary understanding for readiness determinants. Research findings determine main readiness factors and reveal critical areas of intervention to facilitate effective transition to FIDIC 2017 and deliver concrete guidance for decision-making plus strategic adoption advancement in construction companies.

4.2. Analysis of measurement model:

The measurement model created in this analysis examined how constructs were linked to their respective indicators for the Structural Equation Modeling (SEM) process to validate the reliability of variables. The study model incorporates Organizational Preparedness and Available Support together with Perceived Compatibility and Awareness of Socio-Economic Benefits and Perceived Ease and Process-Related Benefits as well as Resources Available for Adoption acting as core constructs and Respondents' Years of Professional Experience serves as the moderating variable. Specific observable variables present precise representations of each construct which appear in the measurement model diagram (see Figure 7).

The study examined the measurement model to verify the constructs, and their indicators were reliable and valid. The analysis focused on three key aspects: outer loadings, internal consistency reliability, and convergent validity and average variance extraction AVE as shown in Table 3. Our analysis showed that all constructs passed the established thresholds thus confirming the measurement model's strength.

The dataset for Organizational Preparedness and Available Support shows robust indicator performance since the outer loadings for variables V2, V3, V5, and V21 stayed between 0.769 and 0.828 which surpasses the reliability threshold of 0.7. Research findings reveal that the construct, shows robust internal consistency, demonstrated through a Cronbach's Alpha of 0.808 and Composite Reliability at 0.874 which surpassed the minimum accepted cutoff figure of 0.7. Convergent validity was established through the construct's Average Variance Extracted score of 0.635 which shows that the construct, accounts for more than 63% of its indicators' variance (see Table 3).

Observed variables V11 through V15 for Perceived Compatibility demonstrated strong outer loadings with values ranging between 0.700 and 0.872 exceeding the benchmark 0.7. The construct obtained evidence of solid internal consistency as shown by Cronbach's Alpha score of 0.798 together with Composite Reliability that reached 0.870. Ave of 0.627 established convergent validity because the construct explained over 62 percent of its indicator variance.

Regarding Awareness of Socio-Economic Benefits, the observed variables (V8, V9, V10) achieved strong outer loadings that fell between 0.829 and 0.851. Internal consistency results where strong as gyroscopic measurement data indicated a Cronbach's Alpha of 0.797 together with a Composite Reliability measurement of 0.880. The construct revealed convergent validity when the AVE reached 0.710 so that the construct accounted for 71% of variance across its indicators.

Observed variables V16 through V18 and V7 for Perceived Ease and Process-Related Benefits maintained robust outer loading metrics from 0.752 to 0.935. Cronbach's Alpha determined the construct's excellent internal consistency at 0.876 besides Composite Reliability verified it at 0.915. AVE measures at 0.730 validated that this construct accounts for over 73% of the variance among its indicators.

The observed variables for Resources Available for Adoption display strong outer loadings through V1, V4, and V6 which measure from 0.710 to 0.786. Evaluating internal consistency, the construct demonstrated an acceptable level which yielded a Cronbach's Alpha result of 0.603 (perceptibly below the 0.7 threshold which remains acceptable for exploratory research) and produced a Composite Reliability score of 0.789. AVE results of 0.556 indicated strong convergent validity because the construct accounted for more than 55% of its indicators' variances.

The measurement model shows rigor that enables precise construct representation which meets analysis requirements in the structural model (see Figure 7). It establishes a strong base from which researchers can examine the relationships in their hypotheses to determine how prepared stakeholders are to implement FIDIC 2017.

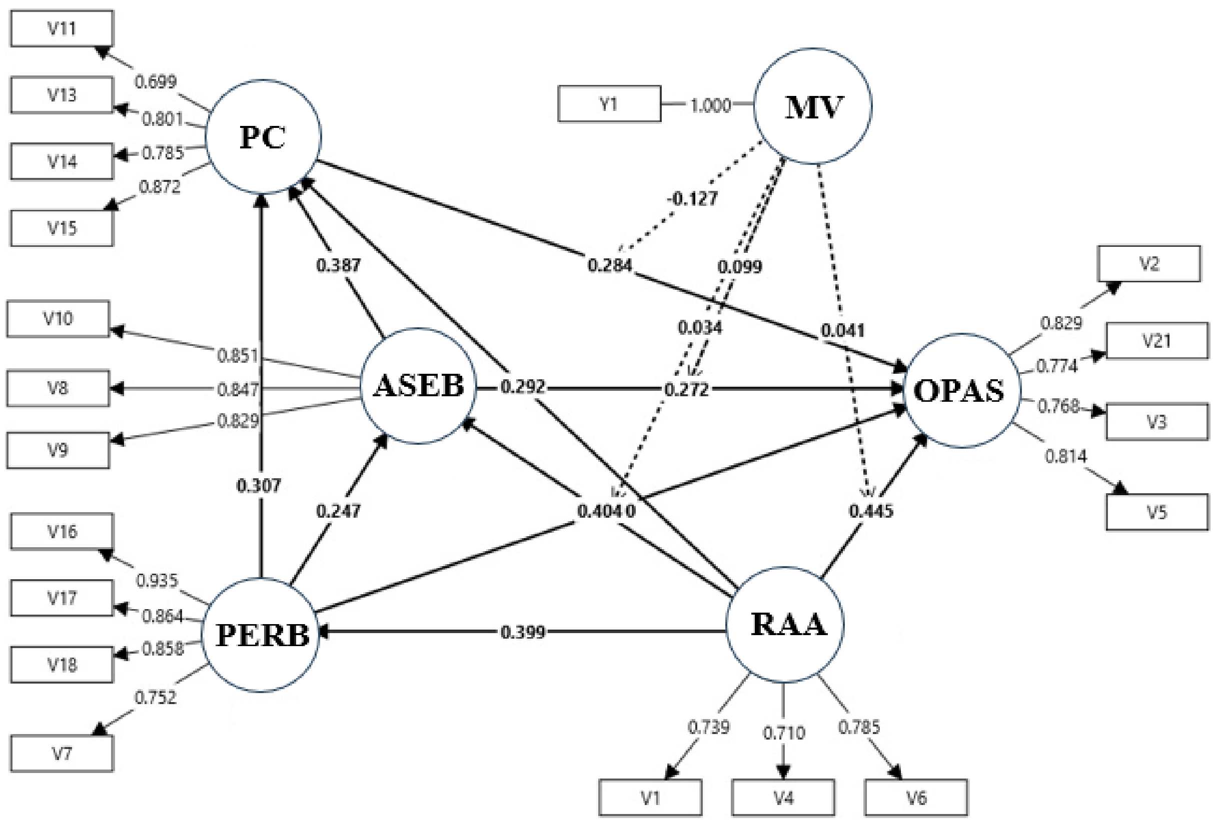

Figure 7: Measurement model

Table 3: Evaluation of measurement model

Construct	Observed variables	Outer loading	Cronbach's alpha	Composite reliability	AVE
Organizational preparedness	V2	0.828	0.808	0.874	0.635
	V3	0.769			
	V5	0.815			

and available support	V21	0.772			
Perceived compatibility	V11	0.700	0.798	0.870	0.627
	V13	0.802			
	V14	0.785			
	V15	0.872			
Awareness of socio-economic benefits	V8	0.842	0.797	0.880	0.710
	V9	0.829			
	V10	0.851			
Perceived ease and process related benefits	V16	0.935	0.876	0.915	0.730
	V17	0.864			
	V18	0.858			
	V7	0.752			
Resources available for adoption	V1	0.739	0.603	0.789	0.556
	V4	0.710			
	V6	0.786			

4.3. Discriminant validity:

The measurement model relies on discriminant validity because it verifies construct uniqueness by removing any overlapping measurement areas. To assessed discriminant validity by the Fornell-Larcker criterion which dictates that the square roots of Average Variance Extracted values for each construct should exceed their correlation coefficients with other constructs (see Table 4). Constructs establish their distinctiveness through better shared variance with their indicators than with any other constructs in the model confirming their clear definition.

Researchers determined that discriminant validity remained strong across all examined constructs. The square root of the AVE score for Awareness of Socio-Economic Benefits at 0.843 surpassed all correlation values which stood between 0.409 and 0.673 with other constructs. Organizational Preparedness and Available Support displayed better discriminant validity since the square root value for AVE (0.797) was higher than all its construct correlations which ranged between 0.459 to 0.754. Regarding Perceived Compatibility, the AVE square root value of 0.792 exceeded the construct correlation spectrum which varied between 0.581 and 0.741. The Perceived Ease and Process-Related Benefits construct confirmed strong discriminant validity because its square root of AVE value of 0.855 exceeded its correlations with construct metrics which varied between 0.399 and 0.581. Within Resources Available for Adoption, the square root of AVE (0.745) stood above all other construct correlations which fell between 0.399 and 0.754.

Table 3 proves complete differentiation between every construct within the measurement model because they show no intersections among each other. Distinct measurement indicators allow both structural model evaluation and construct relationship interpretation to occur through unique construct tracking methods. Studies demonstrate that high discriminant validity between model constructs supports research reliability while confirming accurate construct representations throughout stakeholder readiness measures for FIDIC 2017 concerning the preserved dimensions of construct evaluation as shown in Table 4.

Table 4: Discriminant validity of constructs

Construct	**Awareness of socio-economic benefits**	**Organizational preparedness and available support**	**Perceived compatibility**	**Perceived ease and process related benefits**	**Resources available for adoption**
Awareness of socio-economic benefits	0.843				
Organizational preparedness and available support	0.673	0.797			
Perceived compatibility	0.659	0.741	0.792		
Perceived ease and process related benefits	0.409	0.459	0.581	0.855	

Resources available for adoption	0.503	0.754	0.609	0.399	0.745

4.4. Cross loadings:

Non-discrimination validity was tested through cross loading analysis which compared relationships of observed variables to their respective constructs and other constructs in the measurement model. The analysis shows that each indicator demonstrates greater strength on its correct construct relative to others proving distinct and clear definitions between constructs.

Expected constructs of Organizational Preparedness and Available Support received strong loadings from observed variables (V2, V3, V5, V21) which measured between 0.769 and 0.828. The primary construct loadings remained significantly above the cross-loadings which fluctuated between 0.367 and 0.669. The V2 variable demonstrated a loading measurement of 0.828 on its predetermined construct with specifically measured cross-loadings on alternative constructs which ranged between 0.398 to 0.644. The measurement indicators for Organizational Preparedness and Available Support demonstrate distinct construct specificity and remain separate from other constructs (see Table 5).

Authors found strong factor loadings from observed variables (V1, V4 and V6) to their proper construct between 0.710 and 0.786 regarding Resources Available for Adoption. The loadings for these observed variables exceeded their cross-loading values, which remained between 0.149 and 0.652. The intended construct loading for V6 measured at 0.786 while its other construct loading varied between 0.348 and 0.652. This finding establishes that the Resources Available for Adoption construct maintains its uniqueness.

The observed variables V11, V13, V14, and V15 related to Perceived Compatibility demonstrated strong loadings on their designated construct from 0.699 up to 0.872. All observed variable item loadings surpassed their cross-loadings on different constructs that showed values between 0.304 and 0.658. The intended construct of V15 showed a loading measurement of 0.872 as opposed to its cross-loadings which fell between 0.410 and 0.658 in other constructs. The indicators for Perceived Compatibility maintain distinctiveness because they do not show overlap with variables from other constructs.

The measured variables (V8 through V10) under the Awareness of Socio-Economic Benefits loaded strongly onto their desired construct between 0.829 and 0.851. Their primary construct loadings outperformed cross-loadings which extended from 0.287 to 0.673 on other constructs. V10 demonstrated a loading of 0.851 for its correct construct but achieved cross-loadings between 0.425 and 0.673 on different constructs. These empirical results establish that Awareness of Socio-Economic Benefits functions as a distinct construct.

The observed variables including V7, V16, V17, V18, showed robust loadings from 0.752 up to 0.935 when applied to the Perceived Ease and Process-Related Benefits construct. Data shows that measurements loaded considerably more strongly on their intended construct because their cross-loadings on alternative constructs varied between 0.240 and 0.628. Variable V16 achieved a load score of 0.935 for its primary construct but displayed lower cross-loadings between 0.343 and 0.523 on alternate constructs. The analysis demonstrates clear separation between the indicators identified for Perceived Ease and Process-Related Benefits and other measurement constructs.

Research reveals that all observed variables show stronger loadings for their specific constructs than for other constructs which confirms strong discriminant validity. This confirms that all constructs have unique boundaries which establish a solid base for subsequent structural model analysis. Our results confirm measurement model reliability and validity so that our construct representations accurately serve as the foundation for examining hypothesized study relationships.

Table 5: Cross loadings of observed variables

Constructs	ID	Organizational preparedness and available support	Resources available for adoption	Perceived compatibility	Awareness of socio-economic benefits	Perceived ease and process related benefits
Organizational preparedness and available support	V3	**0.769**	0.663	0.570	0.420	0.367
Organizational preparedness	V2	**0.828**	0.644	0.579	0.609	0.398

and available support						
Organizational preparedness and available support	V5	**0.815**	0.614	0.638	0.448	0.396
Organizational preparedness and available support	V21	**0.772**	0.475	0.574	0.669	0.296
Resources available for adoption	V6	0.652	**0.786**	0.556	0.355	0.348
Resources available for adoption	V1	0.478	**0.739**	0.357	0.342	0.392
Resources available for adoption	V4	0.539	**0.710**	0.427	0.435	0.149
Perceived compatibility	V15	0.658	0.503	**0.872**	0.531	0.410
Perceived compatibility	V13	0.546	0.480	**0.802**	0.439	0.533
Perceived compatibility	V11	0.576	0.478	**0.699**	0.699	0.304
Perceived compatibility	V14	0.554	0.461	**0.785**	0.403	0.602
Awareness of socio-economic benefits	V10	0.673	0.442	0.597	**0.851**	0.425
Awareness of socio-economic benefits	V8	0.516	0.391	0.571	**0.847**	0.287

Awareness of socio-economic benefits	V9	0.490	0.436	0.488	**0.829**	0.305
Perceived ease and process related benefits	V7	0.314	0.404	0.361	0.240	**0.752**
Perceived ease and process related benefits	V16	0.436	0.343	0.523	0.387	**0.935**
Perceived ease and process related benefits	V17	0.455	0.333	0.628	0.414	**0.864**
Perceived ease and process related benefits	V18	0.336	0.296	0.425	0.326	**0.858**

4.5. Analysis of structural model:

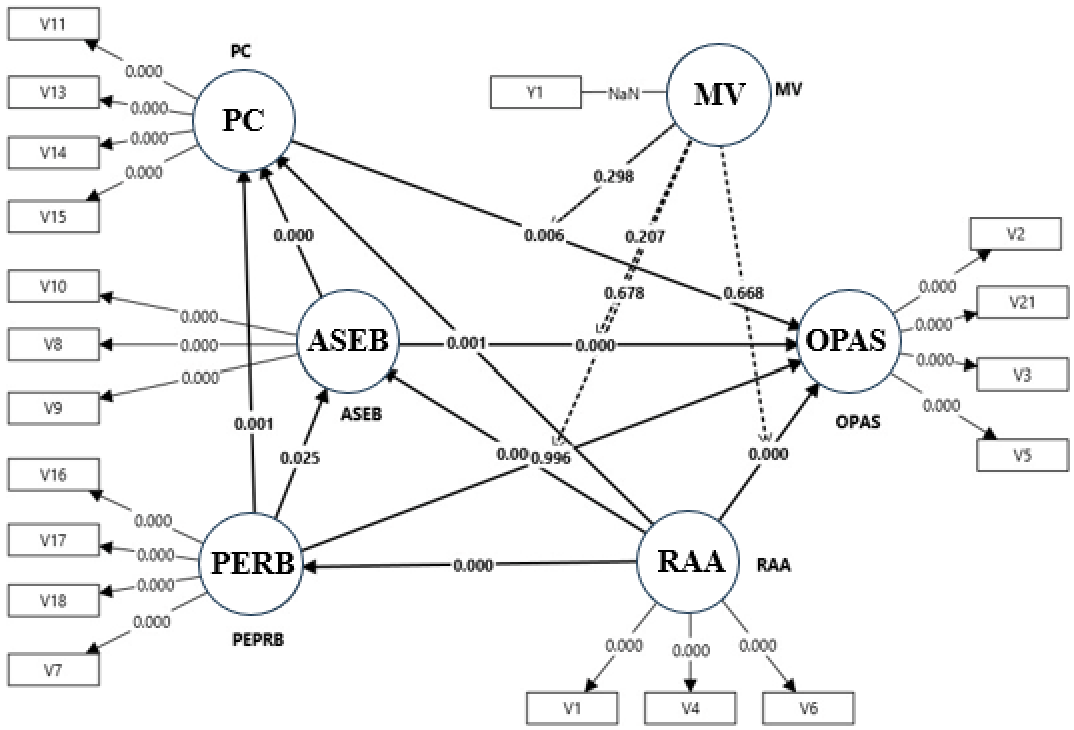

Figure 8: SEM model

To determine relationship patterns between identified constructs while testing hypothesized influences on Organizational Preparedness and Available Support (OPAS) during FIDIC 2017 adoption. The study applied Partial Least Squares Structural Equation Modeling (PLS-SEM) using bootstrapping with 5000 samples to validate the robustness and reliability of the analysis results. The research model covers Perceived Compatibility (PC), Awareness of Socio-Economic Benefits (ASEB), Perceived Ease and Process-Related Benefits (PEPRB), Resources Available for Adoption (RAA), and a Moderating Variable (MV) that tracks Respondents' Years of Professional Experience. The existing model achieved impressive predictive strength through an R^2 value of 0.72 which demonstrated that its constructs account for 72% of OPAS variability. The model demonstrates its power to capture essential factors affecting stakeholder readiness through its substantial R^2 measure (see Figure 8).

Table 6: Evaluation of structural model

Hypothesis	Path from hypothesis	Path coefficient	T statistics	p-value	Interpretation
H1	PC -> OPAS	0.282	2.792	0.005	*
H2	ASEB -> OPAS	0.270	3.756	0.000	***
H3	PEPRB -> OPAS	0.005	0.078	0.937	ns
H4	RAA -> OPAS	0.445	4.616	0.000	***
H5	ASEB -> PC	0.387	4.457	0.000	***
H6	PEPRB -> PC	0.307	3.475	0.001	***
H7	PEPRB -> ASEB	0.247	2.249	0.025	*
H8	RAA -> PEPRB	0.399	3.929	0.000	***
H9	RAA -> ASEB	0.404	4.206	0.000	***
H10	RAA -> PC	0.292	3.456	0.001	***
H11a	MV x PC -> OPAS	0.049	0.833	0.405	ns
H11b	MV x PEPRB -> OPAS	0.043	0.554	0.579	ns
H11c	MV x ASEB -> OPAS	0.108	1.483	0.138	ns
H11d	MV x RAA -> OPAS	-0.112	1.048	0.295	ns

Note: ns = not significant; * = significant at the p < 0.01 level; ** = significant at the p < 0.05 level; * = significant at the p < 0.1 level.**

The research demonstrated multiple meaningful direct associations. The study determined Organizations prepared better for FIDIC 2017 when they viewed these policies as fitting with existing operations, which proved a valuable link between perceived application compatibility and organizational readiness (Path Coefficient = 0.282, p = 0.005). Organizations which understand the social and financial value of FIDIC 2017 express stronger support for its implementation while displaying better Organizational Preparedness and Available Support (Path Coefficient = 0.270, p

= 0.000). The Resources Available for Adoption (RAA) indicator presented positive effects on OPAS with a Path Coefficient of 0.445 which reached statistical significance through p-value = 0.000 and demonstrated that suitable financial support and organizational resources are essential for organizational preparedness. The study revealed the Internal Process Benefits which incorporates Perceived Ease of Implementation demonstrated no significant direct effect on OPAS due to their weak path coefficient of 0.005 and p-value of 0.937 so ease remains not influential by itself for preparedness actions.

Significant indirect relationships emerged from the research findings in Table 6. The research results show that stakeholder awareness about socio-economic benefits leads to high Perceived Compatibility rates for FIDIC 2017 frameworks in their practices. The positive relationship between Perceived Ease and Process-Related Benefits (PEPRB) with Perceived Compatibility (PC) (Path Coefficient = 0.307, p = 0.001) shows that stakeholders who perceive the framework as easy to implement tend to assess it as fitting. The ease of implementation dictated by PEPRB positively affected ASEB with Path Coefficient = 0.247 and a significance value of p = 0.025 which demonstrates how implementation simplicity boosts stakeholders' recognition of socio-economic advantages. The Resource Available for Adoption (RAA) significantly improved three key indicators PEPRB at 0.399 (p = 0.000), ASEB at 0.404 (p = 0.000), and PC at 0.292 (p = 0.001) within the model. Organizations benefit from adequate resources which lead to perceived ease while also raising awareness and ensuring compatibility collectively building organizational readiness.

The investigation covered how Respondents' Years of Professional Experience (MV) played a moderating role between studied variables. The results showed a lack of support for all the hypotheses about moderating factors. The moderating role of MV showed no significance on the relationship among PC and OPAS (Path Coefficient = 0.049, p = 0.405) as well as between PEPRB and OPAS (Path Coefficient = 0.043, p = 0.579), ASEB and OPAS (Path Coefficient = 0.108, p = 0.138), or RAA and OPAS (The research indicates professional experience fails to have a meaningful impact on the interactions between these constructs and organizational preparedness systems.

4.6. Identification of neglected variables:

The analysis process eliminated variables V12, V19, V20, and V22 together because they demonstrated insufficient factor loading values. The strength of how well an observed variable represents its hidden theoretical construct can be determined through factor loading in structural equation models (SEM). These variables displayed factor loadings below the usual SEM threshold of 0.5 which serves as the foundation for acceptable measurement values.

Scientists excluded variables to maintain both the validity and reliability of their measurement model structure. The practice of excluding variables with low loading values results in a measurement model that focuses on significant contributing indicators for explaining latent construct variances and leads to better model fit along with improved interpretability.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion:

The research, Assessing the Readiness of Construction Industry Stakeholders to Adopt FIDIC 2017', investigates every factor that impacts on the construction industry stakeholders' efforts to adopt FIDIC 2017. Research results verify that effectiveness of the adoption of revised contract guidelines is contingent on stakeholder knowledge, organizational strength, regulatory environments and recognized benefits. This research utilizes Structural Equation Modeling (SEM) and robust quantitative techniques to enable data informed analysis of the interacting elements and demonstrates how these challenges and opportunities of the adoption process play out distinctly.

Critical requirements for focused learning programs with stakeholder education were established for bridging rebuke deficient areas identified by research. The study shows that the implementation of FIDIC 2017 must be supplemented with strengthening of regulatory support and stakeholder collaboration if both the organizational objectives and wider industry development targets are to be achieved. FIDIC 2017 will be simplified in terms of standardized contract practices through enhanced training accessibility, better awareness campaigns and strengthened private-public sector alliances.

Together with researchers, our research offers practical recommendations usable in academic discussions and industrial applications for practitioners and policymakers. Key results are presented, which clearly show that significant progress has been made in understanding FIDIC adoption metrics, while further study is necessary to examine the longer-term effects of and cross regional experiences with FIDIC 2017, to assess implementation effectiveness and success. Leading to study of the worldwide construction industry's modernization work, this research effort will also help establish standardized contractual practices.

5.2. Recommendations:

Based on the presented research, the following recommendations are made to enhance construction industry stakeholders' readiness to apply FIDIC 2017 standards. Organizations can show stakeholders how the FIDIC 2017 framework either aligns with existing practices and processes, or target training programs in conjunction with workshops equip organizations to demonstrate how the FIDIC 2017 framework can be aligned with organization's practices and processes. The practicality and use of FIDIC 2017 is something construction industry stakeholders can gain when they execute it on smaller pilot projects which can be transferred to larger projects. Certain FIDIC 2017 contract terms are subject to modification, when necessary, for them to fit into both local regulatory requirements and position operational processes of organizations.

An essential element is the distribution of knowledge about Socio Economic Benefits. Educational efforts must be driven by both government institutions as well as industry organizations to demonstrate the economic benefits of working in a dynamic environment (reduced expenses and risk), and the social benefits (improved project execution results and stakeholder satisfaction). Examples of projects that adopted FIDIC 2017 successfully expose stakeholders in the knowledge of FIDIC 2017 benefits. Economic benefits such as tax reductions and subsidies can help the government to increase their rate of adoption in organizations of FIDIC 2017.

Adoption of new systems requires securing enough resources for effective implementation. FIDIC 2017 requires government support to organizations for financial as well as technical help in the forms of award of funding or lines of credit at reduced interest rates and provision of professional consulting services. The organization needs to allocate the budget to technical training programs that often create the necessary expertise for success. Project managers are responsible for finding the proper time between their personnel and technology resources to successfully deploy the system.

The study showed that Perceived Ease and Process Related Benefits have no direct influence on organizational readiness but have indirect impact on the organizational readiness through enhancing the Perceived Compatibility together with Awareness of Socio-Economic Benefits. To assist with the adoption of FIDIC 2017, industry bodies must produce easy to follow guidelines, and clear documentation to promote better stakeholder understanding. When stakeholders have technical support and expert advice available to them, management of the complexity of contract framework comprehension becomes manageable. In order for FIDIC 2017 to be fully integrated into an organization’s work, organizations must take the steps needed to optimize the processes they already have in place. Though with many years of professional experience the model relationships were not significantly modified, experienced professionals are still essential for adoption facilitation. Job experience organizations should consider having professionally experienced mentoring programs in place, as seasoned organizations help out the less experienced staff on FIDIC 2017 processes. FIDIC 2017 needs to be driven by the organizational adoption by the senior leaders and experienced project managers. Senior engineers that have implemented FIDIC 2017 need to highlight their best practices to share experience and increase use of it within the industry. This research has important implications for policymakers and industry regulators. They should develop regulatory guidelines that either compel or endorse the use of FIDIC 2017 in public infrastructure project development by the public administrations. Achieving uniformity and cutting out contract confusion requires that industry organizations develop standardized contract practices based on FIDIC 2017 principles. Resolution of difficulties such as the development of resistance to change and a lack of awareness among potential adopters require collective efforts of policymakers joined with industry stakeholders. The work provides strategic planning guidance to organizations which are about to adopt FIDIC 2017. An essential first phase is a ready assessment to determine deficiencies in understanding and resource and procedural requirements. Including clients, contractors, and consultants in an adoption phase works well if such an activity is present because organizations can negotiate and address concerns about changes from the beginning. Continuous improvement approaches can improve adoption to organizations that constantly adjust their implementation strategies through feedback analysis.

5.3. Practical implementation:

This research led to meaningful pragmatic conclusions for stakeholders, including policymakers and project managers, contractors and consultants, and clients doing business as part of FIDIC 2017 adoption processes. By analysis of Organizational Preparedness and Available Support factors, this research offers useful strategies to facilitate a success implementation of the FIDIC 2017 framework format.

Perceived compatibility was found to be the key in making organizations ready to do affiliate marketing. Stakeholders who recognize that FIDIC, 2017 adoption matches their current practices and processes promote FIDIC, 2017 adoption. Workshops to introduce all stakeholders to the 2017 FIDIC framework, along with training sessions focusing specifically on areas where the current practice does not follow the 2017 FIDIC framework should be developed for all stakeholders. FIDIC 2017 will be initially employed in smaller pilot projects by which stakeholders will find out firsthand how it works before extending it to larger projects. Where required Organizations may adapt some sections of FIDIC 2017 to meet local legal standards and to optimize their operations.

Adoption of Awareness of Socio-Economic Benefits (ASEB) results in an enormous enhancement of organizational readiness. Those who understand economic benefits and social returns of FIDIC 2017 will gain stronger support for the same. Therefore, governments and industry institutions should launch awareness programs with stakeholders about how FIDIC 2017 delivers economic effects such as cost reduction and risk management and social benefits, which in turn produce better project outcomes and enhanced stakeholder relationships. Learning from project case studies and success stories which adopted FIDIC 2017 will help stakeholders better understand the practical advantages of FIDIC 2017. A significant role in supporting organizations to adopt FIDIC 2017 is played by governments through tax allowances or financial subsidies to the organizations.

Results for Adequate Resource Contributions prove to be fundamental in developing organizational readiness in this study. To have successful adoption, organizations should have the right access to financial support and instructional programs with technical support. So, governments should assist the organizations taking the leap to FIDIC 2017 both financially, and technically by providing tools (grants, low interest loans, etc.) and access to professional consultants. For organizations, they must set aside budget resources aimed at training programs which will develop the essential technical skills for proper execution. For effective adoption, project managers need to bring time, workforce, and technology resources to maintain the implementation process.

According to the findings of the study, Process-Related Benefits and Perceived Ease (PEPRB) have no direct connection to organizational readiness but rather stand as indirect influencers of Perceived Compatibility and Awareness of Socio-Economic Benefits. Of perceived ease will be accomplished by simplified user manuals and straightforward guidelines as given by industry organizations. Expert advice is available to help stakeholders understand and work with the complex contract framework through technical support availability. Only through an improvement of organizations' internal processes can they achieve an efficient FIDIC 2017 adoption throughout organizational workflows.

Research results revealed that duration of professional experience failed to moderate model relationships, however, experience was still important in making adoption implementation possible. Professional mentorship programs allow organizations to leverage the expertise of the senior professional to provide junior team members' guidance on the use of FIDIC 2017 as evidenced in the gap identified in the research. FIDIC 2017 protocols must always be promoted by top organizational executives while knowledgeable project managers. It would be only natural that the adoption of FIDIC 2017 will be faster as experienced professionals are sharing their successful methods and implementation knowledge with the community.

Consequently, the research results will significantly influence policymaking professionals and industry regulatory bodies. Government bodies need to create rules to either demand or incentivize FIDIC 2017 on public infrastructure projects. To ensure consistency, eliminate ambiguities and create uniform contracting standards, sector groups need to establish the precise FIDIC 2017 clauses that need to be implemented. It becomes important for industry stakeholders and policymakers to work together to remove obstacles to adoption: resistance to change and lack of awareness.

The study provides a strategic planning roadmap for organizations that intend to transform to use FIDIC 2017. The gross fundamental initial move is the readiness assessment, to recognize knowledge operations and resource availability deficits. When organizations start their FIDIC 2017 adoption journey with clients, contractors, and consultants, they can easier build consensus while identifying issues. Continuing improvement principles are deployed, especially if adopted by organizations to make the process of adopting more efficient, as strategies are constantly assessed by getting feedback from staff as well as implementation experiments.

5.4. Directions for future research

In the study, analysis standards must be defined and paid attention to during results examination. This implies our study was couched in numerical data collection methods and therefore did not fundamentally explore how social elements affect organizational readiness. Future studies involving new practice adoption are in need of researchers looking at how social relationships affect adoption, as well as organizational culture and top-level leadership decisions, using both conversations analysis and real-world examples. We did not account for how changes in guidelines to industry would come with market behavior development and how that would affect the organization's preparedness to accommodate the new demands. By including outside variables into the subsequent analyses, we will have more clarity concerning the critical factors that govern organizational transformations.

The study is formulated to include controls for organizational bias as staff candidates rate their company's readiness for new practices and perceived benefits from these procedures. As suggested by existing data further research should implement performance indicators to validate organizational readiness in this area. Research conducted to advocate perceived ease and process benefits did not manage to see the significance of leadership support and these can drive organizational readiness potentials.

As manipulating factors, perceived compatibility and socio-economic benefits were analyzed, but organization size, industry type and the other moderating elements were left untested. Future research should investigate the effect of combined readiness mechanism components, along with other factors, in hopes of better understanding organization wide change preparedness.

REFERENCES

Al Hadwer, A., Tavana, M., Gillis, D., & Rezania, D. (2021). A systematic review of organizational factors impacting cloud-based technology adoption using technology-organization-environment framework. *Internet of Things*, *15*, 100407.

Alnaser, A. A., Hassan Ali, A., Elmousalami, H. H., Elyamany, A., & Gouda Mohamed, A. (2024). Assessment Framework for BIM-Digital Twin Readiness in the Construction Industry. *Buildings*, *14*(1). https://doi.org/10.3390/buildings14010268

Alotaibi, B. S., Waqar, A., Radu, D., Khan, A. M., Dodo, Y., Althoey, F., & Almujibah, H. (2024). Building information modeling (BIM) adoption for enhanced legal and contractual management in construction projects. *Ain Shams Engineering Journal*, *15*(7), 102822.

Ameyaw, E. E., Edwards, D. J., Kumar, B., Thurairajah, N., Owusu-Manu, D.-G., & Oppong, G. D. (2023). Critical Factors Influencing Adoption of Blockchain-Enabled Smart Contracts in Construction Projects. *Journal of Construction Engineering and Management*, *149*(3). https://doi.org/10.1061/jcemd4.coeng-12081

Awa, H. O., Ojiabo, O. U., & Orokor, L. E. (2017). Integrated technology-organization-environment (T-O-E) taxonomies for technology adoption. *Journal of Enterprise Information Management*, *30*(6), 893–921. https://doi.org/10.1108/JEIM-03-2016-0079

Awwad, R., Barakat, B., & Menassa, C. (2016). Understanding dispute resolution in the Middle East region from perspectives of different stakeholders. *Journal of Management in Engineering*, *32*(6), 05016019.

Badi, S., Ochieng, E., Nasaj, M., & Papadaki, M. (2021). Technological, organisational and environmental determinants of smart contracts adoption: UK construction sector viewpoint. *Construction Management and Economics*, *39*(1), 36–54. https://doi.org/10.1080/01446193.2020.1819549

Bagozzi, R. P., & Phillips, L. W. (1982). Representing and testing organizational theories: A holistic construal. *Administrative Science Quarterly*, 459–489.

Barakat, M., Abdul-Malak, M.-A., & Khoury, H. (2020). Pivotal New Roles and Changes Introduced by the 2017 FIDIC's Claim and Dispute Resolution Mechanism. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *12*(1). https://doi.org/10.1061/(asce)la.1943-4170.0000355

Berhe, A. H. (2021). *Mitigating Risks of Corruption in Construction: A theoretical rationale for BIM adoption in Ethiopia*.

Boadu, E. F., Wang, C. C., & Sunindijo, R. Y. (2020). Characteristics of the construction industry in developing countries and its implications for health and safety: An exploratory study in Ghana. *International Journal of Environmental Research and Public Health*, *17*(11), 4110.

Bolhassan, D. N., Changsaar, C., Khoso, A. R., Siawchuing, L., Bamgbade, J. A., & Hing, W. N. (2022). Towards Adoption of Smart Contract in Construction Industry in Malaysia. *Pertanika Journal of Science and Technology*, *30*(1), 141–160. https://doi.org/10.47836/pjst.30.1.08

Çoban, G. (2020). *Claim management and dispute resolution under FIDIC contracts 2017 edition*.

Darko, A., Chan, A. P. C., Yang, Y., Shan, M., He, B. J., & Gou, Z. (2018). Influences of barriers, drivers, and promotion strategies on green building technologies adoption in developing countries: The Ghanaian case. *Journal of Cleaner Production*, *200*, 687–703. https://doi.org/10.1016/j.jclepro.2018.07.318

Elashmawy, M., Ahmed, M. M. Z., Alawee, W. H., Shanmugan, S., & Omara, Z. M. (2024). Scientometric analysis and review of materials affecting solar still performance. *Results in Engineering*, 102574.

Farooqui, R., Ahmed, S., & Lodi, S. H. (2008). Assessment of Pakistani construction industry–current performance and the way forward. *J. Adv. Perform. Inf. Value*, *1*(1), 51–72.

Fawzy, S. A., & El-adaway, I. H. (2012). Contract Administration Guidelines for Managing Conflicts, Claims, and Disputes under World Bank–Funded Projects. *Journal of Legal*

Affairs and Dispute Resolution in Engineering and Construction, *4*(4), 101–110. https://doi.org/10.1061/(asce)la.1943-4170.0000091

Ghaly, M., Elbeltagi, E., Elsmadony, A., & Tantawy, M. A. (2024). Integration of Blockchain-Enabled Smart Contracts in Construction: SWOT Framework and Social Network Analysis. *Civil Engineering Journal (Iran)*, *10*(5), 1662–1697. https://doi.org/10.28991/CEJ-2024-010-05-020

Gurgun, A. P., & Koc, K. (2023). The role of contract incompleteness factors in project disputes: a hybrid fuzzy multi-criteria decision approach. *Engineering, Construction and Architectural Management*, *30*(9), 3895–3926. https://doi.org/10.1108/ECAM-11-2021-1020

Hair, J., & Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, *1*(3), 100027.

Hair Jr, J. F., Anderson, R. E., & Tatham, R. L. (1986). *Multivariate data analysis with readings*. Macmillan Publishing Co., Inc.

Hair Jr, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106–121.

Hashim, M. Z., Chao, L., Wang, C., & Awan, S. H. (2022). The role of trust, opportunism and adaptation in coordination and contract cooperation: evidence from construction projects. *Journal of Economic and Administrative Sciences*. https://doi.org/10.1108/jeas-01-2022-0008

Hidayat-ur-Rehman, I., & Alsolamy, M. (2023). A SEM-ANN analysis to examine sustainable performance in SMEs: The moderating role of transformational leadership. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(4), 100166.

Hussain, S. (2024). *Integrated Project Delivery (IPD): A Contractual Framework for the Egyptian Construction Industry*.

Jünger, I. H. C. (n.d.). *Alternative Dispute Resolution mechanisms for construction projects in Spain–Guidelines for local and international practitioners*.

Kunj, K. (2024). Environmental Law and Corporate Social Responsibility: Evaluating the Role of Legal Frameworks in Sustainable Business Practices. *Legal Spectrum J.*, *4*, 1.

Kunkcu, H., Koc, K., Gurgun, A. P., & Dagou, H. H. (2023). Operational Barriers against the Use of Smart Contracts in Construction Projects. *Turkish Journal of Civil Engineering*, *34*(5), 81–106. https://doi.org/10.18400/tjce.1322972

Lau, C. H., Mesthrige, J. W., Lam, P. T. I., & Javed, A. A. (2019). The challenges of adopting new engineering contract: a Hong Kong study. *Engineering, Construction and Architectural Management*, *26*(10), 2389–2409. https://doi.org/10.1108/ECAM-02-2018-0055

Li, J., Greenwood, D., & Kassem, M. (2019). Blockchain in the built environment and construction industry: A systematic review, conceptual models and practical use cases. *Automation in Construction*, *102*, 288–307.

Malik, S., Chadhar, M., Vatanasakdakul, S., & Chetty, M. (2021). Factors affecting the organizational adoption of blockchain technology: Extending the technology–organization–environment (TOE) framework in the Australian context. *Sustainability*, *13*(16), 9404.

Mohamed Abdel-Hamid, D., & Alaa El-Din Mostafa, A. R. (2023). The Effect of FIDIC red book 2017 to avoid disputes in Egyptian construction field. In *Ain Shams Engineering Journal* (Vol. 14, Issue 5). Ain Shams University. https://doi.org/10.1016/j.asej.2022.101963

Mohammadi, S., Aibinu, A. A., & Oraee, M. (2024). Risk Allocation and Mitigation Practices for Building Information Modeling: Addressing Legal and Contractual Risks Associated with Contract Documentation. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *16*(2), 04524005.

Musarat, M. A., Alaloul, W. S., Zainuddin, S. M. B., Qureshi, A. H., & Maqsoom, A. (2024). Digitalization in malaysian construction industry: Awareness, challenges and opportunities. *Results in Engineering*, 102013.

Ndekugri, I., & Mcdonnell, B. (1999). Differing site conditions risks: A FIDIC/engineering and construction contract comparison. In *Engineering, Construction and Architectural Management* (Vol. 6, Issue 2, pp. 177–187). https://doi.org/10.1108/eb021110

Puri, A., Ali, N. A., & Elkharboutly, M. (2023). Suitability of FIDIC Contracts for Post-disaster Reconstruction of Infrastructure Projects. *International Conference on Engineering, Project, and Production Management*, 323–343.

Rashed, A., & Mutis, I. (2023). Influence of Internal Factors in Construction Organizations on Implementing Integrated Project Delivery Viewed from the Organizational Change Theories. *Practice Periodical on Structural Design and Construction*, *28*(4). https://doi.org/10.1061/ppscfx.sceng-1322

Saqib, G., Hassan, M. U., Zubair, M. U., & Choudhry, R. M. (2023). Investigating the Acceptance of an Electronic Incident Reporting System in the Construction Industry: An Application of the Technology Acceptance Model. *Journal of Construction Engineering and Management*, *149*(5). https://doi.org/10.1061/jcemd4.coeng-12583

Scheepers, H., McLoughlin, S., & Wijesinghe, R. (2022). Aligning stakeholders perceptions of project performance: The contribution of Business Realisation Management. *International Journal of Project Management*, *40*(5), 471–480.

Shang, G., Pheng, L. S., & Zhong Xia, R. L. (2024). Adoption of smart contracts in the construction industry: an institutional analysis of drivers and barriers. *Construction Innovation*, *24*(5), 1401–1421. https://doi.org/10.1108/CI-03-2022-0066

Shuai, B. (2023). A rationale-augmented NLP framework to identify unilateral contractual change risk for construction projects. *Computers in Industry*, *149*. https://doi.org/10.1016/j.compind.2023.103940

Singh, A. K., Mohandes, S. R., Awuzie, B. O., Omotayo, T., Kumar, V. R. P., & Kidd, C. (2024). A roadmap for overcoming barriers to implementation of blockchain-enabled smart contracts in sustainable construction projects. *Smart and Sustainable Built Environment*. https://doi.org/10.1108/SASBE-10-2023-0303

Singh, P., Sharma, M., & Daim, T. (2024). Envisaging AR travel revolution for visiting heritage sites: A mixed-method approach. *Technology in Society*, *76*, 102439.

Sutrisno, A. D., Lee, C.-H., Suhardono, S., & Suryawan, I. W. K. (2024). Evaluating factors influencing community readiness for post-mining environmental development strategies. *Journal of Environmental Management*, *366*, 121823.

Weerapperuma, U. S., Rathnasinghe, A. P., Jayasena, H. S., Wijewickrama, C. S., & Thurairajah, N. (2023a). A knowledge framework for blockchain-enabled smart contract adoption in the construction industry. *Engineering, Construction and Architectural Management*. https://doi.org/10.1108/ECAM-01-2023-0012

Weerapperuma, U. S., Rathnasinghe, A. P., Jayasena, H. S., Wijewickrama, C. S., & Thurairajah, N. (2023b). A knowledge framework for blockchain-enabled smart contract adoption in the construction industry. *Engineering, Construction and Architectural Management*. https://doi.org/10.1108/ECAM-01-2023-0012

Zhao, T. (2022). Recovering Loss of Productivity under FIDIC Contracts. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *14*(1). https://doi.org/10.1061/(asce)la.1943-4170.0000510

Zoo, H., de Vries, H. J., & Lee, H. (2017). Interplay of innovation and standardization: Exploring the relevance in developing countries. *Technological Forecasting and Social Change*, *118*, 334–348.