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A Framework for Enhanced Decision Making in Construction Organisations Based on Quality of Pipeline Information

A thesis submitted in partial fulfilment of the requirements for
the degree of

Doctor of Philosophy

School of Built Environment, Massey University, New Zealand

By

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ABSTRACT

The New Zealand government actively pursues the development of a sustainable construction sector that ensures high performance, productivity, innovation, and community well-being through diverse project initiatives spanning residential, non-residential, and infrastructure development. Despite these aspirations, construction projects in New Zealand are frequently delayed and not effectively completed, thus leading to underperformance. Two critical factors contributing to project delays and suboptimal outcomes are inadequate quality of information and ineffective strategic decision-making processes. Formulating effective strategic decisions is a fundamental challenge for construction organisations, significantly impacting their overall strategic goals and operational success. While information management and decision execution are widely recognised as crucial elements in organisational strategy, there remains a notable gap in understanding the intricate relationship between the quality of information and strategic decision-making, particularly within the context of construction business performance.

This research addresses this critical knowledge gap by identifying the determinants for successful construction business performance. It investigates the mediating role of quality of information in the relationship between strategic decision-making and the performance of construction businesses in New Zealand. The study employs a comprehensive methodological approach combining systematic literature review, quantitative analysis, and stakeholder validation to develop a robust understanding of these complex relationships.

The systematic literature review focused specifically on identifying critical determinants for successful construction business performance in New Zealand, utilising the ATLAS.ti 9 tool for analysis. This comprehensive review highlighted the fundamental role of the quality of information in strategic decision-making processes and its subsequent impact on organisational performance. This systematic analysis led to the development of a conceptual framework and associated hypotheses establishing the relationships between these factors and their impact on strategic decision-making, information quality, and construction business performance.

A quantitative survey was conducted with 102 respondents, and the sample size was determined using G*Power analysis to ensure statistical validity. The study examined how strategic decision-making and information quality influence construction business performance in New Zealand. The research method that was employed integrated established theoretical models and employed Partial Least Squares Structural Equation Modelling (PLS-SEM) using

SmartPLS4 software. This analytical approach allowed for robust testing of both direct relationships between variables and the mediating effect of information quality on the relationship between strategic management practices and business performance outcomes. The findings revealed a strong positive correlation between strategic decision-making management and construction business performance, with quality of information serving as a crucial mediating factor.

A key research component involved validating the proposed strategic decision-making process framework for its sufficiency, clarity, coherence, relevance, and applicability in New Zealand construction organisations. This validation process included in-depth interviews with six industry experts representing various organisational approaches to strategic decision-making. Their responses revealed a spectrum of techniques ranging from highly structured to more informal methodologies, providing valuable insights into the practical application of strategic decision-making frameworks in different organisational contexts.

The research outcomes significantly contribute to theoretical understanding and practical application in the construction industry. Establishing clear criteria for successful quality of information and identifying critical factors affecting project implementation success, this study offers valuable guidance for improving practices within the construction sector. The findings emphasise the crucial importance of prioritizing both the quality of information and strategic decision-making to effectively lessen project delays and optimize overall performance in the construction sector.

Furthermore, the research contributes to developing more effective strategic decision-making processes by highlighting the interconnected nature of the quality of information and strategic planning. The validated framework provides construction organisations with a practical tool for enhancing their strategic decision-making capabilities while considering the critical role of quality of information in achieving successful outcomes.

This study's findings have significant implications for construction industry stakeholders, such as project managers, organisational leaders, and policymakers. The research demonstrates that improving the quality of information and strategic decision-making processes can enhance project outcomes and overall organisational performance. The validated framework offers a structured approach for organisations to assess and improve their current practices while considering their unique operational contexts and requirements.

DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Massey University or any other institution.



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DEDICATION

I offer my heartfelt gratitude to the Almighty God, our great Redeemer, for His boundless blessings, wisdom, and guidance that have enabled me to complete this PhD program successfully. I am immensely grateful for the knowledge and time granted to me throughout this journey.

I greatly appreciate my esteemed supervisors, Prof. James OB Rotimi and Dr. Wajiha Shahzad, for their support throughout this journey. The invaluable support, guidance, and financial assistance have made my dream tangible. Without their expertise and dedication in assisting me with preparing this thesis, it would not have achieved the level of perfection presented here. May the Almighty God, in His infinite mercies, continue to bless you abundantly and protect you from all adversities.

Furthermore, I would like to express my eternal gratitude to my irreplaceable parents, especially my mother, and the memory of my late father. May the Almighty God continue to bless and protect my mother. I also extend my thanks to all members of my family for their unwavering moral support.

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TABLE OF CONTENTS

ABSTRACT	II
DECLARATION:	IV
DEDICATION:	V
ACKNOWLEDGMENT:	VI
TABLE OF CONTENTS	VII
LIST OF FIGURES	XVII
LIST OF TABLES	XIX
LIST OF PUBLICATIONS RELATED TO MY PHD:	XXI
ABBREVIATIONS AND ACRONYMS:	XXII
PART 1	1
PROLOGUE	2
CHAPTER 1 INTRODUCTION	4
1.0 Introduction	4
1.1 Background of the Study	5
1.2 Problem Statement	8
1.3 Research Aim	12
1.4 Research Objectives	12
1.5 Research Questions	13
1.6 Scope of the Study	16

CHAPTER 2 LITERATURE REVIEW	19
2.1 Overview of New Zealand’s Project Pipelines	19
2.2 High-Level Comparison of Construction Project Pipelines Information	26
2.3 Strategic Decision Making	32
2.3.1 Strategic Decision Formulation	37
2.3.2 Strategic Decision Implementation Practices	38
2.3.3 Strategic Decision Evaluation	39
2.3.4 Reliance on Financial Strength	40
2.3.5 Reliance on Workforce	41
2.4 Quality of Information	42
2.5 Construction Business Performance	45
2.6 Information Used in Construction and its Type	48
2.7 Theoretical Discussion	50
2.7.1 Ansoff Strategic Success Theory	50
2.7.2 Resource-Based View (RBV) Theory	53
2.8 Research Framework	56
2.8.1 Hypotheses Development	58
CHAPTER 3 METHODOLOGY	61
3.1 Introduction	61
3.2 Philosophical Justifications and Stances	61
3.2.1 Ontological Justifications	62
3.2.2 Epistemological Justifications	64
3.2.3 Axiological and Rhetorical Justifications	65
3.2.4 Methodological Justifications	66
3.3 Justifications for Using Quantitative Research Method	66
3.4 Research Process	67

3.5	Research Design	69
3.6	Research Approach	71
3.7	Measurements Development	72
3.7.1	Operational Definition	73
3.7.2	Questionnaire Design	81
3.7.3	Pre-test	83
3.7.4	Pilot Study	87
3.8	Population and Sample	89
3.9	Data Collection Method	92
3.10	Data Preparation	94
3.11	Quantitative Data Analysis Method	96
3.11.1	Measurement Model Assessment	97
3.11.2	Structural Model	103
3.12	Ethical Considerations	104
	EPILOGUE: PART ONE	106
	PART 2	108
	PROLOGUE	109
	CHAPTER 4 PAPER ONE	111
	4.0 PIPELINE PROJECTS: MATTERS ARISING IN THE NEW ZEALAND CONSTRUCTION INDUSTRY.	111
4.1	Introduction	112
4.2	Literature Review	114
4.2.1	Overview of New Zealand's project pipelines	114
4.2.2	Problems in New Zealand's Project Pipelines	117
4.3	Research Materials and Methods	118

4.4	Results and Discussion	119
4.5	Conclusion	123
CHAPTER 5 PAPER 2		126
5.0	EXAMINING INFRASTRUCTURE PIPELINES INFORMATION FOR THEIR RELEVANCE IN CONSTRUCTION ORGANISATIONS' STRATEGIC DECISION-MAKING	126
5.1	Introduction	127
5.2	Methodology	129
5.2.1	Search Strategy and the Selection of Studies	131
5.3	Literature Review	132
5.3.1	Overview of Infrastructure Project Pipelines in New Zealand	132
5.3.2	Sources of Infrastructure Project Pipelines Information in New Zealand	134
5.3.3	Strategy Management in Construction Industry	135
5.3.4	Levels of Strategy	136
5.3.5	Infrastructure Pipelines Information as a Factor in Strategic Decision-Making	138
5.3.6	Data/Information Needs and Strategic Decision-Making in the Construction Industry	139
5.3.7	Strategic Decision-Making Under Quality of Information	141
5.3.8	Known Challenges in Quality of Information on Strategic Decision-Making	143
5.4	Discussion	145
5.5	Conclusion	147
CHAPTER 6 PAPER 3		150
6.0	IMPACT OF INFORMATION QUALITY ON STRATEGIC DECISION-MAKING IN CONSTRUCTION ORGANISATION: UNRAVELLING COMPLEXITY AND CONTINGENCIES	150

6.1	Introduction	151
6.2	Methodology	152
6.2.1	Search String	152
6.2.2	Analysis process	155
6.3	Results and Analysis	155
6.3.1	Publications by Year	155
6.3.2	Publications by Authors	156
6.3.3	Publications by Countries	157
6.4	Insights on Information Quality and Strategic Decision-Making	157
6.4.1	project pipelines in New Zealand	158
6.4.2	The Strategic Decision-Making Process	160
6.5	Information	162
6.5.1	Information Quality	163
6.5.2	Dimensions of Information Quality	165
6.5.3	Factors Influencing Quality of Information	169
6.5.4	Strategic Decision-Making Effectiveness	172
6.5.5	Quality of Information as a Strategic Resource	175
6.6	Discussion	178
6.7	Conclusion	180
6.8	Implications and Future Research	181
	EPILOGUE: PART TWO	183
	PART 3	185
	PROLOGUE	186
	CHAPTER 7 PAPER 4	188

7.0	IMPROVING CONSTRUCTION PROJECT SUCCESS: UNRAVELING THE NEXUS BETWEEN STRATEGIC DECISION-MAKING AND CONSTRUCTION BUSINESS PERFORMANCE	188
7.1	Introduction	189
7.2	Levels of Strategic Decision Making in Organisations	192
7.3	Hypotheses Development and Theories	195
7.4	Research method – Questionnaire	199
	7.4.1 Questionnaire Design	200
	7.4.2 Population and Sample	200
	7.4.3 Data Collection Method	201
7.5	Findings	202
	7.5.1 Demographic Distribution of the Respondents	202
	7.5.2 Measurement Model Assessment	203
	7.5.3 Collinearity Statistics (VIF)	206
	7.5.4 Structural Model Assessment: Hypothesis Testing	207
	7.5.5 Coefficient of Determination (R^2)	209
	7.5.6 Effect Size	210
	7.5.7 Assessment of the PLS Predict	210
7.6	Discussions of Findings	211
7.7	Research Implication	213
	CHAPTER 8 PAPER 5	217
8.0	ENHANCING CONSTRUCTION ORGANISATIONS' PERFORMANCE THROUGH STRATEGIC DECISION-MAKING: UNVEILING THE MEDIATING ROLE OF QUALITY OF INFORMATION	217
8.1	Introduction	218
8.2	Literature Review	220
	8.2.1 Overview of the New Zealand Construction Industry	220

8.2.2	Strategic Decision Making	221
8.2.3	Quality of Information	223
8.2.4	Construction Organisation Performance	224
8.3	Hypotheses Development and Theories	225
8.3.1	Strategic Decision Formulation	227
8.3.2	Strategic Decision Implementation Practices	228
8.3.3	Strategic Decision Evaluation	229
8.3.4	Reliance on Financial Strength	230
8.3.5	Reliance on Workforce	231
8.3.6	Quality of Information as a Mediating Variable Between Strategic Decision-Making and Construction Business Performance	232
8.4	Methodology	234
8.5	Findings	235
8.5.1	Demographic Distribution of the Respondents	235
8.6	Assessment of Measurement Model	237
8.6.1	Convergent Validity	238
8.6.2	Discriminant Validity	240
8.6.3	Collinearity Statistics (VIF)	241
8.7	Assessment of Structural Model	241
8.7.1	Coefficient of Determination (R^2)	243
8.7.2	Effect Size	244
8.7.3	PLS-Predict	245
8.8	Discussions of Findings	246
8.9	Conclusion	253
8.10	Research Implications	253
	EPILOGUE: PART THREE	256

PART 4	258
PROLOGUE: PART FOUR	259
CHAPTER 9 STRATEGIC FRAMEWORK DEVELOPMENT	261
9.1 Introduction	261
CHAPTER 10 VALIDATION INTERVIEW	267
10.1 Introduction	267
10.2 Experts Response to Questions One	269
10.2.1 Expert 1	269
10.2.2 Expert 2	270
10.2.3 Expert 3	271
10.2.4 Expert 4	272
10.2.5 Expert 5	272
10.2.6 Expert 6	273
10.3 Experts Response to Questions Two	274
10.3.1 Expert 1	275
10.3.2 Expert 2	276
10.3.3 Expert 3	276
10.3.4 Expert 4	277
10.3.5 Expert 5	278
10.3.6 Expert 6	279
10.4 Experts Response to Questions Three	280
10.4.1 Expert 1	280
10.4.2 Expert 2	281
10.4.3 Expert 3	282
10.4.4 Expert 4	282

10.4.5	Expert 5	283
10.4.6	Expert 6	284
10.5	Experts Response to Questions Four	286
10.5.1	Expert 1	286
10.5.2	Expert 2	287
10.5.3	Expert 3	288
10.5.4	Expert 4	288
10.5.5	Expert 5	289
10.5.6	Expert 6	290
10.6	Quality of Information as a Strategic Resource	291
CHAPTER 11 CONCLUSION AND IMPLICATIONS		298
11.1	Introduction	298
11.2	Recapitulation of Findings	298
11.3	Research Implication	302
11.3.1	Practical Implications	304
11.3.2	Theoretical Contribution	307
11.4	Limitations and Suggestions for Future Research	309
11.5	Conclusion	311
EPILOGUE: PART FOUR		315
REFERENCES		316
APPENDIX A: HUMAN ETHICS NOTIFICATION - 4000025806		364
APPENDIX B: PARTICIPANT INFORMATION SHEET		365
APPENDIX C: PARTICIPANT CONSENT FORM - INDIVIDUAL		366

APPENDIX D: INTERVIEW OFFICIAL INVITATION LETTER	367
APPENDIX E: INTERVIEW QUESTIONS	368
APPENDIX F: RESEARCH QUESTIONNAIRES	369

LIST OF FIGURES

Figure 2.1:	All Buildings and Construction Nationally, By Value (2022), New Zealand	20
Figure 2.2:	All Buildings and Construction Nationally, By Value (2023), New Zealand	21
Figure 2.3:	All Buildings and Construction Nationally, By Value (2024), New Zealand	23
Figure 2.4:	Conceptual Framework	57
Figure 2.5:	Theoretical Framework	58
Figure 3.1:	Research Methodology Flow Chart	68
Figure 3.2:	Power Analysis for Medium Effect and X-Y Plot for Medium Effect Power Analysis	92
Figure 4.1:	Atlas.Ti 9 Classification of Construction Project Pipelines in Line With Project Phases	121
Figure 4.2:	Four Priority Areas	122
Figure 5.1:	Methodology Framework	130
Figure 5.2:	Constrained Rationality Theory	140
Figure 5.3:	Data, Information, Knowledge, and Wisdom	142
Figure 5.4:	Information-Decision-Interdependences Within the Multi-Actor System	144
Figure 6.1:	An Overview of The Literature Identification, Selection and Inclusion Process	154
Figure 6.2:	Article Count by Year Publication	156
Figure 6.3:	Top Ten Authors in Quality of Information and Strategic Decision-Making Research	156
Figure 6.4:	Top Ten Countries	157
Figure 6.5:	Decentralized Decision-Making Process	161
Figure 6.6:	Centralized Decision-Making Process	162
Figure 6.7:	Framework of Quality of Information	168
Figure 6.8:	Information Quality Processing	171
Figure 6.9:	Quality of Information as a Mediator	174
Figure 6.10:	Quality of Information as a Strategic Resource	177
Figure 7.1:	Conceptual Framework	196
Figure 7.2:	PLS Path Model	204
Figure 7.3:	Evaluation of Structural Model through PLS Bootstrapping	208
Figure 8.1:	Conceptual Framework	226

Figure 8.2:	PLS Path model	238
Figure 8.3:	Evaluation of Structural Model through PLS Bootstrapping	242
Figure 9.1:	Quality of information as a strategic resource (Proposed Strategic Framework)	262
Figure 10.1:	Current sources of information used for strategic decision-making	274
Figure 10.2:	Type of information/data needed for strategic decision-making.	280
Figure 10.3:	Role of quality of information playing in strategic decision-making	285
Figure 10.4:	Recommendation for strategic framework improvement	291
Figure 10.5:	Revised Framework on Quality of Information as a Strategic Resource	294

LIST OF TABLES

Table 1.1:	Overview of Research Aim, Objectives, Questions, and Adopted Method	14
Table 2.1:	High-Level Comparison of Construction Project Pipelines Information from Selected Providers	27
Table 3.1	Specification of the Domain of the Constructs and Measurement Items	74
Table 3.2:	Pre-test Feedback	83
Table 3.3:	Convergent Validity	89
Table 3.4:	Summaries of Validity Principles for Evaluating Reflective Measurement Model	99
Table 3.5:	Measurement of Normality	100
Table 3.6:	Full Collinearity Testing	102
Table 5.1:	Sources of Infrastructure Project Pipelines Information	134
Table 6.1:	Criteria of Inclusion and Exclusion	153
Table 6.2:	Summary of Quality of Information Characteristic/Attributes	166
Table 6.3:	Dimension and Definitions of Quality of Information	167
Table 6.4:	Factors Influencing Quality of Information in the Construction Industry	169
Table 7.1:	Profile of Respondents	203
Table 7.2:	Convergent Validity	205
Table 7.3:	Discriminant Validity: Heterotrait-Monotrait Ratio Statistics	206
Table 7.4:	Inner VIF Values	207
Table 7.5:	Summary of Hypotheses Testing	209
Table 7.6:	Variance Explained in the Endogenous Latent Variable	210
Table 7.7:	Effect Size	210
Table 7.8:	Construct Cross Validity Redundancy	211
Table 8.1:	Profile of Respondents	236
Table 8.2:	Convergent Validity	239
Table 8.3:	Discriminant validity results based on the heterotrait-monotrait ratio of correlations (HTMT).	240
Table 8.4:	Inner VIF values	241
Table 8.5:	Summary of Hypotheses Testing	243
Table 8.6:	Variance Explained in the Endogenous Latent Variable	244
Table 8.7:	Effect Size	244
Table 8.8:	PLS-Predict	245

LIST OF PUBLICATIONS RELATED TO MY PhD:

Journal Articles

Moshood, T. D., Rotimi, J. O., & Shahzad, W. (2024). Project pipelines Matters Arising in the New Zealand Construction Industry. *Journal of Engineering, Project, and Production Management (EPPM)*. Indexed in *Web of Science, SCOPUS*. (Published).

Moshood, T. D., Rotimi, J. O., & Shahzad, W. (2024). Impact of Information Quality on Strategic Decision-Making in Construction Organisation: Unravelling Complexity and Contingencies. *Management Research Review*. Indexed in *Web of Science, SCOPUS*. Emerald, (Published).

Moshood, T. D., Rotimi, J. O., & Shahzad, W. (2024). Improving Construction Project Success: Unraveling the Nexus between Strategic Decision-Making and Construction Business Performance. *Systems*. Indexed in *Web of Science, SCOPUS*. (Under Review).

Moshood, T. D., Rotimi, J. O., & Shahzad, W. (2024). Enhancing Construction Organisations' Performance through Strategic Decision-Making: Unveiling the Mediating Role of Quality of Information. *International Journal of Organisational Analysis*. Indexed in *Web of Science, SCOPUS*. Emerald, (Published).

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Moshood, T. D., Rotimi, J. O., & Shahzad, W. (2024). Examining Infrastructure Pipelines Information for Their Relevance in Construction Organisations' Strategic Decision-Making. *EPPM Conference Paper*. (Published).

Conference Papers

Moshood, T. D., & Shahzad, W., Rotimi, J. O. (2025). Are Construction Pipeline Information Reliable: The Primacy of Internally Generated Data in Strategic Decision Making. *CIB Conference*. (Accepted).

ABBREVIATIONS AND ACRONYMS:

AVE - Average Variance Extracted
BIM - Building Information Modelling
CIC - Construction Industry Council
CR - Composite Reliability
DOC - Department of Conservation
DV - Discriminant Validity
GDP - Gross Domestic Product
HRM - Human Resource Management
HTMT - Heterotrait-Monotrait ratio
ICT - Information and Communication Technology
IC - Information Quality
IRG - Infrastructure Industry Reference Group
LM - Linear Model
MAE - Mean Absolute Error
MBIE - Ministry of Business, Innovation and Employment
MOE - Ministry of Education
NZIC - New Zealand Infrastructure Commission
NZIOB - New Zealand Institute of Building
NZTA - New Zealand Transport Agency
PLS-SEM - Partial Least Squares Structural Equation Modelling
PMBOK - Project Management Body of Knowledge
RMSE - Root Mean Square Error
SDM – Strategic Decisions-Making
TEC - Tertiary Education Commission
TQM - Total Quality Management
VIF - Variance Inflation Factor

PART 1

BACKGROUND OF THE STUDY

AND

STUDY APPROACH

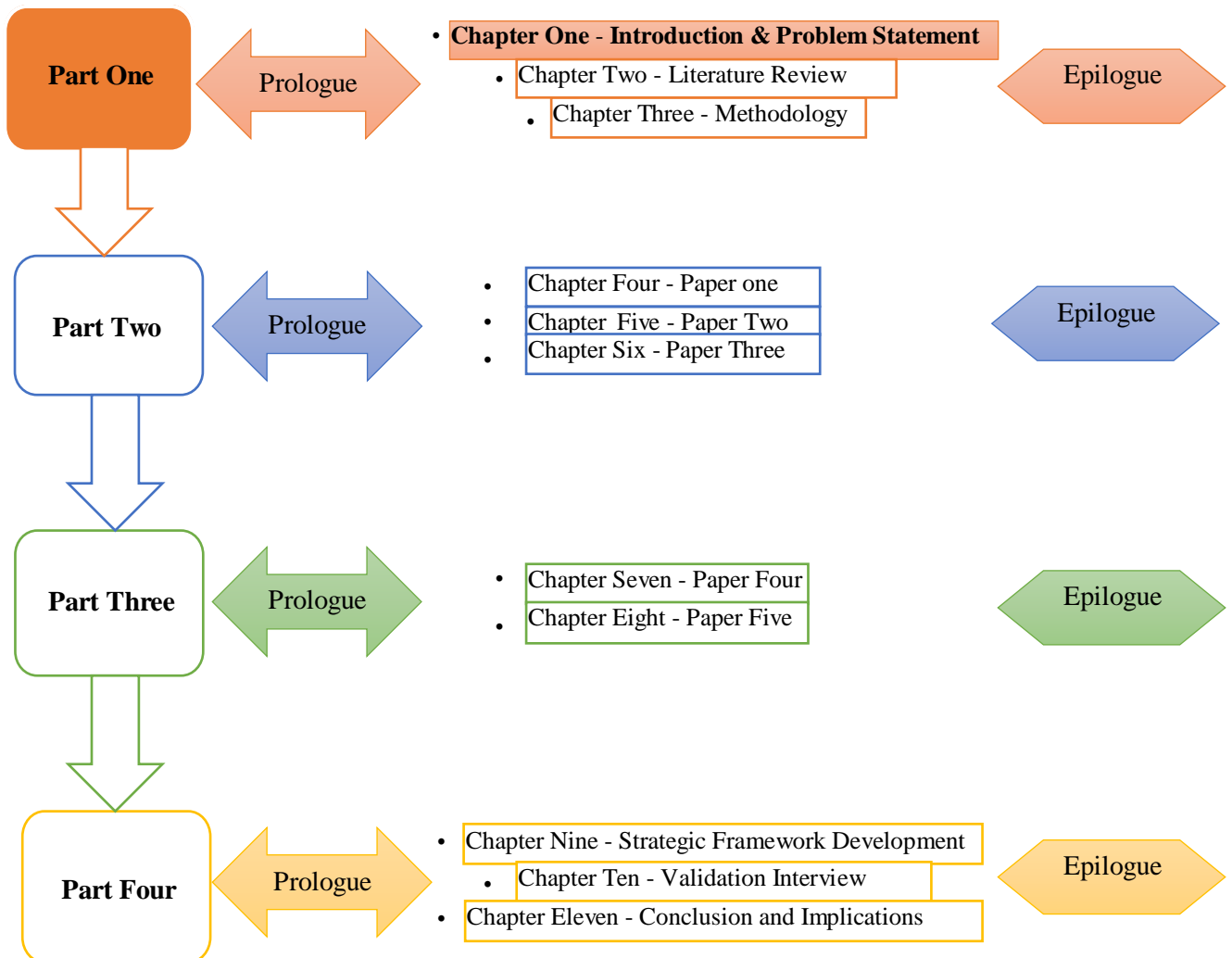
PROLOGUE

The first three chapters establish the study's foundational framework and methodological approach. The first chapter introduces the research by presenting a comprehensive analysis of empirical literature on construction information quality and strategic decision-making. It identifies critical research gaps through systematic review. It articulates the research problem from New Zealand and international perspectives, particularly emphasising pipeline construction projects' unique challenges. The chapter concludes by defining the study's aims, objectives, and scope, establishing clear connections between industry needs and academic contributions.

Chapter two provides a thorough literature review synthesising current knowledge in project pipeline information management, strategic decision-making frameworks in construction organizations, and information quality assessment methodologies. The chapter culminates in developing a theoretical framework that integrates these elements, providing a robust conceptual foundation for the research. This framework draws on established theories while incorporating novel approaches to address identified research gaps.

Chapter three presents the research methodology, opening with a comprehensive research design flowchart that illustrates the logical progression of the study and its alignment with research objectives. The chapter articulates the philosophical underpinnings of the research, adopting a pragmatic paradigm that informs the selection of research methods. It details the mixed-methods research strategy, which combines quantitative analysis of construction project data, qualitative investigation through expert interviews, and systematic validation of the proposed framework.

The methodology chapter provides a detailed justification for each methodological choice, including data collection instruments, sampling strategies, and analytical approaches. It addresses research quality by carefully considering validity, reliability, and generalizability. The chapter concludes with a thorough discussion of ethical considerations, emphasizing participant confidentiality and data security protocols that align with institutional research standards.



CHAPTER 1

INTRODUCTION

1.0 Introduction

New Zealand's construction sector has significantly contributed to its economy, as evidenced by its impact on GDP growth, job creation, and business development (National construction pipeline report, 2024). New Zealand's construction sector has contributed 6.3% to the country's nominal GDP as of March 2024, and a substantial 10% of the workforce has been employed by the construction sector (MBIE, 2024). As the nation's third-largest employer of labour, the construction sector employed 308,500 people in 2024 - a robust increase of 13,700 positions from the previous year (MBIE, 2024).

The construction industry has also aligned its objectives with the government's vision for housing and infrastructure that ensures safety, affordability, health, and sustainability (Salesa, J., & Reidy, 2019). The government has strongly supported the construction industry. It is committed to enhancing its capacity (MBIE, 2023) by strengthening it to create opportunities for investment and infrastructure improvements while stimulating sectoral activity (Brown, 2023).

In order to achieve optimal construction business performance, it is essential to improve the quality of information used in decision-making processes related to projects, productivity, workforce, and risk management to ensure value for money (Yahya et al., 2024). However, the stability of the construction sector seems to have been influenced by uncertainties surrounding project pipelines. Innovative views from the government, stakeholders, and contractors are supposed to be provided for the effective administration and prompt completion of project pipelines. Because uncertainties regarding the delivery of projects can create stress in the construction sector and increase risks for the industry, this study seeks to find out the pipeline requirements, criteria, challenges, and strategies to mitigate the situations confronting the construction section to pave the way forward. The findings from this study will contribute to a better understanding of the useability of current construction sector project pipeline trends. Understanding these trends facilitates decision-making for those interested in investing in the

construction sector to guide the government for future programme development. The field investigation focuses on strategies for decision-making based on the quality of information to enhance construction business performance in New Zealand. In addressing this critical aspect, the study aims to provide valuable insights and recommendations for the construction industry, government, and stakeholders to navigate the challenges and opportunities associated with project pipelines to ensure the sector's long-term success.

1.1 Background of the Study

In today's rapidly evolving business landscape, the construction industry seems to face unprecedented challenges regarding effective planning for the future and accurately predicting operational performance (Kashpruk et al., 2023). In an era of technological disruption and market uncertainties, organisations must develop sophisticated budgeting, forecasting, and financial planning mechanisms to maintain their competitive advantage (Jayawardene et al., 2021; Richards & Thompson, 2023). Recent analyses from the industry indicate that construction organisations with robust planning systems demonstrate 47% higher project success rates than those with traditional approaches (Martinez-Lopez et al., 2024). Hence, the construction sector's capacity to swiftly adapt its plans and projections has become increasingly crucial for capitalizing on opportunities and mitigating potential threats in a dynamic business landscape.

Management accounting techniques, particularly budgeting, forecasting, and variance analysis, are essential for construction organisations to gain deeper insights into their operational environment. In addition to these tools, information quality seems to be very paramount (Bossé & Rogova, 2019; Papiorek & Hiebl, 2024). Contemporary research has revealed that organisations implementing high-quality information systems experience a 35% reduction in project delays and a 28% improvement in cost management (Zhong et al., 2024). This quality of information evolves, potentially contributing valuable insights to organisations' strategic decision-making processes (van Dijk et al., 2023). The successful execution of construction projects heavily relies on the availability and effective utilization of high-quality information, with recent studies indicating that data-driven decision-making can lead to a 42% increase in project efficiency (Kumar et al., 2024).

In addition, the construction industry's decision-making landscape has become increasingly complex, with choices being made throughout the project lifecycle, from the

tender phase to project closure (Chen et al., 2023). Research indicates that approximately 3,000 decisions are made during an average commercial construction project, with 15% being classified as critical to project success (Noorzai & Golabchi, 2020). Decision-makers face many options, including project acceptance criteria, technical solution selection, risk reserve allocation for cost and schedule considerations, in-house versus subcontracted construction decisions, procurement strategies, and human resource management (Bayraktar et al., 2011).

Recent studies emphasise that decision-makers must have comprehensive access to relevant information, including factual data, potential consequences, and outcome predictions (Butler et al., 2024). While access to quality information does not guarantee desired outcomes, it substantially increases the probability of achieving favourable results, with data showing a 58% improvement in decision accuracy when based on high-quality information (Castañeda et al., 2024). The significance of making informed decisions from the project's inception cannot be overstated, particularly in an industry traditionally resistant to change, where the cost of modifications increases exponentially as the project progresses (Omar et al., 2024).

The construction industry's decision-intensive nature makes it particularly vulnerable to information quality deficiencies, with research indicating that approximately 3,000 decisions are made during an average commercial construction project, with 15% being classified as critical to project success (Noorzai & Golabchi, 2020). Decision-makers operating with incomplete, inaccurate, or outdated information face a fundamental dilemma, delay decisions while seeking better information (potentially missing critical deadlines) or proceed with available information and risk making suboptimal choices. Contemporary research emphasizes that decision-makers must have comprehensive access to relevant information, including factual data, potential consequences, and outcome predictions (Butler et al., 2024). While access to quality information does not guarantee desired outcomes, it substantially increases the probability of achieving favourable results, with data showing a 58% improvement in decision accuracy when based on high-quality information (Castañeda et al., 2024). This scenario often manifests across various decision contexts, including project acceptance criteria, technical solution selection, risk reserve allocation for cost and schedule considerations, in-house versus subcontracted construction decisions, procurement strategies, and human resource management (Bayraktar et al., 2011).

Organisations must maintain vigilant oversight of both the economic climate and the various internal and external factors influencing their operations. Contemporary research

indicates that companies employing systematic environmental scanning are 2.3 times more likely to achieve project success (Harris et al., 2024). Strategic planning necessitates a balanced consideration of sector-specific opportunities and challenges, with successful organisations dedicating 12% more resources to strategic analysis (Murumbika, 2012). Rapidly adjusting or updating initial plans has become crucial in strategic decision-making contexts where quick and reliable information is vital. Organisations have increasingly adopted rolling forecasts and flexible budgets to enhance their adaptability, resulting in a 31% improvement in project performance (Henttu-Aho, 2018).

Investigating performance deviations requires a more sophisticated approach than traditional rigid budgets or projections, particularly when significant drivers deviate from the original plans (Wood et al., 2024). Recent studies have indicated that construction industry performance has been suboptimal due to inadequate and poor information quality, with projects experiencing an average cost overrun of 28% and schedule delays of 40% due to poor information management (Melaku Belay et al., 2021).

In the context of New Zealand, there exists a notable research gap in understanding the interplay between influencing factors on information quality and stakeholder decision-making in the construction industry. While project management and information quality represent distinct research domains, limited studies have investigated the factors influencing strategic decision-making concerning information quality and construction business performance in New Zealand. The relationship between strategic decision-making strategies and information quality performance for enhancing construction business performance in New Zealand remains largely unexplored.

The implications of inadequate information quality in construction extend far beyond isolated project incidents, creating a cascade effect that amplifies throughout the project lifecycle and across organizational portfolios. When research indicates that projects experience an average cost overrun of 28% and schedule delays of 40% due to poor information management (Melaku Belay et al., 2021), these figures represent only the immediate, measurable impacts. In reality, a single information failure during the early phases of a project can trigger a series of downstream consequences that exponentially increase costs and delays. The significance of making informed decisions from the project's inception cannot be overstated, particularly in an industry traditionally resistant to change, where the cost of modifications increases exponentially as the project progresses (Omar et al., 2024). For

instance, inaccurate geotechnical data discovered during excavation not only requires immediate design modifications and material procurement changes, but also affects subsequent trade scheduling, resource allocation, and potentially the critical path of the entire project. This cascading effect means that what begins as a seemingly minor information gap can ultimately compromise project viability and organizational profitability.

This research addresses this knowledge gap by examining how the quality of information mediates the relationship between strategic decision-making and construction business performance in New Zealand. The study emphasises the necessity for evolving traditional perspectives regarding construction industry business performance. While comprehensive business performance measurement is not novel, the specific aspect of stakeholder strategic decision-making based on information quality, particularly in construction companies, and its integration into strategic business planning represents an emerging area of investigation that warrants detailed exploration.

1.2 Problem Statement

Information in today's digital age exists in multiple formats - organized, semi-structured, and unstructured - each presenting unique business challenges and opportunities (Pearlson et al., 2024). The transformation of unstructured information into structured, actionable knowledge remains a significant challenge, particularly in complex industries like construction, where information flows are multifaceted and time-sensitive (Dzokoto, 2016; Strekalova & Bouakkaz, 2022). While the accessibility of information has increased exponentially, the ability to effectively filter, process, and utilize this information for strategic decision-making has not kept pace with its availability, leading to inefficiencies and missed opportunities in project execution (Axali et al., 2024; Schulz et al., 2021).

The implications of poor information quality extend into stakeholder relationships and broader market positioning, creating long-term strategic consequences for construction organizations. The construction industry's decision-making landscape has become increasingly complex, with choices being made throughout the project lifecycle, from the tender phase to project closure (Chen et al., 2023). When information systems fail to provide accurate and timely updates, stakeholder relationships suffer as trust erodes, and defensive contracting practices emerge. The quality of information evolves, potentially contributing valuable insights to organizations' strategic decision-making processes (van Dijk et al., 2023), but poor

information quality prevents organizations from leveraging these strategic advantages. Information quality seems to be very paramount (Bossé & Rogova, 2019; Papiorek & Hiebl, 2024) for maintaining stakeholder confidence and competitive positioning. These stakeholder tensions create a cycle of mistrust and defensive contracting practices that further complicate project delivery and increase transaction costs throughout the industry.

In addition, the challenge in the construction industry is particularly acute due to the dynamic nature of projects and the diverse stakeholders' environments, including contractors, suppliers, architects, engineers, and regulatory bodies (Yuan et al., 2021). While information is readily available, identifying and accessing context-specific, timely information throughout the project lifecycle remains a persistent challenge that affects project outcomes and stakeholder collaboration (Haar, 2024). The difficulty is compounded by the fact that unstructured decision-making information often remains siloed within individual knowledge bases, making it challenging to access, communicate, and evaluate effectively across organisational boundaries (Dzokoto 2016).

Recent research has emphasized the critical role of structured information in facilitating process automation and digital transformation in construction (Naji et al., 2024; Wijayarathne et al., 2024). However, the industry continues to rely heavily on document-based information sharing, where the majority of data remains unstructured and text-based, leading to inefficient information retrieval and utilization (Barton & Stromski, 2005; Camici & Rimoldi, 2009; Nebiu & Kamberaj, 2020; Tribelsky & Sacks, 2010). This reliance on traditional documentation methods creates significant barriers to efficient information flow and knowledge management across project stakeholders, ultimately impacting project timelines, costs, and quality outcomes.

The construction sector's persistent challenges with collaboration, coordination, and knowledge management across various domains have been well-documented and continue to hinder industry progress (Asrar-ul-Haq & Anwar, 2016). A significant contributing factor to these challenges is the limited research on information behaviour and information quality specific to the construction industry, particularly in the context of modern digital transformation initiatives and emerging technologies such as Building Information Modelling (BIM) and artificial intelligence (Y. Liu et al., 2017).

Extensive research has explored the dynamics of information flow measurement within organisational contexts, offering valuable insights into how data moves through complex systems (Barton & Stromski, 2005; Camici & Rimoldi, 2009; Nebiu & Kamberaj, 2020; Tribelsky & Sacks, 2010), information retrieval (Demian & Balatsoukas, 2012; Manning, 2008), and information and knowledge capture (Becker, 2016; Hari et al., 2004; Rezgui et al., 2009). However, despite extensive theoretical research, a critical knowledge gap persists in understanding how information flow and decision-making processes integrate within construction project pipelines. This gap is particularly evident in two key areas: the practical implementation of information management systems and the measurement of their tangible outcomes in construction projects. The lack of empirical evidence linking theoretical frameworks to real-world construction scenarios has hindered the industry's ability to optimize project delivery and performance.

Poor information quality contributes to construction's persistent performance challenges and creates systemic barriers to improvement and innovation. Recent analyses indicate that construction organizations with robust planning systems demonstrate 47% higher project success rates than those with traditional approaches (Martinez-Lopez et al., 2024), suggesting that information quality deficiencies prevent a significant portion of the industry from achieving optimal performance. Contemporary research indicates that companies employing systematic environmental scanning are 2.3 times more likely to achieve project success (Harris et al., 2024), while successful organizations dedicate 12% more resources to strategic analysis (Murumbika, 2012). Recent studies have indicated that construction industry performance has been suboptimal due to inadequate and poor information quality (Melaku Belay et al., 2021), creating barriers to digital transformation and new technology adoption. This performance gap affects the industry's ability to attract investment, skilled professionals, and progressive clients who might otherwise drive innovation and efficiency improvements.

Recent efforts to organize information resources in digitized construction project environments have been promising (Dzokoto, 2016), but determining optimal information accessibility and timing for various stakeholders requires a deeper understanding of both their roles and information use behaviours in real-world project scenarios (Eastman et al., 2011). This understanding becomes increasingly crucial as construction projects become more complex and digitally integrated, requiring more sophisticated approaches to information management and control to ensure project success (Rane, 2023).

The New Zealand construction industry presents a unique context for studying these challenges, as it faces distinct regulatory, geographical, and market conditions that influence information management practices and project delivery methods (T. Liu & Wilkinson, 2011). The construction sector requires highly coordinated information flows to ensure project success and regulatory compliance while dealing with specific environmental and cultural considerations unique to the New Zealand context.

This research addresses a critical gap in the literature by proposing a comprehensive framework for strategic decision-making focused on information quality to enhance the performance of construction businesses in New Zealand's construction projects. The significance of this study lies in its potential to bridge the theoretical understanding of information quality with practical applications in construction business performance while considering the specific challenges and opportunities within the New Zealand construction sector. Despite the growing recognition of information quality's importance in construction project success, there remains limited research on how construction businesses can leverage information quality as a competitive advantage in increasingly complex and digitalized project environments.

This study aims to develop practical strategies that can be implemented within the New Zealand construction industry by examining the relationship between information quality and construction business performance through quantitative and qualitative approaches. The research will contribute to both theoretical understanding and practical applications in construction information management, potentially leading to improved project outcomes and industry-wide best practices that consider local market conditions and requirements.

The findings from this research will be particularly valuable given the increasing digitalization of construction processes and the growing emphasis on data-driven decision-making in project management across the industry. Addressing the identified research gap will provide insights that can help construction businesses optimize their information management practices, enhance decision-making processes, and ultimately improve their ability to compete in the market through better information quality management and utilization.

Furthermore, this research aims to establish a foundation for future studies in construction information management by providing a structured approach to evaluating and improving information quality in construction projects. The proposed framework will consider

technological and organisational factors influencing information quality while accounting for the specific needs and development constraints. This comprehensive approach will enable construction businesses to understand better and address their information management challenges while developing strategies for long-term success in an increasingly competitive market.

1.3 Research Aim

This research aims to develop a strategic framework for enhanced decision-making on the quality of the information that could improve the performance of construction organisations.

1.4 Research Objectives

Consistent with the research background and the problem statement, this research embarks on the following research objectives:

1. To establish the key factors influencing effective strategic decision-making processes within New Zealand construction organisations and their impact on organisational performance.
2. To determine the impact of key determinants of strategic decision-making on the successful performance of construction organisations in New Zealand.
 - 2.a To investigate the direct effects of strategic decision-making on construction organisation performance in the New Zealand construction industry.
 - 2.b To investigate the mediating role of quality of information on strategic decision-making and construction organisation performance in New Zealand.
3. To develop a comprehensive strategic decision-making framework that enhances construction organisation performance in New Zealand, incorporating key success factors, information quality metrics, and practical implementation guidelines.
4. To validate a strategic decision-making process framework for its sufficiency, clarity, relevance, and applicability in New Zealand construction organisations and to identify areas for further improvements.

1.5 Research Questions

The study employs a comprehensive methodological approach that combines systematic literature review, quantitative analysis, and interview validation (qualitative) to develop a robust understanding of these complex relationships based on the above research problem. To specify the research problems, this study attempts to answer the following research questions.

1. What are the contributory factors to effective decision-making within construction organisations in New Zealand?
2. What are the effects of the key determinants of strategic decision-making on successful construction organisation performance in New Zealand?
 - 2.a What influence does strategic decision-making have on construction business performance in the New Zealand construction industry?
 - 2.b What mediating role does quality of information have on strategic decision-making and construction organisation performance in New Zealand?
3. How can a comprehensive strategic decision-making framework be developed to enhance construction business performance in New Zealand, considering the interrelationships between information quality, strategic planning processes, and organisational outcomes?
4. How effectively does the proposed strategic decision-making process framework meet the criteria of sufficiency, clarity, relevance, and applicability for New Zealand construction organisations, and what improvements can be made to enhance its utility?

Table 1.1 summarises the research aim, research objectives, research questions and methodological approach used, based on the strong evidence provided by the literature considering the influence of quality of information on strategic decision-making required for successful construction business performance in New Zealand.

Table 1.1: Overview of Research Aim, Objectives, Questions, and Adopted Method

Research Aim	Research Objectives	Research Questions	Data Collection	Analytical Technics
To develop a strategic framework for strategic decision-making on the quality of the information to enhance the performance of construction businesses. concerning the execution of pipeline construction projects in New Zealand since there is a scarcity of research on the topic of how the construction industry can gain a competitive advantage by improving their construction business performance through the quality of information.	1. To establish the key factors influencing effective strategic decision-making processes within New Zealand construction organisations and their impact on organisational performance.	1. What are the contributory factors to effective decision-making within construction organisations in New Zealand?	Systematic literature review.	Systematic Reviews and Meta-Analyses (PRISMA).
	2. To determine the impact of key determinants of strategic decision-making on the successful performance of construction organisations in New Zealand. 2.a To investigate the direct effects of strategic decision-making on construction organisation performance in the New Zealand construction industry. 2.b To investigate the mediating role of quality of information on strategic decision-making and construction organisation performance in New Zealand.	2. What are the effects of the key determinants of strategic decision-making on successful construction organisation performance in New Zealand? 2.a What influence does strategic decision-making have on construction business performance in the New Zealand construction industry? 2.b What mediating role does quality of information have on strategic decision-making and construction organisation performance in New Zealand?	Survey (Questionnaire)	Smart-PLS 4 software for the Partial Least Squares Structural Equation Modelling (PLS-SEM) technique.

	<p>3. To develop a comprehensive strategic decision-making framework that enhances construction organisation performance in New Zealand, incorporating key success factors, information quality metrics, and practical implementation guidelines.</p>	<p>3. How can a comprehensive strategic decision-making framework be developed to enhance construction business performance in New Zealand, considering the interrelationships between information quality, strategic planning processes, and organisational outcomes?</p>	<p>Outcome of the first and second objectives.</p>	<p>Based on the findings of the first and second objectives.</p>
	<p>4. To validate a strategic decision-making process framework for its sufficiency, clarity, relevance, and applicability in New Zealand construction organisations and to identify areas for further improvements.</p>	<p>4. How effectively does the proposed strategic decision-making process framework meet the criteria of sufficiency, clarity, relevance, and applicability for New Zealand construction organisations, and what improvements can be made to enhance its utility?</p>	<p>Interview</p>	<p>Engaging directly with stakeholders through interviews.</p>

1.6 Scope of the Study

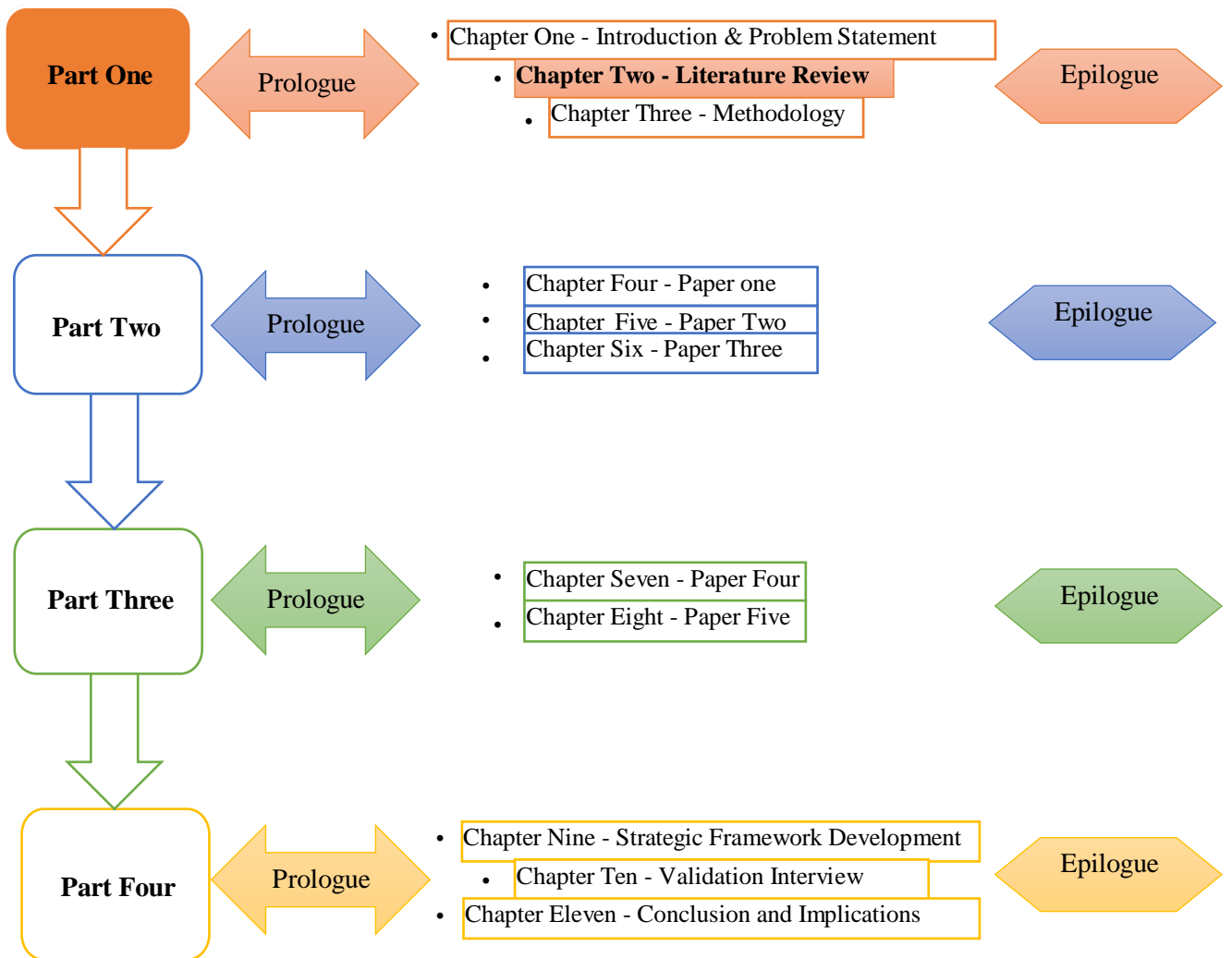
This research addresses the critical challenge of underperforming project pipelines in New Zealand's construction sector, particularly within public infrastructure development. The persistent project delays, postponements, and suboptimal performance levels in project pipelines have been well-documented (Construction Sector Accord, 2019). The construction sector accord highlights the need for strategic intervention. The focus on project pipelines aligns with the New Zealand government's long-term emphasis on infrastructure, residential construction, and non-residential building activities developments.

The study aims to develop a comprehensive conceptual framework for strategic decision-making and information quality enhancement to improve construction business performance. The study uses a quantitative research methodology to examine statistical relationships between key variables that influence project outcomes. The research targets middle- to senior-level construction managers actively involved in strategic decision-making within their organisations, with Expert recruitment facilitated through established professional networks, including the New Zealand Institute of Building (NZIOB) and industry-specific LinkedIn groups.

Data collection utilizes a cross-sectional approach through a self-administered online survey featuring structured, closed-ended questions. This approach ensures systematic data gathering that accurately reflects the current state of the New Zealand construction industry. The study's geographical scope is limited to New Zealand's construction sector, with particular emphasis on the New Zealand project pipelines, excluding other sectors and international contexts.

The research intends to generate actionable insights and evidence-based recommendations tailored to the unique characteristics and challenges of New Zealand's construction environment. Through the development of a strategic framework integrating decision-making processes and information quality management, the study seeks to address the causes of project underperformance. The framework would benefit various stakeholders, such as construction organisations, government agencies, and project management teams involved in project pipeline delivery.

The study's boundaries are clearly defined to focus on the specific challenges of information quality and strategic decision-making within New Zealand's construction organisation, ensuring that the research outcomes provide practical value for the industry implementation while contributing to the broader knowledge in construction management.



CHAPTER 2

LITERATURE REVIEW

2.1 Overview of New Zealand's Project Pipelines

A project pipeline is a collection of projects that are planned, launched, tracked, and assessed after completion to be considered successful overall (Castagnino et al., 2020). Maintaining consistency in the project pipeline process ensures that projects have agreed-upon dates, rightly allocated team members for each particular job, unambiguous statuses, and precisely maintained project information (Luo & Shahzad, 2020).

The construction industry in New Zealand experienced an annual average growth rate of 6.6% between 2016 and 2019. However, due to the COVID-19 pandemic, the industry's growth was projected to be 7.3% in real terms in 2020 (Construction in New Zealand H1, 2021). The government's severe restrictions imposed in the first half of 2021 and subsequent economic uncertainty and weakness significantly obstructed the industry's activity. The financial crisis was further exacerbated by delays in project completion and the reallocation of a portion of the government's budget towards its response to the COVID-19 outbreak.

Despite the challenges posed by the pandemic, the construction industry in New Zealand was expected to grow by 12.2% in 2022, an increase from the earlier forecast of 6.2% growth (National Construction Pipeline Report, 2022). This upward revision is attributed to the country's success in limiting the spread of COVID-19 and the strong performance of building activity despite the pandemic. The resumption of previously suspended construction projects contributed to the upward revision in growth forecasts (BDO New Zealand Construction Sector Report, 2021). Statistics New Zealand estimates that the value generated by the building industry climbed by 25.9% in the first six months of 2021 (National Construction Pipeline Report, 2022). The construction industry is expected to grow by an average of 3.6% per year during the five years from 2022 to 2025, primarily driven by rising investment in infrastructure, the financial sector, and renewable energy initiatives.

According to the report published in 2022, the total amount of money spent on construction in New Zealand will increase by 7% in 2022 to reach \$50.9 billion. It is estimated that the weakening of the residential market will be the key driver behind the steady fall in building activity forecast for this year. The total value of construction activity is anticipated to reach around \$41.7 billion in 2027 (National Construction Pipeline Report, 2022). Figure 2.1 visually represents the entirety of national buildings and construction activities based on their value in 2022.

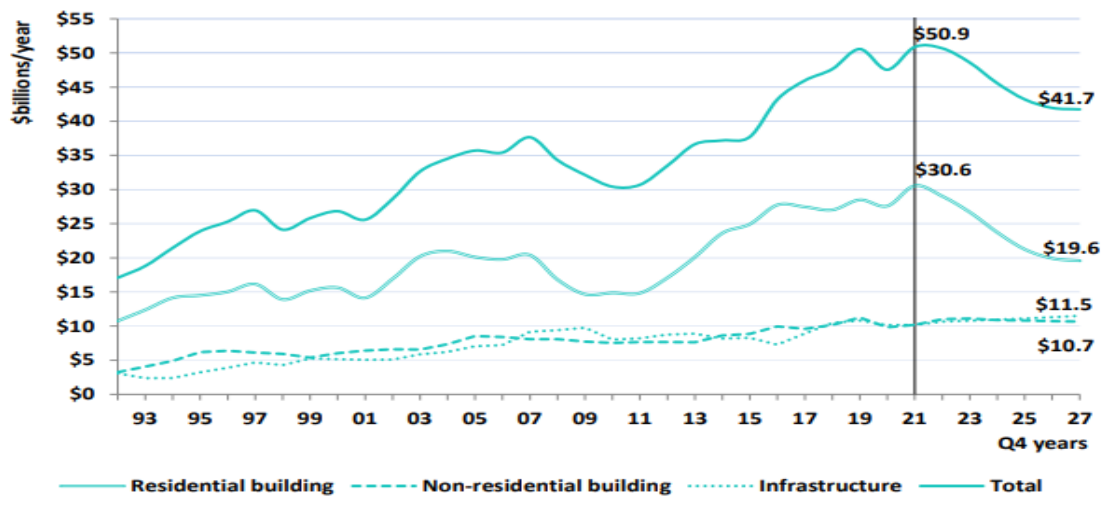


Figure 2.1: All Buildings and Construction Nationally, By Value (2022), New Zealand

The residential construction sector is the most significant contributor to the national construction industry. In 2021, residential construction accounted for 60% of the total construction activity. Although the non-residential and infrastructure sectors were also affected by the pandemic in 2020, the residential sector experienced the most significant impact from the COVID-19 pandemic and the subsequent Level 3 and Level 4 lockdowns. It was projected that residential construction spending will decrease from its peak of \$30.6 billion in 2021 to \$19.6 billion in 2027 (National Construction Pipeline Report, 2022). Analysts anticipate that non-residential activity spending will reach its highest point in 2023 at \$11.1 billion and gradually decline until 2027.

Conversely, infrastructure activity is expected to increase year-over-year, reaching a peak value of \$11.5 billion by the end of the projected period (National Construction Pipeline Report, 2022). In 2019, non-residential building activity across the country reached a high

record of \$11.3 billion (National Construction Pipeline Report, 2022). However, data from project intentions indicates that there is still significant interest in the sector (National Construction Pipeline Report, 2022).

Due to the strong consenting activity, the sector's activity level is anticipated to remain high over the next few years, peaking in 2023 at \$11.1 billion before declining to \$10.7 billion by the end of the projection period. In 2021, infrastructure represented approximately one-fifth of the total building and construction value. Although there was a slight decline in infrastructure activity between 2019 and 2020, it rebounded to reach \$10.2 billion in 2021. Projections suggest that activity will gradually increase year-over-year, reaching \$11.5 billion by 2027. Pacifica's research data indicates that high intentions will likely persist throughout the projection period (National Construction Pipeline Report, 2022).

The 2023 report reveals that New Zealand's construction industry experienced a modest 2.1% growth in 2022, with total activity reaching \$60.2 billion. However, the forecast for the coming years paints a less optimistic picture, with construction activity expected to decline gradually, reaching approximately \$55.7 billion by 2028 (see Figure 2.2). This downward trend is primarily attributed to the weakening of the residential sector.

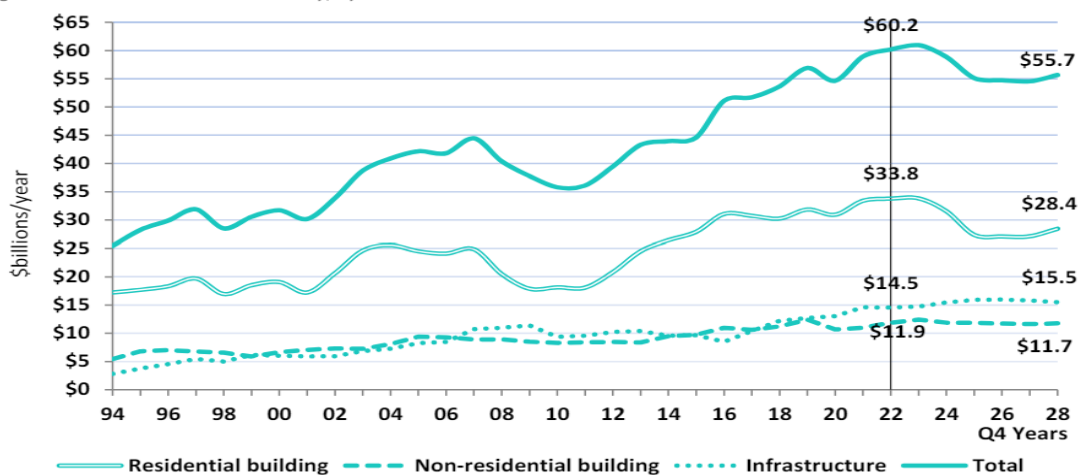


Figure 2.2: All Buildings and Construction Nationally, By Value (2023), New Zealand

Residential buildings, which accounted for more than half (56%) of the total construction activity in 2022, are projected to face significant challenges in the near future. (National Construction Pipeline Report, 2023). The report anticipates residential building activity to drop from \$33.8 billion in 2022 to a low point of \$27.1 billion in 2026–2027 before experiencing a slight recovery to \$28.4 billion by late 2028. Nevertheless, the non-residential sector is expected to peak at \$12.4 billion in 2023 and stabilize at around \$11.7 billion from 2027 onwards. On the other hand, infrastructure activity is projected to grow steadily until 2026, reaching a high of \$16 billion before tapering off to \$15.5 billion by the end of the forecast period (National Construction Pipeline Report, 2023).

The infrastructure sector comprised one-quarter of the total building and construction value in 2022 and experienced a minor decline between 2021 and 2022, with activity falling to \$14.5 billion. However, the report predicts a steady year-on-year increase in infrastructure activity, reaching \$16 billion by 2026 (National Construction Pipeline Report, 2023).

The 2023 National Construction Pipeline Report and its accompanying forecasts and research must be viewed in the context of several key factors, including inflation, high interest rates, and the ongoing recovery following recent cyclones. The previous year's forecast had assumed a peak official cash rate (OCR) of 3%. Still, the Reserve Bank has since raised the OCR to 5.5%, affecting borrowing capacity, especially for newly built properties facing increasing construction costs (National Construction Pipeline Report, 2023).

Inflation in build costs remains a significant concern, with the capital goods price index (CGPI) showing that residential buildings experienced a 13% inflation rate in 2022, while non-residential buildings and infrastructure construction faced inflation rates of 10% and 16%, respectively. These figures follow the high inflation rates observed in 2021, which were 14%, 8%, and 7% for residential buildings, non-residential buildings, and infrastructure construction, respectively (National Construction Pipeline Report, 2023). As a result, some local councils are reassessing and re-costing projects outlined in their long-term plans (National Construction Pipeline Report, 2023).

Furthermore, the early months of 2023 were marked by two severe weather events – the Auckland floods and Cyclone Gabrielle – which caused significant damage to house and critical infrastructure, such as roads and bridges. This has led to a short-term re-prioritization of work to restore essential infrastructure. Simultaneously, uncertainty surrounding the future of three-

waters reform and major transport projects has left some significant projects in limbo (National Construction Pipeline Report, 2023).

The 2024 National Construction Pipeline Report forecasts a short-term decline in construction activity, from \$60.8 billion in 2023 to approximately \$55.1 billion in 2025 (National construction pipeline report, 2024). However, the sector is expected to rebound, with activity projected to increase by nearly 4% to \$57.2 billion in 2026. This upward trend is anticipated to continue, reaching \$63.7 billion by the end of the forecast period (National construction pipeline report, 2024).

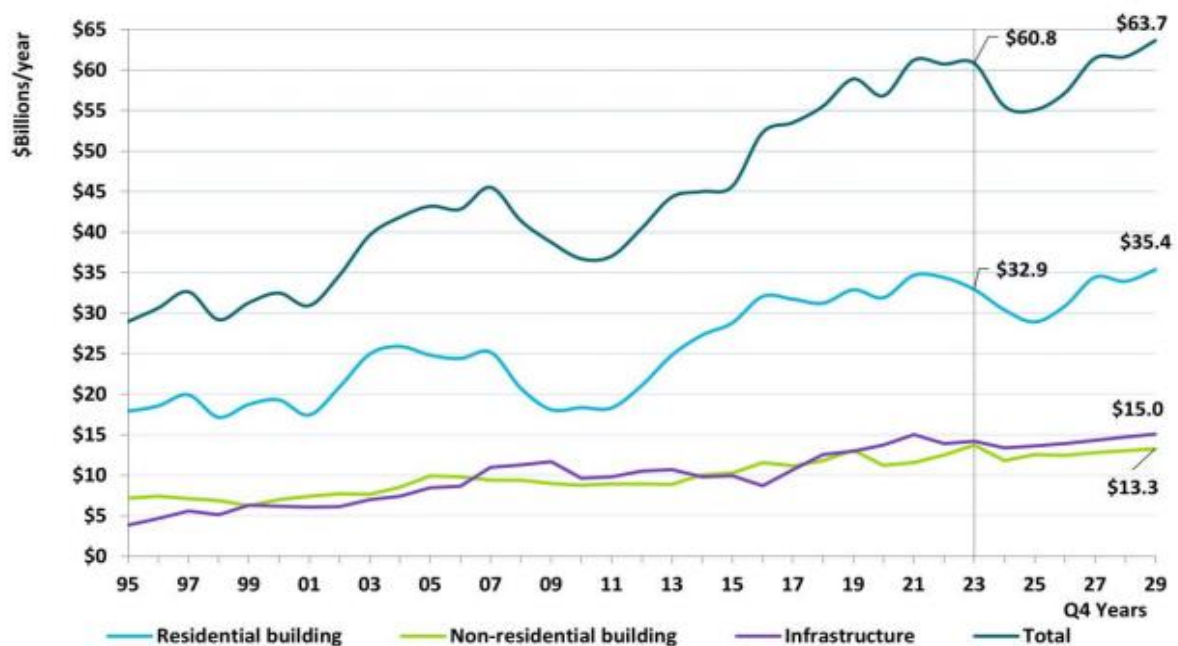


Figure 2.3: All Buildings and Construction Nationally, By Value (2024), New Zealand

New Zealand's total construction activity saw a marginal increase of 0.1% in 2023, reaching \$60.8 billion. However, activity is projected to decline to approximately \$55.1 billion by 2025 before reaching \$63.7 billion in 2029, driven by a strengthening residential sector (National construction pipeline report, 2024). The residential sector, representing the largest national construction component, comprised 54.1% of total construction activity in 2023. Annual residential building activity is expected to decrease from \$32.9 billion in 2023 to \$28.9 billion in 2025 before reaching \$35.3 billion by 2029 (National construction pipeline report, 2024).

Multi-unit dwellings dominated the housing landscape 2023, accounting for 58% of all dwelling consents. The forecast indicates 16,330 multi-unit consents in 2024, declining to 13,910 in 2025, followed by steady growth throughout the remainder of the forecast period. Over the next six years, projections show approximately 200,000 new dwellings will be consented, averaging 34,000 houses annually (National construction pipeline report, 2024).

Non-residential construction activity is projected to decline from its 2023 peak of \$13.7 billion to \$11.8 billion in 2024 before stabilizing around \$12.5 billion from 2025 to 2027 (National construction pipeline report, 2024). A gradual increase is expected thereafter, reaching \$13.3 billion by the end of the forecast period. Infrastructure activity is forecast to stabilise at approximately \$13.6 billion from 2024 to 2027 before climbing to \$15.0 billion by the period's end (National construction pipeline report, 2024).

Commercial buildings dominate the non-residential sector, representing 46% of total projects and 48% of total value for projects scheduled to commence by December 2024. These projects primarily include redevelopments, refurbishments, and high-value data centres (National construction pipeline report, 2024). However, the sector shows an overall decline, with total non-residential building projects down 4.1% compared to the previous year. The total project value has decreased significantly, showing a \$6.3 billion reduction from the 2023 figures (National construction pipeline report, 2024).

The education sector maintains a significant presence, accounting for 23% of all reported projects, though representing only 9% of the total value (National construction pipeline report, 2024). The sector has experienced a 10.5% decrease in project numbers from 2023, reflecting a period of adjustment characterized by project cancellations, postponements, and rescoping due to affordability constraints and shifting priorities. Health and industrial sectors have also seen notable declines, with project numbers dropping by 14.9% and 9.9%, respectively (National construction pipeline report, 2024).

Infrastructure represented a significant portion (23.4%) of total building and construction value in 2023, with activity rising slightly to \$14.2 billion in 2022. The sector is expected to experience a minor slowdown in 2024, followed by a period of stability before gradually increasing from 2027 to reach \$15.0 billion in 2029 (National construction pipeline report, 2024).

Project intentions data shows robust activity throughout the forecast period, with aligned forecast and planned project values. This stability is largely attributed to the public sector's

dominant role, initiating nearly 67% of intended work. The public sector typically provides better long-term funding visibility than the private sector, contributing to consistently strong intentions throughout the forecast period (National construction pipeline report, 2024).

The BRANZ forecast encompasses mining, electricity, water, gas, transport, telecommunications, and other infrastructure sectors. The outlook for 2024 remains comparable to 2023 in terms of both project numbers and total value. Transport, water, and subdivision projects continue to dominate new infrastructure activity, accounting for 93% of projects and 96% of total value, maintaining similar proportions to the 2023 report (National construction pipeline report, 2024).

Therefore, the National Construction Pipeline Reports provide critical insights that shape strategic decision-making within New Zealand's construction organisations. These reports reveal both opportunities and challenges in the sector's future landscape, with projected fluctuations in activity across residential, non-residential, and infrastructure segments through 2029. Construction organisations rely heavily on this pipeline information to inform their strategic planning, resource allocation, and risk management strategies.

The sector's stability is intrinsically linked to certain project pipelines. For instance, the projected decline in total construction activity from \$60.8 billion in 2023 to \$55.1 billion in 2025, followed by an expected rebound to \$63.7 billion by 2029, significantly influences organisational planning and risk assessment. These fluctuations and varying trends across different construction segments create complex decision-making environments for industry stakeholders.

Project pipeline information is a strategic compass for the construction industry, delivering multiple critical functions across the sector. It provides stakeholders a comprehensive forecast of future construction activity, enabling long-term planning and resource optimization. Construction organisations use this intelligence to calibrate their strategic positioning, while government bodies leverage it to develop infrastructure policies and funding allocations. The information guides contractors in capacity planning, resource allocation, and investment decisions while helping suppliers and subcontractors anticipate market demands. Most importantly, the forward-looking data enables stakeholders to identify emerging trends, assess potential risks, and capitalize on future opportunities in the evolving construction landscape. However, the quality and reliability of this information directly affect organisations' ability to make effective strategic decisions. Uncertainties in project pipelines - whether due to economic

factors, policy changes, or external events like the recent weather-related infrastructure damage - create significant operational stress and elevate sector-wide risks, potentially impacting the industry's overall performance and stability.

2.2 High-Level Comparison of Construction Project Pipelines Information

In New Zealand, multiple authoritative sources provide comprehensive information on ongoing and planned construction projects (Project Pipelines Information). These sources serve as critical references for industry professionals, policymakers, investors, and the public, offering detailed insights into project scopes, timelines, and stakeholder involvement (MBIE, 2022). While the accuracy and timeliness of information can vary between sources, stakeholders are encouraged to cross-reference multiple databases to maintain a complete and current understanding of the project landscape.

In order to evaluate the quality and reliability of these information sources, a detailed comparative analysis was conducted on construction pipeline data from various providers. The analysis examined several key dimensions, including the contextual "comprehensiveness" parameter, which assessed the granularity of collected data across project characteristics such as type, stage, value, schedule, and technical specifications. The study also evaluated data "completeness" by analysing missing data points to determine providers' effectiveness in collecting claimed data across different projects. Accessibility of datasets and retrieval methods, intrinsic qualities focusing on believability and accuracy of information sources, usability aspects including private sector coverage and historical data availability, and representational features examining format compatibility and ease of use. This systematic comparison of four significant datasets, documented in Table 2.1, provides valuable insights into the strengths and limitations of New Zealand's construction data ecosystem, supporting more informed decision-making and enhanced collaboration across the construction and infrastructure sectors.

Table 2.1: High-Level Comparison of Construction Project Pipelines Information from Selected Providers

Category	Parameters	Data Attributes	Dataset 1	Dataset 2	Dataset 3	Dataset 4
Accessibility Parameters	Accessibility	Availability	Public	Paid Subscription	Public	Public
		Data Retrieval	Pull	Push/Pull	Push/Pull	Pull
Intrinsic Data Quality Parameters	Believability	Information Sources	Subscribing Agencies	Open (all Sources)	Internal Planning Unit	Internal Planning Units
	Accuracy/Objectivity	Data Collection Methods	Agency Updates	Survey/Communication	Internal Plans	Internal Plans
	Usability	Includes Private Sector	No	Yes	No	No
		Future Projections for Future Planning	Yes	Yes	Yes	Yes
		Past Projects Data for Trend Analysis	No	Yes	Upon request	No
Contextual Data Quality Parameters	Comprehensiveness	Project Identifiers	Name, ID, Short Description	Name, ID, Short Description	Name, Scope (New Vs Redevelopment)	Name
		Procuring Agency/Developer	Yes	Yes	Default (MoE)	Default (Local Authority)
		Project Location	Region (Partial City, Suburb, Coordinates)	The region (Partial Suburb & Street)	By Region	By suburb/area
		Project Work Type	Yes (16 Categories - Commercial, communication, community facilities, defence, education, EM, energy, health, housing, justice, science, transport, waste, water)	Yes (Generic 9 categories) Civil, Commercial, Education, Health, Energy, Industrial Residential, Sport, Multi-Category)	New School and Existing School Redevelopment	4-16 categories depending on the issuing authority (common categories include transport, Roads and footpaths, Water supply, Wastewater treatment, Stormwater, Parks and Community, Waste management, Environmental Services, Engineering & technical services)

		Project Lifecycle Reported	Planning, Procurement, Construction	Planning, Procurement, Construction	Procurement	None, only
		Consents Approvals	No	Partial /Inconsistent	No	No
		Procurement Type	Yes (Direct, Limited, Open, Selective)	No	No	No
		Procurement Method	Yes (Alliance, Construction, only, D&B, ECI, PPP)	No	Yes (Traditional, D&B, ECI)	No
		Supplier information for awarded projects	No	Yes	Preferred Supplier may be identified	No
		Funding	Yes (Funded, Source Confirmed, Source to be confirmed)	No	Only approved projects are published	High-level annual capex
		Preliminary in-house Value Estimate	No	Yes	No	Yes
		Value Bands	Yes (Detailed, < 1 M, 1 - 5 M, 5 - 25 M, 25 50 M, 50 - 100 M, 100 - 250 M, 250 - 500 M, 500M - 1 Bn, > 1 Bm)	Yes (Borad <1 M, 1-5 M, 5-10 M, 10-25 M, < 25 M)	Yes (7 bands guiding suppliers prequalification criteria, VB1 < 1.5 M, VB2 1.5 - 3.5 M, VB3 3.5 - 7 M, VB4 7 - 14 M, VB5 14 - 21 M, VB6 21 - 30 M, VB7 > 30 M)	No
		Reported Schedules	Business Case. Procurement, Construction (Start and End of each phase)	????	Tender, Contract (start date)	No
		Date Formats	Quarters	Month/Year	Month/Year	Year
	Completeness	Total Columns	29	14	9	N/A
		Blank Columns (nothing Reported)	4	0	0	N/A

		Columns with Missing Data	10	3	0	N/A
	Timeliness	Usability Horizon	Current + Future Pipeline	Future Pipeline, Past data available	Future Pipeline	Future
		Currency	3 months	Update Subscription	Bi-Annual	3 Years
Representational Data Quality Parameters		Format	Tableau /Excel	Excel/PDF	PDF	PDF
	Ease of Use	Manageability	Filters, Arithmetic, Visualisations	Filters, Arithmetic, Visualisations	Difficult	Difficult
		Interpretability	Easy	Easy	Confusing between short-term	Different nomenclature and use across the different local authorities
		Consistency	Consistent	Consistent	Consistent	Inconsistent across the different local authorities

Several variances and differences were identified across the four studied dimensions, as shown in Table 2.1. The type of data fields reported across the four studied datasets varied significantly. Moreover, the detail and granularity of the presented project data exhibited huge differences. The following section highlights some of the main differences between the considered datasets.

How a project is defined across the sampled datasets differs. While all the datasets provided a "project name," not all datasets assigned unique identification numbers to the projects. Furthermore, the assigned project names and identification numbers differ across the datasets, making identifying and cross-checking project information from different sources difficult (NZIC, 2021). Similar challenges could be identified when considering how a project location is presented. While some datasets report only high-level locations such as regions or cities, others provide variable detailed levels, ranging from the broad regional level to exact location and coordinates.

A significant variance detected across the datasets was the difference in reported projects' lifecycles. Some datasets reported all the primary cycles, such as planning, procurement, and construction phases. Others concentrated on single phases, such as Dataset 3, which publishes its projected pipeline information focusing on the procurement stage tentative timings. Information provided by the 10-year long time projects (LTP) of the local authorities is only high-level and does not provide details (National Construction Pipeline Report, 2022b). However, some local authorities would publish the appropriate information using other platforms, such as Dataset 1, after completing internal planning processes and confirming project commissioning data. Another point of variance is the reporting of building approvals/consents and resource management consents across the datasets (MBIE, 2022). With only one dataset reporting on the consent status, most of the sampled datasets do not report on the consent approval status of the project, resulting in lower certainty around the project's status quo, progress and expected time limits.

The level of detail and sub-categorisation of the construction type or sector varied significantly. Some datasets adopted a detailed approach with as many as 16 work types reported, while others used a scarce genre work scope such as "new build" or "redevelopment". Though the generally known construction work types include categorisation such as residential, non-residential, commercial, or civil work categories,

some datasets used categorisation phrases related to the developer or owner's affiliation, such as "defence" or "justice" (Pacifiecon, 2021). Despite giving more detail, this approach may create confusion and challenge the ease of use, understandability, interpretability, and manoeuvrability of the data or information.

The sampled datasets adopted different formats to present the procurement criteria for the listed projects. For example, not all datasets reported the expected procurement type and in varying levels of detail. Some explicitly mentioned how a project would be procured, such as a direct award or open tendering (Pacifiecon, 2021). Others did not present such information. Similarly, the procurement scope was not consistently reported across the sampled datasets. Some datasets detailed the procurement scope, including alliances, public-private partnerships, design and build, early contractor involvement, or construction only. Other databases did not report procurement scope. Supplier information was only published in one dataset of the studied sample for awarded projects that progressed beyond the procurement stage. Dataset 3 is only mentioned if a preferred supplier was selected for the project without further details or information.

Reports on project funding status and expected costs varied considerably across the sampled datasets. Some datasets reported if a project is funded or if its funding source was confirmed or not yet confirmed. It is understood that some of the sampled datasets would only publish projects if funding was already approved or secured. High-level datasets such as the local authorities' 10-year plans only project the annual expected capex of the project, with no detail on funding certainty.

Project value or cost estimate reporting is an essential factor in decision-making processes. Three of the sampled datasets categorised the projects according to pre-defined value bands. However, the number of bands and the band intervals also varied considerably. Some datasets categorised projects under nine value bands with tighter intervals, enhancing confidence levels. Other data sets used fewer value bands with more significant intervals. For example, a project with an expected value of 1 billion Dollars would be classified under the value band ">25 million" in one dataset, while it would be more accurately represented in another dataset as "> 1 billion". Additionally, only one data set provided a lump-sum estimated expected cost (National Construction Pipeline Report, 2022b).

Timeframes and schedule reporting differed across the sampled datasets. Generally, each dataset adopted its unique time reporting format, including quarters, months, and years only. In addition, some datasets reported the expected schedule for each project's lifecycles or phases, while others focused on specific phases, such as tendering and contract dates. Other datasets provided only the "year" with no detail on the projected phases. The high variability in time reporting formats reduces the certainty and confidence in the construction activity data.

The number of data columns within each dataset was considered to provide insight into the level of comprehensiveness and details. Significant variances were also perceived. For example, one dataset provided 29 data columns, while the others provided 14 and 9 columns. However, out of the 29 data columns, four were completely blank with no data points recorded, and ten columns had variable degrees of missing data points. None of the other datasets contained blank columns; only one had three columns with missing data points.

Considering the accessibility dimension of the datasets, it is found that only Dataset 2 exhibited a payment subscription module. Data is commonly retrieved through “pull” methods, where users consult the respective data providers' websites and can download the required information. Datasets 2 and 3 offer a “push” service to disseminate updates to subscribed parties. However, the available data formats also differed significantly, causing variations across the “representational” data quality dimensions. For example, Dataset 1 offers online Tableau graphs and tables, with the possibility of providing Excel files bi-annually. Tableau formats may present challenges to some users when downloading the data. Datasets 3 and 4 offer their data in PDF file formats, making it difficult to manage compared to Excel.

2.3 Strategic Decision Making

Mazzolini (1981) defined strategic decision as "the commitment to action and the resource allocations which determine the area of activity of the organisation — what endeavours it pursues, i.e., what commodities or services it creates and what markets it serves." Strategic decision-making can be described as the act of a company's strategic leaders, such as the board of directors, the Chief Executive Officer (CEO), and the key officers of the business or top management team, reaching a consensus and implementing

that consensus (Bello et al., 2022). These decisions influence the organisation's direction and ensure long-term profitability, survival, and sustainability despite external threats and internal inefficiencies (Shaffakat, 2014). Fitzroy & Hulbert (2005) described strategy as the "common theme underlying a set of strategic decisions." They differentiate between corporate-level decisions affecting the entire company and business-level choices involving specific business units within the firm. According to Fitzroy & Hulbert (2005), the three primary decision areas are determining where to compete, how to compete, and what growth plan to implement. Effective strategic management ensures the organisation remains sustainable while simultaneously providing value for all its stakeholders (Calabrese et al., 2019). Stakeholders in the construction industry include people in the immediate location of a company's business, customers, suppliers, regulatory bodies, professional organisations, employees, bondholders, shareholders, creditors, and banks (J. Russell et al., 2022).

It is essential to distinguish between the decision-making process at the strategic or corporate level and the process of making a strategic decision (Coteur et al., 2020). Strategic-level decision-making generally considers the long-term implications and execution of decisions to ensure the organisation's long-term viability within its operating environment. An individual or organisation can make a strategic decision without qualifiers, regardless of the time required for implementation (Buehring & Bishop, 2020). The definition of "long-term" varies across industries. For example, in the construction sector, "long-term" may refer to a period of 10 to 20 years, while in the software industry, it may refer to a period of 3 to 5 years. Strategic decision-making can also be viewed from different perspectives, such as individuals or organisations making decisions in a context unrelated to the strategic-level decision-making within an organisation (Bayrak et al., 2021). For instance, Koklic & Vida (2011) studied consumers' strategic decision-making when purchasing a house. Farmar-Bowers (2010) examined the strategic decisions made by farming families, including adapting to climate change, expanding or selling the farm, seeking additional employment, and educating children effectively. Friend (2006) explored the possibility of individuals making strategic decisions in the presence of complex realities, such as deciding when and where to go on vacation, how to sell a car, or how to manage a challenging request. Collins & Evans (2002) elaborated on military strategy and strategic decision-making.

The time required to design and developed a strategy is significantly shorter than the time needed for strategy implementation. The more extended period for strategy execution and the possibility of changes in both the organisation's external and internal settings make it challenging to maintain focus (Atkinson et al., 2020). For example, material prices fluctuate; technology, interest rates, governments, and regulations constantly change; financial crises and personnel turnover frequently occur (Henriques & Sadorsky, 2011; Kunc & Bhandari, 2011; Pourhejazy et al., 2020; Robert Baum & Wally, 2003). The impact of such changes on the rate, pace, and frequency of strategic decision-making continues to present research opportunities for specific sectors of the economy and governmental domains (Konovalov & Ruff, 2022; Zehir & Özşahin, 2008). Several other factors, including the decision-making style of the top management team, the amount of information available, the top management team's level of expertise, the efficiency of the decision-making process, the decision support system and tools, the size of the organisation, and the type of organisation, can all affect the rate at which strategic decisions are made (Nahum & Carmeli, 2020; Reavis et al., 2021; Talaulicar et al., 2005). Due to the medium- to long-term nature of strategy and its execution, many businesses prioritize proactively ensuring the continued relevance of their corporate strategy by employing methods such as scenario planning and wargaming (Kaplan & Mikes, 2012).

This research and the following literature review focus on strategic-level decisions made by a company's corporate leaders or top management teams. These decisions should align with the organisation's mission, vision, values, and goals and should be based on the quality of the leaders' information on a specific project (Chuang et al., 2022). These high-level strategic decisions are made and acted upon to ensure the company's long-term profitability and continued existence. This research focuses on strategic-level decision-making in profit-oriented organisations regarding the construction industry (Garg, 2018). While acknowledging that various conceptions of strategic decision-making involve different entities, time limit considerations and business unit levels in both for-profit and non-profit organisations, the research focuses on strategic-level decision-making in for-profit organisations. Consequently, one would be inclined to adhere to the concept that strategy is the result of the process by which organisations attain their objectives in a resource-constrained and competitive environment (FERENCE & Thurman, 2009).

Additionally, one could agree with the definition of strategy as "the direction and scope of an organisation over the long term, which achieves advantage in a changing environment through its configuration of resources and competencies intending to fulfil the expectations of stakeholder groups" (Johnson et al., 2008). Modern businesses are forced to deal with complex, unstructured, and non-routine issues due to the rapid pace at which new technologies, improved communication technologies, peer-to-peer networking, and social networking apps are developed (Garg, 2018). The impact of such challenges on the quality of information available within an organisation and the long-term viability of its financial situation is a significant matter (Karam et al., 2019).

In organisations, strategy can be implemented at three levels: corporate, business, and functional. The overarching goal of a corporate strategy is to determine what the company should be and how its operations should be organized and controlled (Назаров, 2021). This strategy is responsible for establishing the general purpose and objectives of the company, assessing ideas that emerge from business and functional levels, and allocating resources following strategic priorities (G. Li et al., 2021). Due to the multiple levels of strategy, business executives can create goals for their companies at every level, from the most general corporate level to the most specific functional level. As the highest point in an organisation, the decisions made at the corporate level will ultimately inform the primary aim of the firm and the goals of the lower levels (BusinessBecause, 2022). Corporate-level strategic decisions are those made by senior management to penetrate different sectors or marketplaces to achieve a competitive advantage.

Business strategies constitute the second level of strategy within organisations. According to Nyariki (2016), the primary focus of a business strategy is to ensure that each strategic business unit maintains a competitive edge. Coulter et al., (2008) state that business strategies and competitive strategies are concerned with how an organisation plans to compete in a particular sector or line of work. This level of strategy also involves accurately identifying the essential success factors in a given market and operating the company in a way that meets these factors more successfully than its competitors. Adendorff et al., (2011) suggest that a differentiation strategy is appropriate when a company can differentiate its products along attributes that customers value. The cost of doing so is lower than the extra revenue anticipated from pursuing the differentiation strategy (BusinessBecause, 2022). In other words, the consumer believes that the product's price, relative to other available options, is significantly lower than its value (Louis &

Dunston, 2018). According to Adendorff et al., (2011), the differentiation strategy is intended to reduce the degree to which the company's product is affected by price competition, meaning that shoppers place less importance on cost considerations when purchasing.

The third level of strategy is known as the functional or operational strategy. Ehlers & Lazenby (2004) define functional strategies, also known as operational strategies, as the decisions and actions taken by an organisation's various functional areas, such as marketing, operation, production, finance, and human resources, that are directed towards achieving short-term goals (BusinessBecause, 2022). In order to support the company's business and corporate strategy, the corporation must maintain its competitive strategy throughout each functional area (G. Li et al., 2021). For the functional-level strategy to be successful, project managers must ensure that day-to-day operations in each department align with the company's desired results. This requires setting specific metrics to monitor whether each sector achieves broader goals (Eberhardt et al., 2022). Examples of functional strategies include a company's approaches to research and development, marketing, financing, and manufacturing. These diverse strategies necessitate a unique set of decisions to effectively execute their respective tasks, aligning with the company's overarching strategy. Proficient communication is a crucial competency for departmental leaders responsible for functional-level strategy (BusinessBecause, 2022). These executives must adeptly translate organisational strategy into actionable functional strategies and offer insights for refining organisational strategies when necessary. Moreover, they must grasp the skill of converting higher-level strategies into functional-level strategies.

It is essential to outline that the strategic management process encompasses envisioning a guiding vision, formulating a strategic mission, defining objectives, conducting situational analysis, crafting strategies, executing plans, and assessing outcomes (G. Li et al., 2021). In the literature, strategic management involves a recurring sequence of interlinked stages, enabling companies to establish, execute, and oversee the achievement of long-term business objectives. This process remains dynamic and continuous, implying that changes in one facet can trigger a cascade effect across the entire strategy.

In strategy formulation, factors encompassing economic, social, political, technological, ecological, and industry environments come under consideration (Karam et al., 2019). These factors span entry barriers, competitive dynamics, substitutes' availability, and the bargaining influence of buyers and suppliers. Following the successful formulation of an efficient strategy, organisations must diligently assess their strategic choices to sustain competitiveness, eventually. Subsequently, as organisations set long-term goals and pinpoint suitable approaches, the strategic management process seamlessly transitions into the implementation phase. Adopting strategic management practices profoundly impacts a firm's performance, as it provides a conceptual framework to comprehend strategic positioning and navigate future choices. Pearce-Higgins et al., (2007) echo this perspective, emphasizing that embracing strategic management is pivotal for mitigating uncertainties, devising strategies that sustain operations and minimizing risks. Furthermore, within the construction industry, applying strategic management practices is paramount in enhancing financial performance and overall business outcomes.

2.3.1 Strategic Decision Formulation

Strategic decision formulation, an essential aspect of strategic planning, involves defining an organisation's mission, philosophy, objectives, policies, and methodologies to achieve these objectives (W. Lu, 2010). This process is crucial for bolstering an organisation's position and gaining a competitive edge, not just domestically but also on a global scale (Ng'andu, 2022). It involves delineating the organisation's mission objectives and crafting a suitable strategy (Safaeian et al., 2022). Numerous factors influence this process, such as evaluating both internal and external environments, envisaging the future landscape, establishing organisational missions and goals, defining strategic policies, and assessing the capabilities of those involved in strategy development (Yu et al., 2022). These same factors influence the formulation of strategic objectives. It is a multifaceted process entailing goal setting and devising action plans to achieve these goals. Strategy formulation enables organisations to plan for success and adapt workplace strategies as needed, playing a pivotal role in goal attainment and assessment (Han et al., 2023). After crafting strategies, organisations often educate their workforce about their purpose and objectives. Strategic decision formulation and implementation form an intricate, interactive process shaped by policies, values, organisational culture, and management

styles, culminating in outcomes. The amalgamation of strategy, structure, and systems influences these results (Mintzberg & Rose, 2003).

Strategic decision formulation involves setting organisational objectives, devising alternative courses of action, and selecting the best course, considering an organisation's core competencies and the external environment (Yildiz & Ahi, 2022). This process relies on aggregated, incomplete, and uncertain information about various strategic options. Modern executives are tasked with managing internal activities and navigating the challenges presented by their organisation's immediate and broader environment (Ng'andu, 2022). Strategic management encompasses decisions and actions geared toward formulating and executing plans to achieve company objectives, focusing on forward-thinking, large-scale plans for engaging with the environment to accomplish these objectives.

2.3.2 Strategic Decision Implementation Practices

Strategic decision implementation practices involve delegating tasks and responsibilities to individuals or groups within the organisation (Ng'andu, 2022). This process, facilitated through organisational structure, is the second pivotal step in strategic management. It encompasses a range of managerial decisions, including determining the organisational structure, information systems, leadership alignment, and suitable control mechanisms (Wuni, 2022). Implementation, the most challenging phase, necessitates mobilizing both employees and managers. It aims to rally the entire organisation behind the strategy, requiring involvement from all units, with top management initiating and leading the process for successful execution (Bakar et al., 2011).

An effective strategic plan must translate into actionable steps, prioritizing its execution tailored to the unique aspects of producing goods (Chen, 2015). While plans need to be specific and well-articulated, they also function as instruments steering an organisation towards success, providing the flexibility to seize new opportunities and adapt to market changes. This planning process is evolutionary and constantly adjusted to accomplish the mission (Babalola et al., 2019). Stakeholders, encompassing stockholders, employees, management, creditors, consumers, and suppliers, anticipate the organisation to meet their respective demands, be it adequate returns on investment, fair wages, timely

payments, value for purchases, or more. Ignoring stakeholder interests in formulating strategies can lead to their withdrawal of support (Doz, 2020).

Once long-term objectives are set and suitable strategies are chosen, the strategic management process progresses into the implementation phase. As Ehlers & Lazenby (2004) described, strategy implementation marks this process's active phase, encompassing administrative tasks to mobilise organisational resources cohesively to accomplish its strategy (Ng'andu, 2022). Successful execution of this phase is integral to an organisation reaching its potential and is symbolic of effective management. Nnaji & Karakhan (2020) state that sound strategy coupled with effective implementation is a testament to good governance, as it tests a manager's abilities to direct change, motivate people, enhance organisational competencies, and nurture strategies. For an implemented strategy to be effective, it must be deeply ingrained in the organisation's daily operations, permeating its day-to-day functioning.

2.3.3 Strategic Decision Evaluation

Strategic decision evaluation entails establishing evaluation systems to ensure the effective execution of strategic planning towards organisational objectives (Ng'andu, 2022). This process involves comparing anticipated outcomes with actual results and encompasses appraising the entire corporation while considering the environmental dynamics (You & Wu, 2019). Typically, it centres on long-term opportunities and issues related to achieving corporate objectives, forming a continuous cycle of visioning, planning, implementing, and evaluating within the strategic management process.

Evaluating strategic decisions is pivotal in validating management's strategies and determining their success or failure. It is a pivot point for organisations to reevaluate their course and adjust the strategic plan if performance falls short of expectations (Ng'andu, 2022). After successfully implementing a well-formulated strategy, organisations must consistently review their strategic choices to sustain competitiveness. Strategy evaluation becomes the linchpin for deciding whether to persist or modify the company's vision, objectives, strategies, or execution approaches (Barbhuiya & Das, 2023).

When a company's direction aligns well with the industry conditions and performance targets are met, management can focus on refining the strategy and

enhancing execution (Y. Pan & Zhang, 2021). Strategy evaluation helps ascertain the appropriateness of objectives, policies, and plans, confirming or challenging underlying assumptions (Mintzberg et al., 2002). Strategic managers must vigilantly monitor market responses and establish control mechanisms to ensure strategy adherence (Ng'andu, 2022). It is crucial to emphasise that evaluation should be continual rather than intermittent, necessitating ongoing performance assessment and proactive adjustments in the company's long-term direction, objectives, and strategy (Chen et al., 2021).

2.3.4 Reliance on Financial Strength

The historical intertwining of the construction and finance strength has been foundational, driven by long-term political aims to ensure accessible housing (Daier et al., 2022). Despite this enduring connection, scholarly attention within construction management often overlooks these intricate links. The construction industry, encompassing primary contractors, subcontractors, and vital suppliers, significantly relies on substantial financial investments to execute projects (Chen, 2009). Project financing stands as a critical facet within this industry. Financial ratios wield immense influence in determining project feasibility and guiding financing decisions. Understanding these ratios equips construction organisations to secure funding effectively and execute projects successfully.

Financial ratios illuminate a construction company's financial robustness, stability, and performance. Stakeholders such as lenders, investors, and project experts heavily rely on these metrics to gauge creditworthiness and associated risks linked to project financing (Singla & Prakash, 2021). By scrutinizing these key financial indicators, stakeholders can make informed judgments about a project's viability and potential returns (Taofeeq et al., 2020b). Assessing a company's financial performance holds immense significance for various stakeholders, from managers and shareholders to creditors, investors, and even tax authorities, particularly amid the swiftly evolving global landscape (Styhre, 2019). International corporations often secure contracts in foreign nations, competing directly with local businesses. Consequently, both multinational and local contracting organisations must prioritize performance enhancements to uphold their global reputations (Naumenkova et al., 2020).

Financial performance serves as a reflection of a company's overall financial stability and relative position in comparison to its counterparts. Evaluating financial statements to discern profitability and stability is pivotal in assessing a firm's financial performance (Mishlanova, 2019). Financial ratios serve as diagnostic tools, illuminating strengths and weaknesses regarding liquidity, efficiency, leverage, and profitability. Numerous studies highlight the efficacy of financial ratios in evaluating organisational performance (Fahami et al., 2019).

2.3.5 Reliance on Workforce

Improving project performance through enhanced labour skills has been a persistent demand in the construction sector. Acknowledged widely, labour efficiency significantly influences project progress, particularly in construction projects where physical labour is integral (Agenbag & Amoah, 2021). Project management involves a team comprising a project manager, assistant manager, engineers, architects, contractors, and subcontractors, with physical labour being crucial in executing tasks at the construction site (Hussain et al., 2020). As a labour-intensive industry (Hussain et al., 2018), the construction sector heavily relies on labour skills for successful project execution. In any industry, performance is critical for ensuring sustainability and competitiveness (Muthuveloo et al., 2017). It serves as a pivotal indicator, determining the industry's survival (MSCM, 2016), project success, and adherence to the triple constraint (time, cost, quality) (Cserháti & Szabó, 2014).

The role of skilled and unskilled labour profoundly influences project performance in construction. Understanding this impact is vital to ensure seamless project completion without delays. Labour skills and efficiency are pivotal factors that significantly impact project performance (Aghimien et al., 2023). The availability of an experienced and skilled labour force is crucial for initiating and successfully executing construction projects. Shortages or deficiencies in skilled labour can negatively impact project performance, leading to delays and quality compromises (Calvetti et al., 2020). The productivity of labour significantly influences project outcomes in construction. Labour productivity is a multifaceted aspect that affects project performance positively or negatively. Challenges related to unskilled labour productivity are a significant concern within the construction industry due to various social, cost-related, and physical issues

(Hussain et al., 2020). Unskilled labour poses a significant productivity challenge within the construction sector, impacting project performance adversely.

The scarcity of skilled labour presents a significant challenge for construction projects' long-term economic viability and success. Projects facing a shortage of skilled labour often grapple with tight schedules to meet project targets (Hussain et al., 2018). Poor labour productivity remains a critical factor influencing project performance within the construction industry (Shehata & El-Gohary, 2011). Effectively managing resources is essential to mitigate adverse impacts on construction projects' time, cost, quality, and safety. Construction managers and contractors must discover strategies and methodologies to assess workers' productivity across different skill levels (Hussain et al., 2020).

2.4 Quality of Information

There are many various approaches that have been taken in the past when attempting to convey the idea of information (Bawden & Robinson, 2013). For instance, it has been described as data processed into a meaningful form and assembled in an intelligible form capable of communication and application. Other definitions include “data that has been processed into a meaningful form” (Cawkell, 2003). According to M. Chen et al., (2013) state that information refers to both well-formed and meaningful data, and it must also be honest. Bates (2018) offers a different definition of information, which may be summarised as “the patterns of organisation of matter and energy.” Maksimov and Lebedev (2020) have suggested that information might show itself differently. Although it is a representation of an item, it demonstrates its power by influencing the behaviour of other things and bringing about shifts in those objects (Maksimov & Lebedev, 2020). Data are “representations of events, people, resources, or conditions,” according to Davis, (2000), while information is “a result of processing data,” and knowledge is “information that has been organised and processed to convey understanding, experience, accumulated learning, and expertise.” According to Davenport & Prusak (1998), data is “a set of discrete, objective facts about events,” while information is “a message that has a sender and a receiver, and its purpose is to shape the way the receiver perceives something.” Data is defined as “a set of discrete, objective facts about events,” while information is described as “a message that has a sender and a receiver.”

Their pragmatic definition of knowledge is “a fluid combination of framed experience, values, contextual information, and expert insight that provides a framework for assessing and assimilating new experiences and information” (Davenport & Prusak, 1998). Knowledge is defined as a “human or organisational asset allowing effective choices and action in context” in the ISO 30401:2018 standard for knowledge management systems (Schmitt, 2022). In other words, knowledge is actualized and used in the minds of those who possess it, and in contrast to facts and information, it includes an element of judgment (Davenport & Prusak, 1998). Buckland, (1991) suggests three primary applications for the word “information”:

- Information may refer to the process of getting informed.
- Information can refer to knowledge that is shared, and
- Information can refer to things like data and documents.

According to Floridi (2010), it is difficult to presume that a single idea of information could adequately account for all the different applications that may be performed. The quality of the information has been given much consideration in scholarly writing. The researchers looked at the accuracy of the data from several different angles, which helped shed light on the topic in several different ways and contributed to the main body of the study. The most exhaustive study on the topic has been conducted in Management Information Systems and Information Management (Y. W. Lee et al., 2002). Around 1980, the notion of information as a product began gaining widespread popularity. This was because the principles of Total Quality Management (TQM) have always been applied to information quality (Shankaranarayan et al., 2003). “Covering all actions through which the needs and expectations of the customer and the objectives of the organisation are realised in a manner that is efficient and cost-effective” is how the concept of TQM is described (P. Wang & Li, 2020). The concept of a “product” derived from the data serves as the basis for majority of the models presented in the academic research corpus.

According to Ridwan et al., (2020), the definition of quality information is a consistent correlation between the information requirements and expectations of end-customers and knowledge workers to effectively meet either the knowledge worker’s or end-commercial customers’ or personal objectives. According to this conception, knowledge workers are a company based in an office whose major duty is to guarantee

that the company runs efficiently and without hiccups (Rajaraman et al., 2021). End customers are clients that buy a company's products or services directly from the company itself. They are also known as retail customers. According to Lillrank (2003), the quality of information is still a "vaguely defined term," he has developed two distinct conceptions for defining information and, consequently, the quality of information. One of these conceptions is that the quality of information can be measured in terms of accuracy. One of the guiding concepts is referred to as the "information as a deliverable" concept.

According to this, information is produced to satisfy requests that have not been clearly and concisely articulated. This occurs in situations where the requirements and demands for the information shift while the process of discussing and sharing information is still being carried out (Lillrank, 2003). It can be stated that the quality of the information being conveyed has improved when most people have no trouble understanding the information and when "its meaning can be assigned to it with a degree of agreement and in a way that is considered worthwhile." The second concept that Lillrank, (2003) discusses sees "information as an artefact," the quality of which is already established but still must be thoroughly characterised and described. In the accounting field, where each report's format is standard across the board, such situations occur regularly. If information is "communicated in such a way that the information receiver realises the aim of the sender," then the information is said to have high quality in this context ("information-as-an-artefact").

In today's work environment, it is not unusual for many people to work together as a team to complete a single job, such as producing a paper or carrying out a project. This type of collaborative effort is known as "teamwork." It is possible that navigating through situations like this might be rather tricky. Under these circumstances, the information needs are not entirely transparent but must be identified by collaboration and communication. The idea of information as a deliverable is best suited to the atmosphere of work that prevails in an office setting. By integrating the explanations offered by Lillrank (2003) and situating them within the framework of the working environment, one might arrive at the following description of the quality of the information: The degree to which the information consistently corresponds to the information requirements and expectations of office employees in such a manner as to provide information that is easily

comprehended and is viewed as beneficial for achieving business objectives is what is meant by the term the quality of the information.

2.5 Construction Business Performance

Over the course of the last century, the evaluation of organisational and corporate performance has concentrated chiefly on financial elements. This is primarily attributed to innovations in performance measurement that have their roots in financial and management accounting (Wentzel et al., 2022). These innovations are the direct cause of the shift in emphasis that has taken place. The exclusive use of financial indicators in performance evaluation has been scrutinised recently, particularly within the past two decades. This is because financial ratios in and of themselves may not be reliable due to the use of "creative accounting" practises in certain businesses, particularly failing ones (Mafundu & Mafini, 2019). This issue stems from the possibility that financial ratios in and of themselves may not be credible because certain businesses engage in practices known as "creative accounting" (Arditi et al., 2000). In addition, academics have realised that aspects of a company's success that are not related to its financial performance can contribute to that company's overall success. For example, Russell & Zhai (1996) concluded that economic factors might significantly influence a firm's success, particularly in the construction industry. This was particularly true of the industry. Arditi et al., (2000) tried to determine the numerous elements contributing to construction enterprises' failure. They concluded that the most critical aspects are organisational (both human and organisational) and environmental (macroeconomic and industry). On the other hand, financial performance metrics are more like symptoms than causes of the collapse of construction enterprises (Xuan, 2021).

In addition, even though business performance is extremely important in the construction industry, it has received very little attention in the existing literature on construction management. This is especially true regarding its role in providing practical assistance to improve construction business performance (Hu et al., 2021). At the moment, construction business performance is primarily focused on project specifics and profit orientation (considering "tangible" or "hard" factors). Still, it does not take into account the broader "stakeholder decision-making" issues (which are predominantly "intangible" or "softer" issues), which encroach upon these phenomena (Malik et al., 2019). According to Bajracharya et al., (2018), in this context, it is completely

inappropriate to evaluate projects, contractors, procurement methods, and the like solely on the extent to which they meet client objectives and goals without taking into consideration the nature of their business environment, the structure of the organisation, the level of technology employed, and so on (Ingle & Mahesh, 2022). This evaluation method is deemed wholly inappropriate because it disregards the nature of the business environment, the structure of the organisation, the level of technology employed, and so on.

Nevertheless, performance measurement research in the construction industry has traditionally taken a limited approach, generally failing to acknowledge the profoundly complex and interrelated character of what is, in essence, a dynamic social system that is open to an endless number of permutations (Tolson, 2020). To fully comprehend why some businesses are more successful than others, one must have a comprehensive understanding of the contextual, technological, structural, and human elements involved (Behúnová et al., 2018). These aspects are not mutually exclusive; instead, many overlap and are in continual communication with one another, which is how critical social processes are set in motion. It is common to practise neglecting social processes while seeking a comprehensive understanding of corporate organisations (D. Lin et al., 2018). Therefore, it is necessary to look beyond the (traditional) narrow and reactive measures to acquire a holistic perspective of business performance. Instead, one must concentrate on the broad and longer-term considerations of the organisation's corporate strategy, business processes, and the requirements of customers (R. Yang et al., 2020).

Construction companies need to have a solid understanding of how they currently perform and how they will need to perform in the future if they want to maintain their competitiveness in both domestic and international markets (Love & Holt, 2000). These expectations have never previously been more significant than they are now, given that the global economy is becoming increasingly competitive and smaller (Jang et al., 2019). Ignoring this necessity leads to short-termism and management strategies that are "blinkerred," with attendant dangers developing from better structured and "slicker" enterprises pushing upon previously safe markets. If metaphor is used, it has truly become a case of "survival of the fittest." This argument is driven home by the reality that the previous 20 years have seen a significant number of mergers and acquisitions in the construction industry, which has led to the current predominance of enterprises that are part of larger conglomerates (R. Yang et al., 2020). Effective construction business

performance is required in this circumstance. It should be effective because it should make it possible for a construction firm to analyse and establish its position in relation to the business environment in which it operates. On the other hand, the success of a construction company typically depends on "conventional" (bottom-line) performance indicators, such as the effectiveness of the plan, productivity, and profitability (Naji et al., 2022). Several commentators have been justified in their criticism of these measures, primarily due to the following reasons: they over-rely on financial aspects, are retrospective (and are therefore always to some extent out-of-date), and do not accurately reflect the interests of stakeholders.

In addition, it is generally acknowledged that using inappropriate performance measures can encourage short-term thinking, such as lack of strategic focus, failure to provide data on quality, responsiveness, and flexibility, failure to provide information on what customers truly want (and what they are actually getting), and failure to identify how competitors are performing (Nguyen, 2020). Tripathi et al., (2021) argued that business performance measurement should go beyond traditional financial metrics and include essential business drivers that determine and influence a company's future business (volume/direction, etc.). Several new performance measurement frameworks incorporating financial measures and business drivers have emerged in the management literature in response to calls for improved business performance measurement. These frameworks were developed in response to calls for enhanced business performance measurement. The performance measuring matrix (Keegan et al., 1989), the performance pyramid (Lynch & Koshland Jr, 1991), and the balanced scorecard (Kaplan & Norton, 1996) are some examples.

Other examples such as consumer satisfaction (Berry et al., 1994), staff satisfaction (House & Price, 1991), and the success of a corporation (Chakravarthy & Gargiulo, 1998) have been the primary focusses of several authors in measuring particular aspects of a company's performance. In addition, the problem of the significant part that workers play in ensuring the success of a construction company (what is commonly known as the "people factor") has not been ignored (Love & Holt, 2000). In light of this circumstance, this research aims to highlight the need for a shift in orthodox beliefs concerning the performance of businesses involved in the construction industry (Oyewobi et al., 2021). More specifically, the focus of this research will shift from the quality of information to the stakeholder strategic decision-making perspective. Although

the problem of expansive business performance measurement (in the context of any business) is not a new one, the particular aspect of "stakeholder strategic decision-making based on the quality of information" interests in a construction company, as well as the incorporation of such interests into the development of strategic construction business planning, is a relatively new phenomenon (Afzal & Lim, 2022).

2.6 Information Used in Construction and its Type

Information is an integral part of the construction process, yet the quality of the information research conducted in the construction industry is constrained by Information and Communication Technology (ICT) and the systems that either run or manage the information (Akanbi & Zhang, 2021; Gibbs et al., 2013). ICT is used extensively throughout the whole building design and development process, with the computer-aided design largely supplanting more conventional manual sketching techniques (Gorkavyy et al., 2018). Furthermore, according to Dzokoto, (2016), the primary reason a project fails is because of human behaviour aspects. Given this information, one may believe that the critical emphasis of study in the construction industry would be human information behaviour. Despite this, few studies have been done on this subject. Some researchers and academics who have attempted to research the information aspect of the construction process have focused on information flow, the supply chain, and some aspects of communication and knowledge management. These researchers and academics include Demian & Balatsoukas (2012), Emmitt & Gorse, (2009), and Jalaei et al.,(2021). However, these studies do not adequately highlight the significance of the quality of information and information behaviour shown by actors and the value of information and information management in the construction business. According to Young et al., (2015), information possesses both implicit characteristics (the information itself) and explicit characteristics (the context in which the information is stored), and the quality of information is considered to be implicit in both cases.

According to Zhao et al., (2008), the value of information and the quality of information are both influenced by several explicit characteristics. These factors include quality, usability, currency, context, accuracy, availability, relevance, and accessibility (Vignali et al., 2021). According to Gerstberger & Allen, (1968), the only way to draw engineers to information sources and channels is not to make improvements to the amount or quality of the information library but rather to bring the library to the engineers

themselves. This indicates an urgent requirement to provide information to actors in accordance with the quality of information they like to receive. They emphasised that the quality of the channel and its accessibility are the most critical factors that determine the total amount to which information is used. According to the theory put forward by Gerstberger & Allen (1968), gaining expertise with the utilisation of a known channel makes it more accessible. This is the foundation upon which the push technology is built, in which information is sent to the user in response to a profile describing their information wants and requirements. According to research conducted by KPMG and PMI (2012), eight primary variables contribute to the failure of building projects. These causes include delays, inaccuracies in the estimating process, and botched attempts at risk management.

In addition, businesses frequently experience issues with the performance of their subcontractors, as well as design flaws and omissions. According to the study's findings, delays account for 51 per cent of underperforming projects, bad estimates account for 50 percent, and inadequate risk management systems account for 47 percent of such projects. About 37 percent of the issue is a consequence of bad performance by the subcontractors, 20 percent is a result of a lack of available information, 17 percent is a result of the impact that change has on the management teams, and 16 percent is a result of poor customer relations. These issues are the outcome of interactions between players involved in the project delivery and are a direct consequence of ineffective information management processes. Managing information in engineering organisations, particularly those involved in the construction industry, presents various issues. For instance, because of the intricate nature of construction, enormous quantities of information will likely be created, utilised, and transferred among the many project experts (Muumbi & Chege, 2021).

In order to be able to make important choices regarding the project, the actors involved need access to project-specific information, such as design specifications, status reports, planning details, as-built information, and performance reports (Trtílek & Hanák, 2021). In a similar vein, a stakeholder may need specific information on the development of the project. In addition, to be a successful project manager, one needs to have a solid understanding of the technical components of the project as well as the relevant information (Mgbeahuru & Olughu, 2022). As a result, a significant quantity of information is created throughout the project delivery process, yet only a portion of this

information is recorded and utilised. This is because there are so many different competitors on the market (Leje et al., 2022). When the information that has been gathered is given promptly, that is both well-structured and organised, it is clear that effective judgments may be made regarding the project (Hanka & Fuka, 2000). This necessitates the establishment of channels via which it is possible to investigate the informational requirements of users to transmit relevant data. This suggests that by specifying the information-seeking desires of actors, suitable methods and techniques may be devised to support the successful collection and distribution of quality information that is particular to the situation (Al-Hashimy et al., 2022). As a result, this research aims to close the knowledge gap by creating a systematic strategy to improve the quality of the information process in project pipeline environments and the construction industry.

2.7 Theoretical Discussion

Regardless of the specific field or degree programme, nearly all social science and behavioural research need an explanation for why it must be done. This kind of reasoning is commonly referred to as a theoretical framework. Many researchers, each with their own perspective, have offered different explanations of this theoretical framework. Having identified several contributing variables to an issue, a theoretical framework is a mental map of how the author theorises or makes sense of the interrelationships between them (Chen et al., 2016).

2.7.1 Ansoff Strategic Success Theory

Njeru (2015) cites Ansoff (1984) as the originator of the Ansoff strategic success formula for strategic management. This formula was further developed by Harry Igor Ansoff & Donnel (1990). This comprehensive model explains how organisations can achieve and maintain superior performance through the strategic alignment of multiple organisational elements (Moussetis, 2011).

The fundamental premise of Ansoff's theory rests on three critical interdependent conditions that must be simultaneously satisfied for optimal organisational performance. First, the aggressiveness of an organisation's strategic behaviour must precisely match the turbulence level in its external environment. Second, the organisation's capabilities must align with and support the aggressiveness of its chosen strategy. Third, all

components of the organisation's capabilities must work in harmony and reinforce each other.

The relationship between Ansoff's Strategic Success Theory, strategic decision-making, and construction business performance represents a complex interplay of organisational elements that significantly influence business success. When applied to the construction industry, this theoretical framework provides valuable insights into how companies can optimize their performance through strategic alignment and effective decision-making processes.

Environmental turbulence in the construction industry manifests through various factors, such as fluctuating material costs, regulatory changes, evolving sustainability requirements, technological advancements, labour market challenges, and volatile market demands. These elements create a dynamic decision-making environment where construction companies must carefully calibrate their strategic responses to maintain competitive advantage and ensure sustainable performance.

The strategic decision-making process in construction businesses encompasses several critical areas that directly align with Ansoff's theoretical framework. Project selection and bidding strategies must be carefully crafted based on thorough assessments of market conditions and competitive landscapes. Resource allocation decisions, including investments in equipment, workforce development, and technology adoption need to align with the organisation's strategic aggressiveness level. The quality and timeliness of information play a crucial role in supporting these strategic decisions, necessitating robust information systems and analytical capabilities.

Construction companies must ensure their organisational structure and processes support their strategic decisions effectively. This might involve establishing specialized departments for priority areas, implementing advanced project management methodologies, or developing flexible operational structures that can readily adapt to market changes. Risk management and mitigation strategies become increasingly important as environmental turbulence increases, requiring sophisticated analysis and contingency planning processes.

The impact of strategic decisions on construction business performance can be evaluated through various indicators. Financial performance metrics include project profitability, revenue growth, cost management effectiveness, and return on investment.

Operational efficiency is measured through project completion times, resource utilization rates, quality metrics, and safety performance. Market position indicators encompass market share, bid success rates, client satisfaction levels, and competitive advantage measures. Innovation and adaptation capabilities are assessed through technology adoption rates, process improvement metrics, new service development, and environmental sustainability achievements.

To optimize business performance through strategic decision-making, construction organisations must develop comprehensive environmental scanning capabilities that enable them to monitor industry trends, market conditions, and competitive dynamics effectively. They need to implement structured decision-making processes that incorporate multiple stakeholder perspectives and consider both the immediate and long-term implications of strategic choices.

The success of strategic decisions in construction businesses fundamentally depends on achieving the right balance between environmental turbulence, strategic aggressiveness, and organisational capabilities, as prescribed by Ansoff's theory. Companies that effectively align these elements through their strategic decision-making processes are better positioned to achieve superior business performance and maintain competitive advantage in challenging market conditions.

The relationship demonstrates that successful construction business performance extends beyond making isolated strategic decisions. It requires creating a coherent system where decision-making processes, organisational capabilities, and strategic responses work in harmony to address environmental challenges effectively. This systemic approach enables construction companies to maintain operational effectiveness while adapting to changing market conditions and meeting stakeholder expectations.

Continuous monitoring of performance metrics and regular adjustment of strategic responses become essential practices for maintaining alignment with environmental conditions. This dynamic capability allows construction companies to refine their strategic decisions as market conditions evolve, ensuring sustained competitive advantage and optimal business performance. The integration of Ansoff's theoretical framework with strategic decision-making practices provides construction companies with a robust foundation for achieving and maintaining superior performance in increasingly complex and challenging business environments.

2.7.2 Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory represents a fundamental shift in strategic management thinking, emphasizing internal organisational resources and capabilities as primary drivers of competitive advantage and business performance. Initially introduced by Wernerfelt (1984) and subsequently refined by Barney(1991), RBV has become a cornerstone theory in understanding how organisations, particularly in the construction industry, can leverage their unique resources to enhance strategic decision-making and business performance.

In the context of construction businesses, RBV suggests that competitive advantage emerges not primarily from external market positioning, but from the distinctive combination of tangible and intangible resources that a company possesses (Freeman et al., 2021). These resources encompass physical assets like equipment and facilities, human capital including expertise and experience, organisational processes, information systems, and relationships with stakeholders. The theory posits that when these resources are valuable, rare, inimitable, and non-substitutable (VRIN), they can create sustainable competitive advantages (Njeru, 2015).

Strategic decision-making in construction companies is fundamentally shaped by the availability and quality of organisational resources. Management capabilities, which are themselves a critical resource, determine how effectively a company can analyse market conditions, evaluate opportunities, and implement strategic initiatives (Dubey et al., 2019). The quality of these decisions is particularly influenced by the firm's information resources, such as market intelligence, project performance data, and stakeholder feedback systems.

The human capital dimension of RBV is especially crucial in construction business performance. Executive experience, technical expertise, project management skills, and relationship-building capabilities represent valuable resources that directly impact strategic decision-making effectiveness (Safari & Saleh, 2020). These human resources contribute to better risk assessment, more accurate project estimation, and more efficient resource allocation decisions.

Financial resources play a vital role in strategic decision-making within the construction sector. The availability of capital affects a company's ability to pursue new

projects, invest in technology, maintain equipment, and develop human resources (Ehlers & Lazenby, 2004). Companies with strong financial resources can make more aggressive strategic moves and better weather market fluctuations, while those with limited financial resources must be more conservative in their strategic choices.

Information technology resources have become increasingly critical in construction business performance. Advanced project management software, building information modelling (BIM) systems, and data analytics capabilities enable more informed decision-making and improved project execution. Companies that effectively leverage these technological resources can achieve better operational efficiency and make more accurate strategic decisions. Organisational learning and knowledge management represent another crucial aspect of RBV in construction businesses. The ability to capture, store, and utilize lessons learned from previous projects creates a valuable knowledge base that informs future strategic decisions. This institutional knowledge becomes a unique resource that competitors cannot easily replicate, contributing to sustainable competitive advantage.

The application of RBV to construction business performance extends to relationship resources as well. Strong relationships with suppliers, subcontractors, clients, and regulatory bodies constitute valuable intangible assets that can significantly influence business success. These relationships often develop over extended periods and are difficult for competitors to replicate, making them particularly valuable from an RBV perspective. Innovation capabilities, as viewed through the RBV lens, represent another critical resource for construction businesses. Companies that can effectively innovate their construction methods, project management approaches, or client service delivery can differentiate themselves in the market. These innovation capabilities often stem from the unique combination of human, technological, and organisational resources.

The size and structure of construction companies influence their resource portfolios and, consequently, their strategic decision-making capabilities. Larger organisations typically have access to more diverse resources, enabling them to pursue more complex projects and implement more sophisticated strategies. However, smaller companies may develop specialized resources that allow them to excel in specific market niches. Risk management capabilities, developed through the combination of experience, systems, and processes, represent another valuable resource in construction businesses.

Companies with superior risk management resources can make better-informed strategic decisions and more effectively handle project uncertainties, leading to improved business performance.

The quality of strategic decision-making in construction businesses is inherently linked to the organisation's resource configuration. Companies must not only possess valuable resources but also develop the capabilities to deploy and coordinate these resources effectively. This includes the ability to reconfigure resources in response to changing market conditions and project requirements. Sustainability considerations have become increasingly important in construction business strategy, requiring companies to develop new resources and capabilities related to environmental management and sustainable construction practices. Organisations that can effectively build and deploy these resources are better positioned for long-term success in an increasingly environmentally conscious market.

The implications of RBV for construction business performance suggest that organisations should focus on developing and maintaining unique resource combinations that support effective strategic decision-making. The resource combinations should include investing in human capital development, information systems, relationship building, and organisational learning processes. Success in the construction industry increasingly depends on how well companies can leverage their resource base to make informed strategic decisions and deliver superior project outcomes.

These theories present several conceptual tensions that warrant careful consideration. Ansoff's external orientation implies that strategic success depends primarily on environmental scanning, market positioning, and adaptive responsiveness to external turbulence—essentially an "outside-in" approach to strategy formation. Conversely, RBV advocates an "inside-out" perspective, arguing that organizations should leverage existing capabilities and resources to create market opportunities rather than simply responding to environmental demands. Despite these apparent contradictions, several scholars argue that these theories can be theoretically reconciled through dynamic capability frameworks that bridge external responsiveness with internal resource development (Safari & Saleh, 2020). The integration becomes particularly relevant in information-intensive industries like construction, where environmental turbulence (Ansoff's domain) intersects with information processing capabilities (RBV's

domain). Information quality can be conceptualized simultaneously as both an internal resource (RBV perspective) that provides competitive advantage and as an environmental adaptation mechanism (Ansoff perspective) that enables appropriate strategic responses to market turbulence.

In the construction context, this theoretical tension manifests as the ongoing debate between market-driven strategic positioning versus capability-driven competitive advantage. Organizations following Ansoff's logic might prioritize market analysis, competitor positioning, and environmental scanning to inform strategic decisions. Those adhering to RBV principles would emphasize developing unique project delivery capabilities, specialized technical expertise, or superior information management systems. However, the reality of construction strategic decision-making suggests that both external environmental awareness and internal capability development are necessary but insufficient individually.

This study argues that information quality serves as a theoretical bridge between these competing paradigms. High-quality information enables both superior environmental scanning (Ansoff) and enhanced resource utilization (RBV), suggesting that these theories may be complementary rather than contradictory in information-rich contexts. Information quality can be viewed as both a strategic response capability (enabling environmental adaptation) and a core internal resource (providing sustainable competitive advantage), thus reconciling the apparent theoretical tension between external orientation and internal focus.

2.8 Research Framework

The conceptual framework describes how the variable relates to each other. The variables of this study are the independent-dependent and mediating variables. The independent variable affects and determines the effect of another variable on the mediator's relationship. The independent variable in this study is strategic decision-making factors (strategic decision formulation, strategic decision implementation practices, strategic decision evaluation, reliance on financial strength, and reliance on the workforce). The dependent variable is the construction business performance. In line with that, quality of information plays mediating effects on strategic decision-making and construction business performance by improving their relationship. The study operationalised construction business performance through a comprehensive three-factor

that directly aligns with established construction performance research, where productivity measures the time dimension through indicators assessing project delivery efficiency, timeline adherence, and resource utilisation rates, profitability captures the cost dimension via financial performance indicators, cost management effectiveness, and budget variance measures, and plan efficiency operationalises the quality dimension through specification compliance, strategic objective achievement, and client satisfaction outcomes. The survey instruments were specifically designed with indicators mapping to the traditional time-cost-quality framework. Therefore, the research framework for this study measures the relationship between strategic decision-making, quality of information, and construction business performance in the New Zealand construction industry (i.e., the quality of pipeline information available to an organisation mediates the influence that its business strategy decisions could have on the performance of construction organisations). Figure 2.4 shows the conceptual framework of the study.

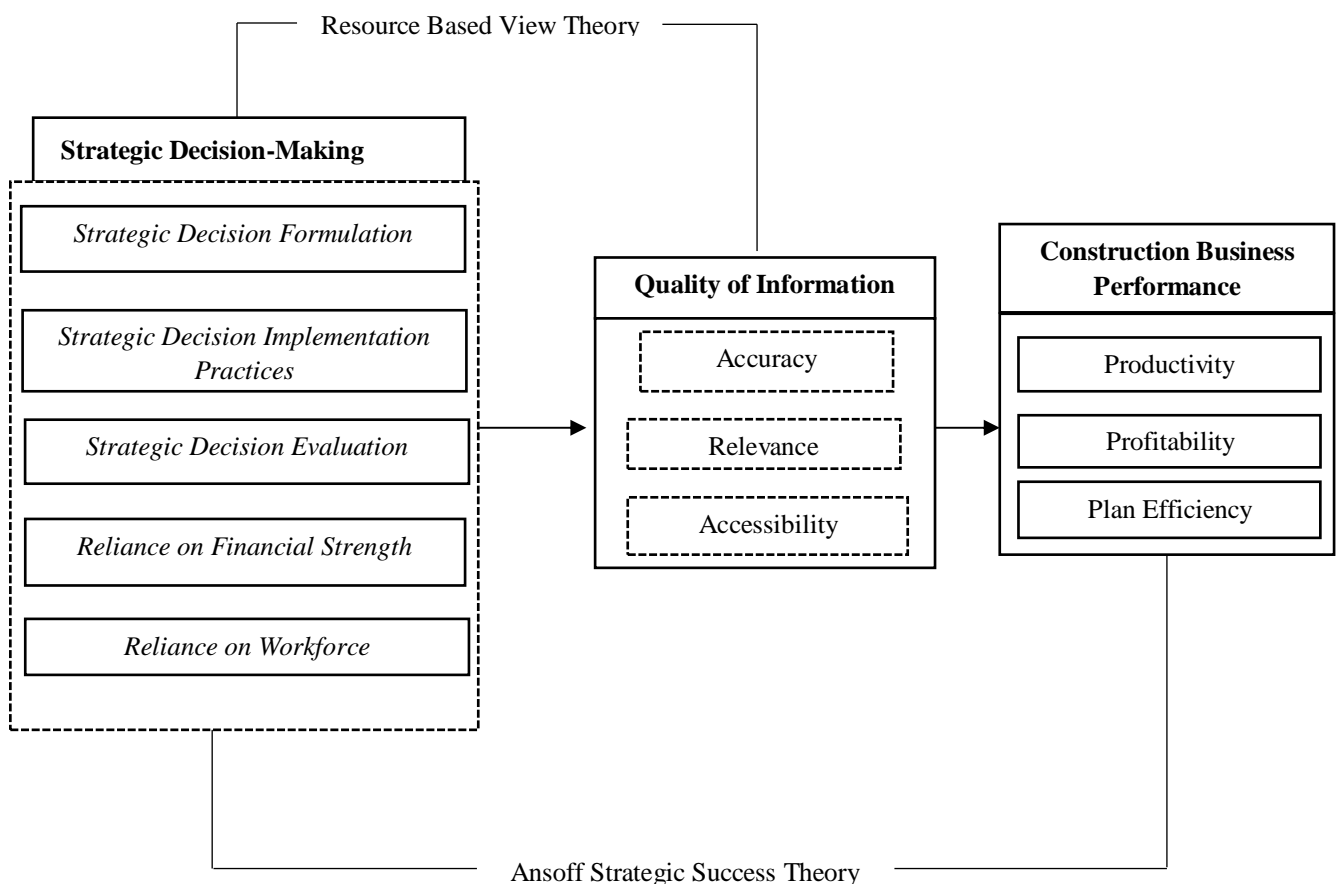


Figure 2.4: Conceptual Framework

2.8.1 Hypotheses Development

Most social and behavioural sciences research, regardless of the field or programme in which they are conducted, require a justification or a foundation for performing the study. This rationale/base is known as a theoretical framework in some circles. The theoretical framework has been defined in various ways by several different academics. A theoretical framework is a conceptual model that describes how one theorises or makes logical sense of the interactions among numerous components that have been recognised as essential to a specific problem's solution (Chen, Chen, Zhang, & Xu, 2018). Figure 2.5 shows the theoretical framework of the study.

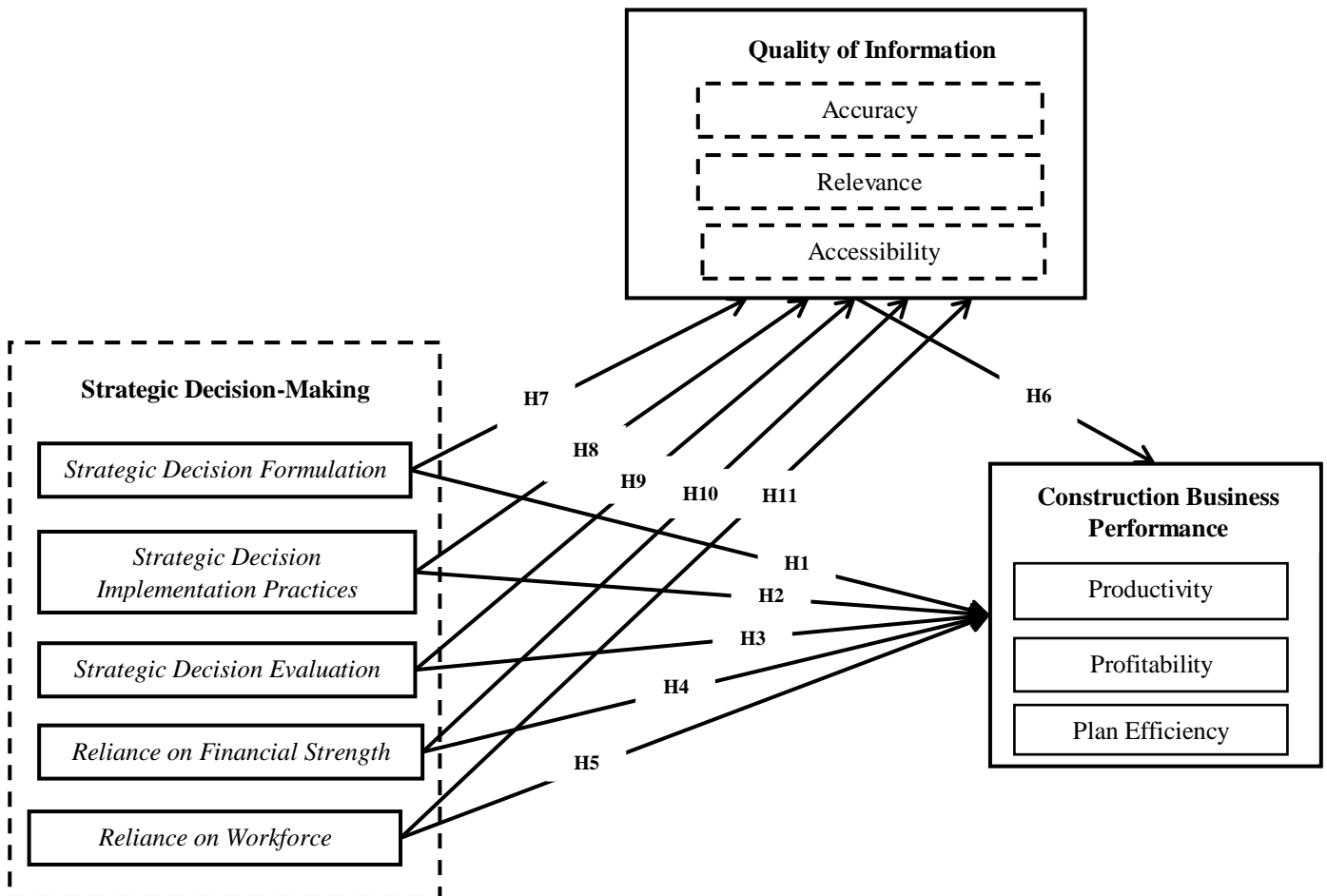
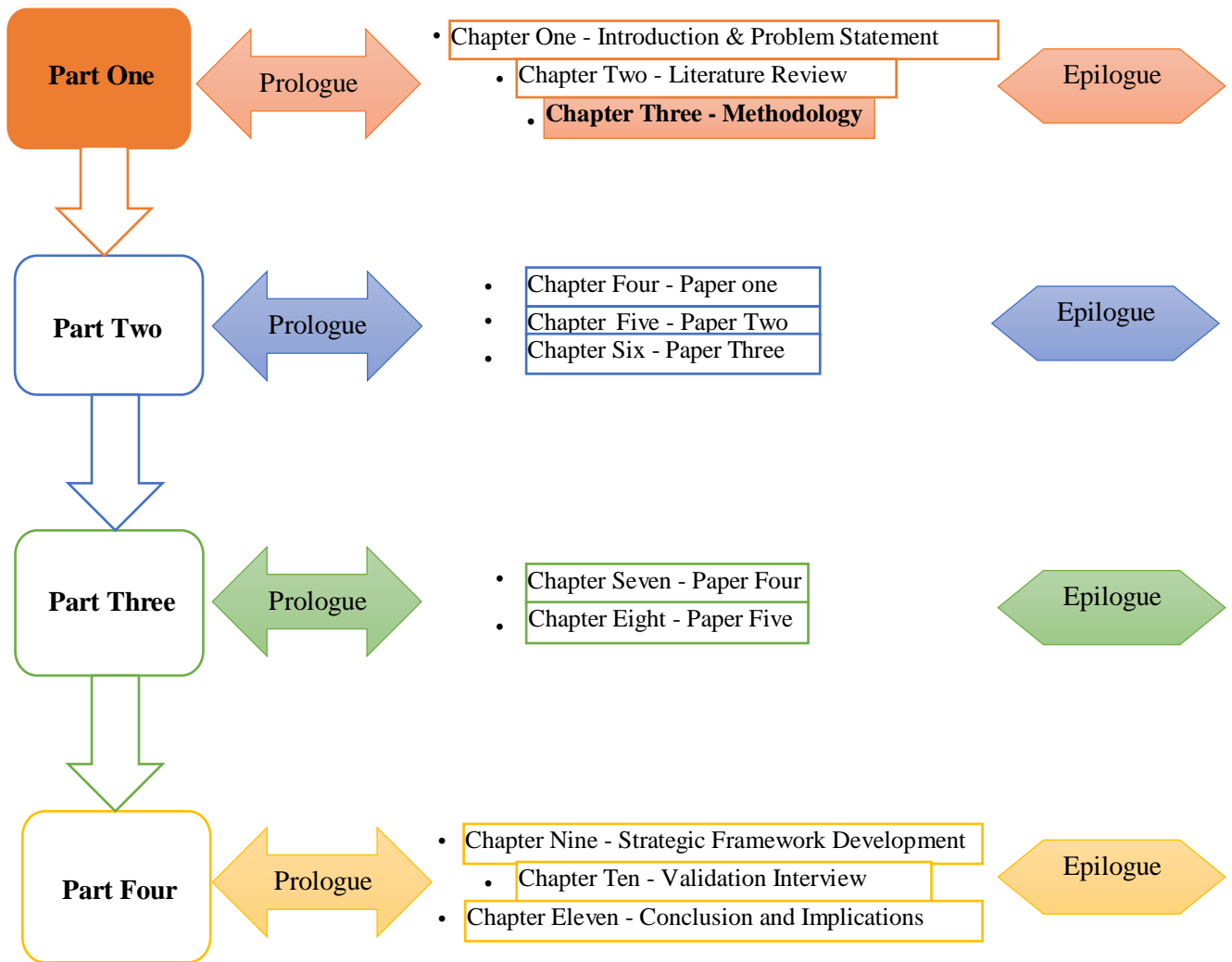


Figure 2.5: Theoretical Framework

Multiple theoretical frameworks underpin the study's hypotheses. It is therefore proposed that strategic decision-making factors (strategic decision formulation, strategic decision implementation practices, strategic decision evaluation, reliance on financial strength, and reliance on workforce) will have a positive effect on construction business performance, mediated by information quality.



CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter addresses the research methods utilized in gathering data to resolve the research problem, answer the research questions, and achieve the research objectives addressed in the earlier chapter. The chapter begins with research philosophy and stances and proceeds to the quantitative approach. Finally, this chapter ends with a summary.

3.2 Philosophical Justifications and Stances

Bloomberg and Volpe (2012) describe knowledge claim as a specific argument for what and how the researcher might learn. A research design includes anything from broad assumptions or explanations to data collection and analysis methods. As a result, all judgments should be based on knowledge claims or philosophical reasons (world views) that underpin overall decisions at every level of a study. The world views of researchers are the beliefs that guide their research (Creswell, 2009). Morgan (2007) defined world perspective as a shared set of beliefs that influences the information sought and how the researcher collects and analyses evidence. As a result, global views are critical in directing the research endeavour while doing a quantitative-method study (Biesta, 2010; Creswell and Plano Clark, 2011). According to Bloomberg and Volpe (2012) and Creswell and Plano Clark (2011), world perspectives differ in the components representing the research's ideas. They are ontology (the nature of reality), epistemology (the connection between the researcher and the subject of the research), axiology (the role of value), rhetoric (the language of research), and study procedures (methodology). The worldviews that drive the entire research process are explained in the following sections.

3.2.1 Ontological Justifications

Ontology refers to the nature of what is being researched (Oates et al., 2012). This asks philosophical questions regarding the nature of existence and the essence of human beings in the universe, and it raises the following questions: What is genuine? What do we search for? What does life mean? What are objects of physical origin?. Ontology stresses the essence of reality by raising questions about researchers' beliefs about interpreting the universe and their assumptions about the basic research view (Saunders et al., 2007). Ontology thus focuses on what happens, reflecting primarily on existence's nature and form (Huff, 2009). Walliman (2006) describes ontology as "the theory of social phenomena that deals with what needs to be explored" (Walliman, 2006). Thus, ontology sheds light on the nature of subjective or objective reality. However, in the broader context where the actor or subject resides, those opinions relate to each other, organisations, and entities (Shimizu et al., 2020).

Research questions should lead to ontological justification (Creswell et al., 2011). The study's research questions suggested that the phenomenon's discoveries are objective. In order to offer a comprehensive knowledge of the study topic, it was necessary to combine a literature review with objective dimensions and singular reality (quantitative stance) (Creswell & Creswell, 2017). As a result, the quantitative method approach is the most appropriate way to acquire knowledge in this study. The researcher uses the quantitative approach with post-positivism perspective to develop the instrument, select the population and sample, measure the variable, and analyse the data.

3.2.1.1 Post-Positivism

Throughout this century, positivist ontology has influenced many quantitative research. It promoted objectivity, reality, and value-free inquiry (Easterby-Smith et al., 2012). According to Miller (2000), positivists regarded absolute truth, unassailable basis, and knowledge assumption as stable. Several academics, however, have criticized positivism (Onwuegbuzie et al., 2011), not because of its realism, objectivity, or value-free inquiry but because it believes in absolute truth. This belief precludes the information from being corrected and amended. Simultaneously, scientific knowledge is historically and socially conditioned, and it is relative rather than absolute (Alvesson & Sköldberg, 2017).

Furthermore, a growing number of academics have argued that observation is theory-laden, encouraging scientists to reject positivist ontology (K. Miller, 2000). A theoretical perspective cannot be avoided in any part of the research process. As a result, establishing a clear difference between the research process and theory is difficult, despite logical positivists needing this division (K. Miller, 2000). According to Easterby-Smith et al. (2012), positivism assumed that human views were irrelevant. Because most quantitative research is done using instruments, it is becoming increasingly difficult to ignore the theoretical claims of social research.

The instruments, on the other hand, are created using a set of theories and literature. Miller (2000) argued that positivism was divorced from the reality of scientific practice. According to positivism, theories arose through the development and testing of hypotheses, and they may be updated, flourished, and decayed through research procedures. By the middle of the twentieth century, positivism had succumbed to criticisms, and post-positivism had emerged (Miller 2000). Positivism has been modified by post-positivism. Positivism presupposes an objective external reality and establishes the findings of hypotheses verification as facts, laws, and truths, whereas post-positivism acknowledges an objective external reality but does not believe in absolute truth; the outcomes of hypothesis testing are likely facts and laws (Guba & Lincoln, 1994). Furthermore, although positivists utilize data to create a theory, post-positivists use data to examine hypotheses or theories.

Finally, rather than positivism, post-positivism is a term that accurately describes today's quantitative researchers (Onwuegbuzie et al., 2009). In this work, the post-positivist ontology guides all decisions taken throughout the quantitative approach. To begin with, post-positivists believed in a deterministic, cause-and-effect worldview. This study was relevant to assessing the effect of strategic decision-making on the quality of the information to enhance the performance of construction businesses concerning the execution of pipeline construction projects in New Zealand. In addition, post-positivism constructs and connects variables using theory. The suitability of adopting this ontology was demonstrated by investigating the influence of the quality of the information on strategic decision-making to enhance the performance of construction businesses.

Reductionism is the second characteristic of post-positivist ontology. Its goal is to break down a massive idea into numerous smaller ones that can be tested, such as a variable with several dimensions (Nawanir, 2016). This is because post-positivists believe that issues are better understood when broken down into their most basic components. All the constructs consist of small dimensions. Furthermore, all the dimensions were made up of several measurement elements.

Thirdly, the post-positivist worldview's knowledge is founded on empirical measurements and observations. The researcher advanced the link between the variables and offered it in terms of hypotheses in this study. A set of closed-ended questions were then used to examine the objective reality. Finally, in a post-positivist worldview, research would begin with theory/theories, build the study framework using theory/theories, gather data to evaluate theory/theories, and, if required, make necessary changes and suggestions. Post-positivism follows the patterns, thus compatible with the features of this study.

3.2.2 Epistemological Justifications

Epistemology deals with people's views regarding how knowledge is produced, interpreted, used, and conveyed, how they pursue reality, and what they believe as researchers. Epistemology is the way people learn about the world and its significance (Oates et al., 2012; Saunders, Lewis, Thornhill, & Bristow, 2015). Epistemology raises the following questions: "What is knowledge, and how are things known?" Do various kinds of knowledge exist? Are there successful information exploration mechanisms of the knowledge? What does reasonable, true, and legitimate information constitute (Denzin & Lincoln, 2012).

Then, epistemology is the study of what knowledge is and how individuals can acquire it. Epistemological concerns have a significant influence on the way research involves complex research methodology and design according to suitable methods. Due to the importance of determining the link between the variables, post-positivist epistemology was chosen following the ontological justification. According to the post-positivist viewpoint, the connection between the variables may be confirmed by constructing measurements to test the established hypotheses.

It was accomplished by empirical observation (Creswell & Plano Clark, 2011; Merriam & Grenier, 2019), such as surveying big samples' experiences. As a result, post-positivists try to check and prove causation among the variables in a study. This study deals with objective realities based on ontology, suggesting a quantitative method. This study was driven by post-positivist epistemology. The researcher followed this point of view to devise and construct mechanisms to allow him to understand, perceive, and explain what was happening around the phenomenon (Easterby-Smith et al., 2018). Consequently, the researcher paid attention to the literature review and questionnaire with experts to clarify their own interpretations.

3.2.3 Axiological and Rhetorical Justifications

The researcher in the study uses an axiological justification to explain value-laden. It examines the role of the researcher's values, such as ethics, aesthetics, and faith, in the study and how they affect it (Denzin & Lincoln, 2012; Saunders et al., 2015; Wahyuni, 2012). In the study, post-positivism allows the researcher to remove all forms of bias that could affect the study (Creswell, Klassen, Plano Clark, & Smith, 2011). Consequently, the researcher refers to related studies to help the measurement objects prepare for the study. Also, during the pre-test, content validity was tested through questionnaire with practitioners and academics (Nawanir, 2016).

The researcher performs multiple statistical tests to prevent perception bias during quantitative research, such as construct validity, normality, outlier test, reliability, goodness-of-fit, non-response bias, and common method variance (Creswell & Clark, 2017). The researcher was motivated by rhetorical reasoning concerning the type of language used in the analysis.

Language markers should be visible even when explaining problem statements, study questions, and objectives. The ontological justifications in this analysis appear to indicate the use of both formal and informal language styles (Creswell & Creswell, 2017; Creswell & Plano Clark, 2011). Besides, the quantitative analysis would use quantitative terminology such as "relationship," "content validity," "normality," "statistics," etc.

3.2.4 Methodological Justifications

The methodological approach examines how to reliably acquire and validate knowledge about the study. This encompasses both the systematic processes individuals use to develop new insights and the analytical frameworks researchers employ to evaluate evidence within their specific disciplines (Denzin & Lincoln, 2012; Saunders et al., 2015; Wahyuni, 2012). This research incorporated deductive reasoning to accomplish the study's aims, motivated by research questions and the essence of reality. Deductively, the researcher assessed the research framework using a quantitative method in this study.

The clarity of theory brought together or developed by the researcher at the start of a research project influences the research strategy, deciding whether it is a deductive approach, or not (Saunders, 2011). As a result, deduction reasoning techniques are closely connected with how theory is placed in research (Bell & Bryman, 2007; Ghauri & Grønhaug, 2010). When using the deductive technique, the theory is combined with hypotheses or propositions, and a research plan for testing or investigating the hypotheses or propositions is developed (Ghauri & Grønhaug, 2010; Saunders, 2011). Deductive research begins with a pre-existing theory, develops a hypothesis based on the available facts, and gathers data to test the hypothesis. Finally, the data is evaluated to determine if the hypothesis is supported or rejected (Ghauri & Grønhaug, 2010).

3.3 Justifications for Using Quantitative Research Method

The research design and methodological approach for this investigation emerged from careful consideration of the study's objectives and analytical requirements. Within the broader landscape of research methodologies—which encompasses qualitative, quantitative, and mixed methods approaches (Venkatesh et al., 2013). This study employs a cross-sectional design with a quantitative survey methodology. This choice aligns with the study's primary aim of gathering empirical data to test the theoretical model's predictive capabilities regarding future behaviours (Foard et al., 2006). To establish and quantify relationships between latent variables, the study leverages Partial Least Squares Structural Equation Modelling (PLS-SEM), an advanced statistical technique particularly suited for predictive modelling and theory testing (Wynne W. Chin, 2013).

Researchers embark on an assessment of the study's unique context before selecting the most appropriate research approach. A specific research approach is also contingent upon data analysis methods, data type, and the research's overarching purpose (Migiros & Magangi, 2011). Quantitative methods are particularly well-suited for discerning associations between pivotal variables (Ong & Puteh, 2017). This study specifically focused on testing hypotheses within a conceptual model, elucidating relationships among quality of information, mediating variables (MV), strategic decision-making, independent variables (IV), and performance of construction businesses, the dependent variable (DV). Consequently, a quantitative approach aligns seamlessly with the study's objectives.

Post-Positivist scholars often employ a quantitative research approach to predict and subsequently describe associations among variables through study hypotheses (Neuman, 2003). Furthermore, the adoption of a quantitative research design is motivated by its alignment with existing studies that employ quantitative methods, focusing on numerical data collection and hypothesis testing involving specific individuals. When compared to qualitative research, quantitative research enables researchers to efficiently gather data from a larger respondents' pool within a shorter period (Creswell & Clark, 2017). Expanding on the quantitative realm, research can be categorized into surveys or experiments. Since this study was not designed to assess the effects of interventions on distinct Expert groups, it focused on survey (Esearch et al., 2003). Conversely, surveys serve as a means of collecting Expert responses to gain insights into a population. However, a survey design does not establish causation; instead, it investigates associations among variables (Rossi et al., 1983). Given its purpose, the survey research design harmonizes effectively with the research objective, probing relationships among variables without intervention or manipulation of experts.

3.4 Research Process

Research is typically characterized as a systematic and methodical inquiry into substantial information regarding a specific topic (Creswell & Clark, 2017). It involves the process of refining and clarifying the research inquiry, which involves formulating hypotheses and a framework, gathering, organizing and assessing data, drawing deductions, and ultimately analysing these deductions to determine their relevance to the initial question (Kothari, 2004). Figure 3.1 shows the research methodology flow chart.

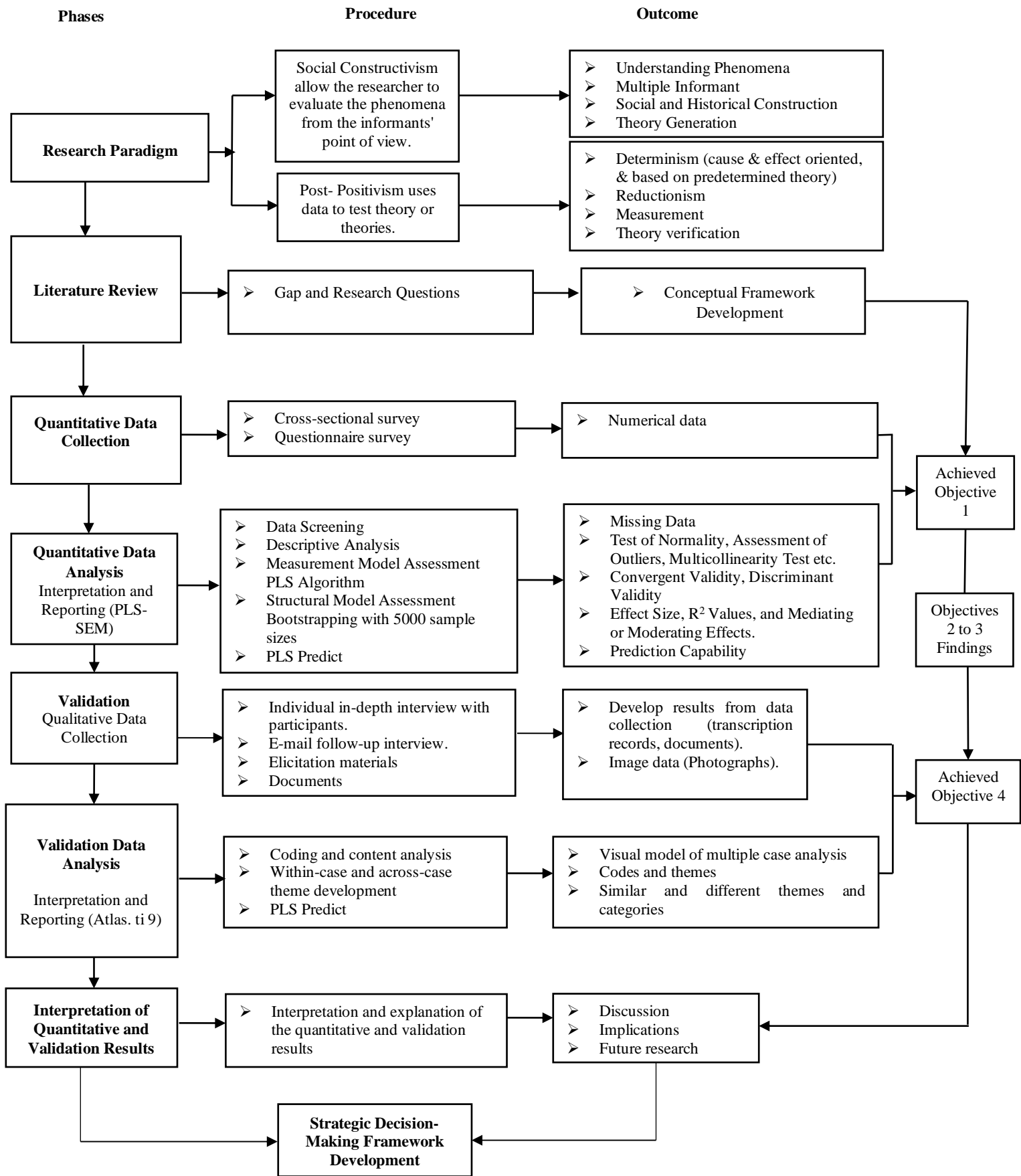


Figure 3.1: Research Methodology Flow Chart

3.5 Research Design

Drawing on Easterby et al. (2008), a research design can be described as the systematic arrangement of research tasks to achieve research objectives through diverse data collection procedures. Research design holds pivotal significance in any research endeavour, offering scholars a structured and comprehensive blueprint outlining how research questions will be addressed. It encompasses an intricate delineation of research strategies, methods, sourcing specifics, data collection techniques, and assessments. The specific focus of the research inquiry and the conceptual framework of the research problem will determine the most appropriate research design to fulfil the research objectives. To discern the most suitable design for a given research undertaking, researchers must grasp the fundamental essence and purpose of the research (Creswell, 2014).

Research design is inherently aligned with the nature of the research question. In essence, determining the type of knowledge the study aims to acquire serves as an initial step in determining the method to be employed. This study endeavours to explore the influence of strategic decision-making on construction business performance, with the mediating influence of quality of the information in New Zealand construction industry. The research design guides the selection and application of research methodologies that necessitate rigorous validation (Craig & Douglas, 2005).

The study is geared towards encoding the research within the framework of a quantitative data design (Grunow, 1995). The research design is a plan to choose the resources that can respond to the research questions. It is a construct connecting between variables and to assume a form of guidelines about the research agenda from hypothesis to data analysis. According to Creswell (1994), research design for quantitative methods includes cross-sectional and longitudinal research. To make our decision, the researcher ought to know more about the advantages and motives of each form of study (Setia, 2016). Cross-sectional analysis can be used while comparing different population groups at a particular point in time. The advantage of a cross-sectional study design is that it helps an investigator to compare many different variables concurrently.

However, cross-sectional analyses, may not offer precise evidence about the association between cause and effect (Creswell & Clark 2017). This is because such studies offer a snapshot of a single moment in time; they do not consider what happens before or after the snapshot is captured. On the other hand, researchers can convey a longitudinal study of numerous studies of the same subjects over a period, often lasting several years (Creswell & Clark 2017). A longitudinal analysis has the advantage of helping researchers to track trends or improvements in the attributes of the target population at the group and individual rate. The point here is that longitudinal studies stretch beyond one moment. Consequently, they will set up sequences of incidents (Setia, 2016). The adoption of the suitable research design relies on the research questions and objectives.

In general, this study adopted cross-sectional approach because it is faster than longitudinal studies. That is why investigators would commence with cross-sectional analysis to decide if there are connections or correlations between certain variables (Kelloway & Francis, 2013). It is essential to effectively select the best research design to include a context for data collections and analysis. It will represent decisions regarding the preference given to a spectrum of the study dimensions.

It is very crucial to know and adopt a philosophy for effective planning and executing research. The layers of the research come into focus, commencing with research philosophies and strategies, followed by considerations of time horizon, research techniques, and culminating in an exploration of the research process. This sequential progression underscores the comprehensive nature of the research framework. Quantitative research is designed to affirm attributes, quantify them, and develop statistical paradigms to illustrate what is being perceived (Miles & Huberman, 1994). Therefore, this research design focused on a quantitative approach to achieve the research objectives.

3.6 Research Approach

This study utilized research approaches that contain quantitative study approach. Creswell & Clark (2017) figured out that quantitative approach designs offer much potential for the researcher who attempts to address dynamic problems that exist at several levels. It can boost the kinds of information that has been obtained and can assist in improving the validity of a given study.

Quantitative analysis can be described as an inquiry focused on the assumption that social system characteristics represent an unbiased observation that is relatively stable over time and situations. The assertive approach is to identify and clarify aspects of this fact by gathering numerical data on measurable Expert actions and mathematical interpretation of the data (Gall et al., 1996). Both research approaches have different contextual differences. Quantitative research has taken a powerful position in distinct fields of study. This research approach is centred on utilizing statistical numbers to represent the values through theoretical constructs and notions. This indicates solid scientific proof of how the incident occurs or functions. Researchers usually adjust the notions or theoretical constructs into quantifiable values by utilizing a survey device consisting of either closed or open-ended questions. All the questions in this study were closed questions. Adopting a quantitative research approach can improve the validity of the research verdicts (Creswell & Clark, 2007; Greene & Caracelli, 1997).

This is because quantitative approach analysis facilitates the assessment of an occurrence or phenomena by facilitating the triangulation of observations via various instruments, thereby complementing outcomes from various methods (Yin, 2013). Given the quantitative nature of data collection in this study, this method is employed to establish and explore the interrelationship between distinct variables or concepts. These variables are quantified numerically, and subsequent analysis involves statistical assessment or graphical representation. Researchers adhering to this approach exhibit a predilection for observation-driven analysis which aligns with the positivist epistemology, prioritizing structured data collection techniques. In this context, the prevalent research strategies correspond with experimental and survey methodologies (Creswell, 2014; Saunders et al., 2012).

In this study, a combination of correlational and descriptive strategies is employed. The investigation was based on the strategic decision-making on construction businesses performance, with the mediating influence of quality of information in New Zealand construction industry. Descriptive analysis is integral here, serving to illuminate existing issues or challenges through data collection that comprehensively outlines the prevailing circumstances (Fox & Bayat, 2008).

Additionally, descriptive studies are aptly employed to elucidate multifaceted dimensions of the phenomenon. In its broadest context, descriptive analysis serves to characterize the traits or behaviours of the sampled population. Furthermore, this study depended on quantitative approaches. So, the survey is a compilation of questions that attempt to obtain relevant data from a particular set of individuals. Surveys may be performed by email, telephone, postal, or conversation through the web. Surveys are employed to improve awareness in social research and demographics. Survey research is also utilized to determine emotions, perceptions, and viewpoints. Surveys offer crucial information with all forms of social research and educational sectors, such as marketing, management, psychology, healthcare availability, and sociology (Al-Kinani¹ & Adavi, 2014). The survey would also be utilized to obtain individual and interpersonal evidence, opinions, and convictions (Kerlinger, 1973). The unit of analysis is the organisation (construction industry), targeting middle to senior-level construction managers, directors, engineers etc., who are involved in strategic decision-making within their respective construction organisations in New Zealand.

3.7 Measurements Development

The development of the quantitative survey instrument followed a rigorous four-phase measurement development process as outlined by Churchill & Iacobucci, (2006). This systematic approach began with a comprehensive definition of construct domains, followed by the generation of measurement items that accurately captured these constructs. The survey questionnaire was then carefully designed and subjected to multiple pilot tests to refine and validate the measures. The final phase involved a thorough evaluation of measurement reliability and validity to ensure the instrument's robustness and scientific merit.

3.7.1 Operational Definition

Table 3.1 provides a detailed mapping of the constructs, and their associated measurements utilized in this research. Drawing from well-established theoretical frameworks, the selection and refinement of measurement scales followed rigorous methodological principles, as emphasized in Brennan et al. (2014) foundational work on scale development. This theoretical foundation enabled precise specification of construct domains, incorporating both conceptual definitions and operational measurement criteria (Churchill & Iacobucci, 2006; Lewis et al., 2005). The resulting measurement framework ensures that each construct within the research model is both theoretically grounded and empirically measurable through validated instruments derived from authoritative sources.

Table 3.1

Specification of the Domain of the Constructs and Measurement Items

Construct	Conceptual Definition	Measurements Instruments	Measurement Item Source	Survey Question
Strategic Decision Formulation	Strategic Decision Formulation refers to the process of developing and crafting strategies that guide an organisation's actions and decisions to achieve its long-term goals and objectives.	<p>1. Our organisation has deliberately set its strategic direction in the form of vision statement, mission statement and core values.</p> <p>2. Our organisation leadership take formal responsibility for the firm's strategic management plan.</p> <p>3. Our organisation analyses/gathers information about its external environment to understand their implications on our business.</p> <p>4. Strategy formulation is a top priority activity in our company.</p> <p>5. Employees are briefed and taken through the strategic management plan before implementation</p> <p>6. When formulating strategy all resources in our organisation are assessed</p>	(Emmanuel Ng'andu, 2018)	7

7. Our organisations strategic behaviour and decisions are in line with developments in our operating environment.

Strategic Decision Implementation Practices	Strategic Decision Implementation Practices refer to the actions, processes, and approaches that organisations employ to effectively execute the strategies they have formulated.	<ol style="list-style-type: none"> 1. Organisational strategic decision is implemented purely based on set objectives and expected performance. 2. Resources are adequately allocated for strategic decision implementation. 3. Our organisational strategic decision is matched to our organisational structure. 4. Organisation strategic decision is adequately and comprehensively communicated to members of staff 5. Organisation is keen on implementing organisational strategic decision in a way that yield the highest performance. <p>There are incentives in place to ensure success of strategic decision implementation.</p>	(Emmanuel Ng'andu, 2018) 6
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Table 3.1: Continued

Construct	Conceptual Definition	Measurements Instruments	Measurement Item Source	Survey Question
Strategic Decision Evaluation Practices	Strategic Decision Evaluation Practices refer to the methods and processes that organisations use to assess the effectiveness and impact of their strategic decisions and initiatives.	<ol style="list-style-type: none"> 1. We monitor, evaluate and control the implementation of strategic decision in our organisation. 2. We have clearly defined and measurable performance targets for each strategic decision management plan element. 3. Strategic decision evaluation involves review of the process of strategy formulation and implementation in our organisation. 4. In our organisation, success of strategy evaluation is done regularly, and corrective action is taken on timely basis for highest performance. 5. We have clear communication channels within the organisation to enable evaluation of strategic decision performance. 6. In our organisation, success of a strategic decision is evaluated at the end of implementation stage. 	(Emmanuel Ng'andu, 2018)	7

		7. In our organisation, corrective measures are taken after strategic decision has been evaluated at the end of implementation stage.		
Reliance on Financial Strength/Capacity	Reliance on Financial Strength/Capacity refers to an organisation's dependence on its financial resources, stability, and ability to generate capital as a critical factor in supporting its strategic decisions and operations.	<ol style="list-style-type: none"> 1. Our organisation is well-equipped with a sufficient quantity of equipment. 2. In our organisation, payments are made promptly without any delays. 3. Our organisation exercises effective control over the allocation of site resources. 4. Our organisation is deeply committed to its financial responsibilities. 5. Our organisation maintains financial stability and has a track record of success. 	(Anna Sinitsyna, 2014; Narasimhaiah Gorla et al., 2010)	5

Table 3.1: Continued

Construct	Conceptual Definition	Measurements Instruments	Measurement Item Source	Survey Question
Reliance on Workforce	Reliance on Workforce refers to an organisation's dependence on its employees, their skills, knowledge, expertise, and overall contribution as a crucial factor in achieving its strategic objectives and maintaining competitiveness.	<ol style="list-style-type: none"> 1. In our organisation, our staff members are highly qualified and experienced for their respective roles. 2. Our organisation has a sufficient number of competent managerial and supervisory personnel. 3. There is adequate skill among employees in our organisation. 4. In our organisation, we prioritize the motivation of our employees. 5. Our organisation maintains a strong focus on effective site management and supervision. 	(Anna Sinitsyna, 2014; Narasimhaiah Gorla et al., 2010)	5
Quality of Information	Quality of Information refers to the accuracy, relevance, reliability, timeliness, completeness, and	<ol style="list-style-type: none"> 1. In our organisation, the relevance and reliability of information sources significantly impact strategic decision-making 	(Anna Sinitsyna, 2014; Narasimhaiah Gorla et al., 2010)	8

overall credibility of the data and facts that are used to inform decision-making and support various business processes within an organisation.	<p>2. In our organisation, quality of information plays a significant role in strategic decision-making</p> <p>3. In our organisation, quality of information helps us to be more resilient and responsive</p> <p>4. In our organisation, we anticipate an increased role of information in supporting strategic decision-making</p> <p>5. In our organisation, the decision makers extensively look for information in making their decision</p> <p>6. In our organisation, decision-makers diligently evaluate relevant information in their decision-making process</p> <p>7. In our organisation, we experience problems concerning information flows from operational to strategic management levels</p> <p>8. Quality of information helps our organisation better understand the current situation of our operating environment.</p>
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Construction Business Performance	Construction Business Performance refers to the measurement and evaluation of how well a construction company is achieving its goals, meeting its objectives, and operating efficiently within the context of the construction industry.	<ol style="list-style-type: none"> 1. Our organisation adopts new strategies to achieve competitive advantage. 2. Our organisation analyses the external and internal environment to know the strategies to adopt. 3. Strategic decision management affects our organisation performance positively. 4. Our organisation is guided by the mission statement to achieve competitive advantage. 5. Lack of strategic planning has had an influence on our organisation performance. 6. Quality of information affects our organisation strategic decision-making. 7. In our organisation, there is time pressures that influence the quality of decision-making. 	(Emmanuel Ng'andu, 2018) 7
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The research framework encompassed seven key constructs, measured through 45 items as detailed in Table 3.1. All measurement scales were selected from established literature based on three essential criteria: conceptual alignment with the study's constructs, empirical validation in previous research, and suitability for individual-level assessment (Schrauf & Navarro, 2005). To ensure organisational relevance, these scales were carefully adapted while maintaining their theoretical integrity. The measurement items employed Likert scales ranging from five to nine points, reflecting the established measurement approaches in contemporary literature for each specific construct.

3.7.2 Questionnaire Design

A self-administered online survey was employed in this study (Creswell & Creswell, 2017). The researcher developed the questionnaire adequately for the experts to easily fill out the questionnaire form on an online platform. A well-designed questionnaire can also aid in increasing response rates (Creswell & Creswell, 2017). Through the manner of design, the researcher should be able to identify if experts comprehend the questions and can readily follow the flow of questions. It is critical to plan the flow of the questions carefully. This was accomplished using an approach Saunders et al. (2012) developed for sequencing questions. As a result, questions were arranged in a logical and natural order for research experts. Strategic decision-making questions (strategic decision formulation, strategic decision implementation practices, strategic decision evaluation, reliance on financial strength, and reliance on workforce) were asked at the start of the survey. The next set of questions focused on the quality of information and construction business performance. At the end of the survey, there were questions for personnel information. The rating scales are a prominent technique in quantitative research (Dawes, 2008). Also, a scale's range of potential answers varies, and textbooks on the subject often depict 5-7- 9-point versions as the most prevalent (Malhotra, 2006).

Third, all scales utilised to measure the researched components in this study were of the 5-, 7-, and 9-point Likert type. Fourth, scales derived from well-known instruments were revalidated for face validity and reliability and concept validity and reliability. Most notably, Likert-type scales can assist in generating a report on an overall scale and subscale internal reliability estimates and individual scale items (Gliem & Gliem, 2003).

The survey used a 5-, 7-, and 9-point scale with the positive side on the right to reflect New Zealand construction industry culture, ranging from 5-, 7-, and 9-points (strongly disagree to strongly agree). The opinions from study experts during the pre-test and pilot test before the online survey were used to create this 5-, 7- and 9-point structure. A pre-test and a pilot test were organised in this research to check the validity of the question sequence before conducting the official online survey. The entire questionnaire had 45 questions and was expected to take about 10-15 minutes to complete. The scale items were improved to reduce method biases in this study. This was done by circumventing vague ideas in the questionnaire and using different Likert scales of 1-9 for endogenous variables, while Likert scales of 1-5 and 1-7 were used for exogenous variables and mediator (Robinson, 2018). All questionnaire items were written in straightforward, precise and brief language to enhance scale items.

One issue that the researcher could be concerned about is the biased response. As a result, every stage in the questionnaire design process was addressed completely to apply procedural remedies. If the antecedent and dependent variables could not be examined independently by different ratters, common method variance may develop in this study. In order to remedy this, two approaches were used: (1) remedies pertaining to questionnaire design procedures and (2) remedies relating to statistics (Podsakoff, 2003). In terms of survey method remedies, a pre-test was undertaken initially, followed by a pilot test to check for any confusing or technical elements that might lead to random replies or subjective interpretation of the questions' meaning. Expert comments from academic personnel and PhD students were obtained during the survey creation phase. Volunteers provided comments and feedback throughout the pre-testing stage to clarify the all-questionnaire items, ensuring face validity and content clarity. Second, all possible experts received an expert information sheet, and a consent statement was included in the preamble to the survey to explain the research's objective. Experts might assert their consent before responding to the questionnaire by clicking the start survey option. Third, all experts responses were anonymous because no personnel information that might be used to identify them was acquired. Regarding statistical remedies, the data preparation procedure followed the guidelines of Kock and Lynn (2012) and Kock (2015) suggested examining the whole collinearity. In this study, the researcher employed these measures as remedies for biased responses at the researcher's discretion.

3.7.3 Pre-test

Prior to the pilot study, the content validity of the research instrument was assessed through a pre-test. According to Yin (2009), content validity is characterized as the extent to which an instrument displays its purpose contained in particular ideas. Moreover, content validity includes consulting with a limited range of experts or potential committees for their viewpoints on the wording and phrases of items in the survey questions (Hair et al., 2019; Sekaran & Bougie, 2016). This ensures that every item in the instrument reflects each variable's concept. Tentatively, the content validity was carried out by asking the experts in the area and organisation to verify and affirm the questionnaire before the primary pilot test. The questionnaire was sent as a soft copy to the experts to assess the meaning of the questions. A qualitative evaluation was often made by professionals to confirm the content validity of the item (Flynn et al., 1990). The pre-test was conducted with the participation of three academics, two PhD students' practitioners and one language specialists. The pre-test informed the researchers of any potential difficulties that may arise from the questionnaire design. This included discussion and conversations with experts (i.e., academics, PhD students, and language specialists were the criteria for selecting experts) to evaluate the specific elements of the questions: (1) if any questions have to be included or excluded from the questionnaire, (2) if the survey questionnaire is acceptable, (3) if the correct questions are being asked, and (4) if the questions are simple to understand. The feedback was utilised to fine-tune the survey instrument's measurement items. The pre-test commenced in July 2023, and the process lasted about three weeks. Table 3.2 below shows the items of the questionnaires before and after the expert's comment.

Table 3.2: Pre-test Feedback

Measurement Items	Before Expert Comment	After the Expert Comment.
Strategic Decision Formulation	1. Does your organisation have deliberately set its strategic direction in form of vision statement, mission statement and core values.	1. Our organisation has deliberately set its strategic direction in the form of vision statement, mission statement and core values.

Measurement Items	Before Expert Comment	After the Expert Comment.
	2. Does Owner take formal responsibility for the firm's strategic management plan.	2. Our organisation leadership take formal responsibility for the firm's strategic management plan.
	3. Does your organisation analyses/gathers information about its external environment to understand their implications.	3. Our organisation analyses/gathers information about its external environment to understand their implications on our business.
	4. Does strategic formulation is a top priority activity at your company.	4. Strategy formulation is a top priority activity in our company
	5. Employees are briefed and taken through the strategic management plan before implementation.	5. Employees are briefed and taken through the strategic management plan before implementation.
	6. In strategy formulation all resources in our organisation are assessed.	6. When formulating strategy all resources in our organisation are assessed.
	7. Does your organisation strategy behaviour and choices are in line with environmental developments.	7. Our organisations strategic behaviour and decisions are in line with developments in our operating environment.
Strategic Decision Implementation	1. Organisational strategic decisions is implemented purely based on set objectives and expected performance.	1. Organisational strategic decision is implemented purely based on set objectives and expected performance.
	2. Resources are adequately allocated for strategic decision implementation.	2. Resources are adequately allocated for strategic decision implementation.
	3. Our organisational strategic decision is matched to organisational structure.	3. Our organisational strategic decision is matched to our organisational structure

Measurement Items	Before Expert Comment	After the Expert Comment.
	4. Organisation strategic decision is adequately and comprehensively communicated to members of staff.	4. Organisation strategic decision is adequately and comprehensively communicated to members of staff.
	5. Organisation is keen on implementing organisational strategic decision in a way that yield highest performance.	5. Organisation is keen on implementing organisational strategic decision in a way that yield the highest performance.
	6. There are motivational systems in place to ensure success of strategic decision implementation	6. There are incentives in place to ensure success of strategic decision implementation.
Strategic Decision Evaluation Practices	1. There is monitoring, evaluation and control of the implementation of strategic decision in our organisation.	1. We monitor, evaluate and control the implementation of strategic decision in our organisation.
	2. There is a clearly defined and measurable performance targets for each strategic decision management plan element.	2. We have clearly defined and measurable performance targets for each strategic decision management plan element.
	4. In our organisation, success of strategy evaluation is done on regular basis, and corrective action is taken on timely basis for highest performance.	4. In our organisation, success of strategy evaluation is done regularly, and corrective action is taken on timely basis for highest performance.
	5. There exist clear communication channels within the organisation to enable evaluation of strategic decision performance.	5. We have clear communication channels within the organisation to enable evaluation of strategic decision performance.
	6 In our organisation, success of a strategic decision is implemented	6. In our organisation, success of a strategic decision is

Measurement Items	Before Expert Comment	After the Expert Comment.
	and evaluated at the end of implementation stage and corrective measures taken.	evaluated at the end of implementation stage. 7. In our organisation, corrective measures are taken after strategic decision has been evaluated at the end of implementation stage.
Reliance on Financial Strength	1. Our organisation is well-equipped with a sufficient amount of equipment. 3. Our organisation exercises effective control over the allocation of site resources. 4. Our organisation is deeply committed to financial responsibility.	1. Our organisation is well-equipped with a sufficient quantity of equipment. 3. Our organisation exercises effective control over the allocation of site resources. 4. Our organisation is deeply committed to its financial responsibilities.
Reliance on Workforce	4. In our organisation, we prioritize motivating our labour force.	4. In our organisation, we prioritize the motivation of our employees.
Construction Business Performance	2. The company does the external and internal analysis to know the strategies to adopt. 6. Quality of information affect the organisation strategic decision-making.	2. Our organisation analyses the external and internal environment to know the strategies to adopt. 6. Quality of information affects our organisation strategic decision-making.
Quality of Information	2. In our organisation, quality of information playing a significant role in strategic decision-making	2. In our organisation, quality of information plays a

Measurement Items	Before Expert Comment	After the Expert Comment.
		significant role in strategic
	3. In our organisation, quality of information helps us in strategic decision-making to be more resilient and responsive.	3. In our organisation, quality of information helps us to be more resilient and responsive.
	4. In our organisation, we anticipate an increased role of information in supporting strategic decision-making.	4. In our organisation, we anticipate an increased role of information in supporting strategic decision-making.
	6. In our organisation, decision-makers diligently assess and consider the relevant information in their decision-making process.	6. In our organisation, decision-makers diligently evaluate relevant information in their decision-making process.
	8. Quality of information helped our organisation better understand the current situation of the project/Business Partners.	8. Quality of information helps our organisation better understand the current situation of our operating environment

3.7.4 Pilot Study

A pilot test was done after the questionnaire had been revised during the pre-testing phase to evaluate the survey's performance through an actual study to improve the questionnaire's internal validity. According to Teijlingen and Hundley (2005), a pilot study is a scaled-down version of a smaller-scale version study or a feasibility study. It is an essential step in determining the success of a complete study.

There are a few options when it comes to determining the sample size for a pilot study. Hill (1998) suggested that a sample size of 10 to 30 respondents is sufficient in these circumstances. This sample size is large enough to test the null hypothesis but small enough to ignore treatment effects that are not significant. Nevertheless, Cooper and Schindler (2011) recommended sample size of 25 to 100 respondents for a pilot test, and Connelly (2008) proposed

sample size of 10 percent of the whole research for a pilot test. According to Memon et al. (2017), internal consistency reliability is measured using Cronbach's alpha. The Central Limit Theorem asserts that a minimum sample size of 30 respondents assures that the mean of any sampling from the target population is approximately equal to the population's mean. According to Hair et al., (1998), the minimum acceptable value of coefficient alpha value is 0.60 to 0.70. Likewise, Flynn et al. (1990) indicated that a coefficient alpha value of 0.6 is adequate for ensuring the reliability of study variables. The pilot study commenced in August 2023, and the process lasted for about four weeks.

In order to attain an adequate response rate for the pilot study, a total of 60 copies of questionnaire were randomly distributed among stakeholders in New Zealand. Out of the 60 distributed copies, 9 were not returned, while 51 were successfully received and collected. The volunteer experts were asked to estimate the time spent completing the pilot survey to verify the questionnaire's clarity, reliability, validity, and understanding. They also shared if they found the directions easy to follow and the ambiguous questions. Other suggestions were welcomed, such as the wording used in the questionnaire. There were several suggestions for improving the order of the questions and the phrasing of two of them. Once the data was received from 51 respondents, SmartPLS 4 was utilized to assess the measurement model. Outer loading, AVE, Cronbach's alpha, and composite reliability were examined.

According to Hair et al. (2019), for interpretive purposes, outer loading of 0.50 and higher is regarded as significant. As for Cronbach's alpha and composite reliability, referring to Hair et al. (2019), the minimum acceptance value of 0.60 and 0.70 is acceptable in an exploratory study. A value of 0.50 or higher shows sufficient convergent validity (Hair et al., 2019). Finally, the construct dependability is tested by utilizing Cronbach's Alpha, demonstrating that the results were satisfactory. Based on this result, it may be inferred that the preliminary survey indicates satisfactory construct validity. Table 3.3 indicates the factor loading for all constructs ranged from 0.523 to 0.869. Based on the result from the model, all the AVE were over the threshold of 0.50. Therefore, the questionnaire can be distributed to the responder with confidence. The input received was merged into the survey questionnaire's final versions.

Table 3.3: Convergent Validity

Construct	Range of Outer Loading	Cronbach's alpha	Composite reliability	(AVE)
CBP	0.523 - 0.794	0.773	0.811	0.575
FC	0.680 - 0.869	0.723	0.871	0.534
QI	0.594 - 0.783	0.891	0.811	0.583
RW	0.678 - 0.834	0.878	0.886	0.572
SDEP	0.790 - 0.743	0.812	0.892	0.556
SDF	0.610 - 0.822	0.867	0.862	0.511
SDIP	0.712 - 0.734	0.812	0.852	0.523

Note: Strategic Decision Formulation (SDF), Strategic Decision Implementation Practices (SDIP), Strategic Decision Evaluation (SDE), Reliance on Financial Strength (FC), Reliance on Workforce (RW), Construction Business Performance (CBP), and Quality of Information (QI).

3.8 Population and Sample

Population can be defined as the conceptual idea of a huge proportion of several cases from which a researcher takes a sample which is applied to the outcomes of a study. In contrast, a sample size can be defined as a small set of cases selected from a large pool by a researcher and generalized to the population (Neuman, 2013). All persons or objects have a common feature, attribute, or personality within a population. One of the most critical aspects of the study is the population. The target population refers to the entire set of people or objects on which researchers want to reach a conclusion, also known as the theoretical population. The subset of the target population is also known as the sample.

In this research, the unit of analysis is organized as the response comes from different construction organisation in New Zealand. Neuman (2013) defines the target population as the concretely specified large group of many cases from which a researcher draws a sample and generalises results. In this study, the researcher focuses on New Zealand construction organisation. According to Stuff.com, there are 70,629 construction companies in New Zealand. As of 30 June 2023, there were 1,327 senior managers in the construction industry (defined as the top 3 tiers of managers with chief executives being tier one). Thus, the target population of this study were middle to senior-level construction managers, directors, engineers etc., who are involved in

making strategic decisions within their respective construction organisations. The aim is to improve decision-making and construction organisations' performance through better-quality of information.

Sampling can be seen as a research strategy for assigning effective experts of the population in certain research (Sekaran & Rani, 2010). The sampling method used in this study is the voluntary sample technique. A voluntary sample is one of the most common forms of non-probability sampling procedures and is also one of the most effective. A voluntary sample is made up of individuals who choose to participate in the survey by self-selection. Frequently, these individuals show a significant interest in the main topic of the survey.

Sekaran (2006) acknowledged that the corresponding sampling reflects the same percentage of a collection of thresholds during the survey process. The minimum sample size was drawn based on G*Power by considering statistical power, effect size, error probability and the number of predictors. As a result, G*Power is a tool for calculating statistical power in a variety of t-tests, F-tests, tests, Z-tests, and other tests. G*Power may also be used to determine effect sizes and display power analysis results graphically. The sample size is calculated as a function of the viewer-assigned values for the observed population effect size (f^2), the required significance level (α), the predicted statistical power ($1-\beta$), and the total number of predictors using G*Power 3.1.9.4 software (Bakker et al., 2020; Faul et al., 2009).

A power analysis helps solve the major issue of what sample size is 'enough' or, more specifically, how large a sample size is required to identify the effect interest (or find a relevant impact in a data) that occurs in the population. In other words, it lets researchers decide the acceptable (optimal) sample size before the study, thereby ensuring the results are highly accurate. Methodologists and statisticians commonly believe that greater sample size is more effective than a small sample size. However, it must be remembered that the sample size is not an end. It is one aspect that can enhance confidence in a study's outcomes (Erdfelder, Faul, & Buchner, 1996).

Cohen (2013) specifically stressed that utilizing the applicable statistical test capacity should impact the sample size. As a result, while establishing an appropriate sample size for this study, the capacity of a test becomes a viable option. According to the Cohen (2013), the capacity of a statistical test is defined as the likelihood of rejecting a null hypothesis or rejecting a given

sample size's specific effect size to a particular alpha of 0.05. The test can make a difference if available to the whole population. Furthermore, suppose other procedures influenced the sample size for a particular study, a power analysis should be utilized to understand the chance of perceiving the influence of several sample sizes (Perugini et al., 2018).

Five (5) predictor variable equations were employed in this study based on the G*Power model to determine the sample size. It is necessary to select the alpha level to use G-Power for computing the sample size, power level, and effective size (Cohen, 1988; Green, 1991). The alpha level was established at 0.05 for this research since it is considered conventional significance (Green, 1991). In the study by Cohen (1988), the effect size index revealed that the impact sizes for multiple and multiple partial correlations were 0.35, 0.15, and 0.02, respectively, with the largest effect size being 0.35 and the smallest effect size being 0.02. Another research used a = 0.05 while evaluating both endogenous and exogenous variables, which resulted in this measurement being adopted by the science establishment (Buttigieg & West, 2013). When a = 0.05 was used, there was a 95 per cent confidence level, indicating that there was no Type 1 error present. It is possible to encounter Type 1 errors anytime the null hypothesis, which is meant to be true, is rejected (Sartor & Halabi, 2015). In research, Type 2 error is related to a power level of 0.95, which means the investigator does not reject a false null hypothesis when using this power level (Bark et al., 2013). The following parameters were used for this study: statistical power (1 - = 0.95), significant alpha level (0.05), effect size ($f^2= 0.15$), and the total number of 2 predictors (Erdfelder et al., 1996). The statistical test results for a multiple regression-based statistical analysis are depicted in Figure 3.2.

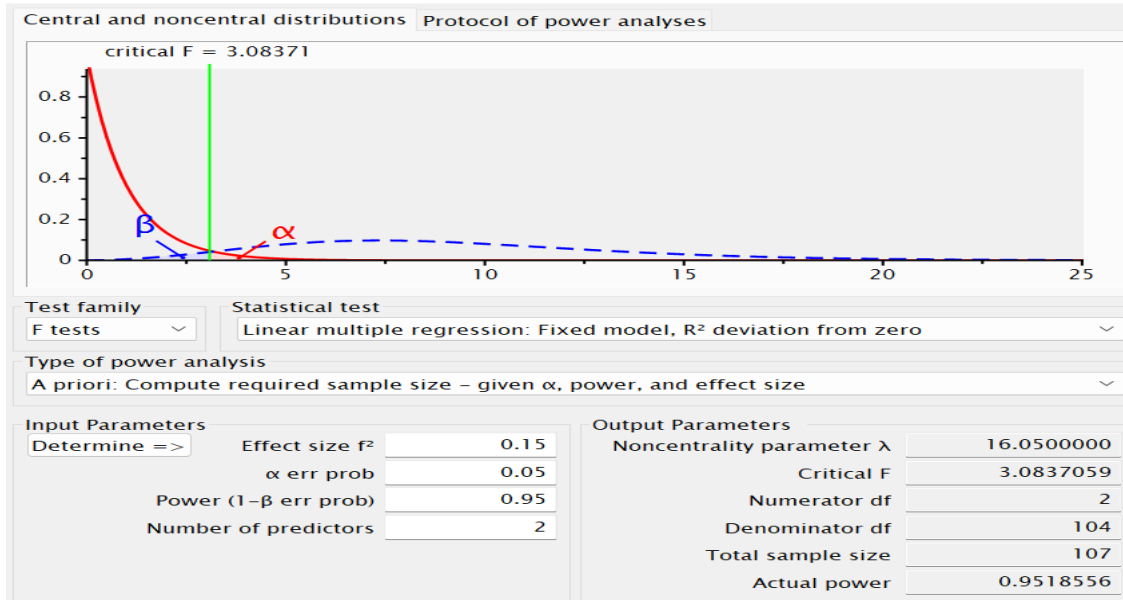


Figure 3.2: Power Analysis for Medium Effect and X-Y Plot for Medium Effect Power Analysis

In accordance with the statistical test, as indicated in Figure 3.2, the study's results revealed that a sample size of 107 is appropriate for a multiple regression-based statistical analysis. The test also revealed that the statistical power for determining the effect sizes for this study was established at a suggested value of 0.95, which was confirmed by the findings (Cohen, 1988). Furthermore, according to Hair et al. (2011), the sample size for any multivariate study must be many times (ideally ten or more times) higher than the number of variables in the study to be valid. In order to avoid using insufficient sample size and ensure accuracy in determining representative sample size in this investigation, a more detailed procedure described by Grover et al. (2006) was implemented. For this reason, a total of 107 experts were sufficient for this study in accordance with the G*Power assumptions for PLS-SEM.

3.9 Data Collection Method

A post-positivist views the world objectively (Merriam & Grenier, 2019). According to Scheuren (2004), the term "survey" is frequently used to describe a technique of collecting data from a group of people. The online questionnaire survey began in September 2023 and continued

until December 2023. This research uses closed-ended questions for this study. The survey technique tracks and identifies people's thoughts, feelings, and views. A survey with a larger number of experts is an appropriate instrument for data gathering to illustrate the quantifiability and generalizability of our qualitative primary data results. The survey is the most properly utilized tool regarding the time and quantity necessary to gather sufficient data. While surveys are frequently employed as a research tool, the data collecting technique can be either a mail-based or an online survey. Data for all variables were gathered through self-administered online-based survey approach to ensure impartiality, prevent researcher bias and to ensure a diverse expert pool.

Recruitment primarily targeted members of Building Contractors, New Zealand Institute of Building, Infrastructure New Zealand, The National Association for Civil Construction in New Zealand as well as professionals associated with various construction organisation through platforms like LinkedIn. Contact information for potential experts was obtained through the School of Built Environment Engagement network and industry connections. Expert recruitment was conducted via email, and data collection was facilitated through the Qualtrics online survey platform to ensure systematic and secure data gathering. This initial contact contained an official invitation letter outlining the study's purpose and importance. Alongside the letter, an expert consent form, and a direct link to the survey questionnaire were provided. Any expert expressing interest in participating has the opportunity to proceed with the survey. The reasons for choosing this online survey method are that it is easy, fast, and inexpensive. Using this technique, the researchers can cut their costs, including documentation, transportation, and printing costs. Respondents also can feel more comfortable and convenient because they can answer the questionnaire anytime and anywhere. Following the delivery of the copies of questionnaire, it was intended that the sampled individual would return them with their answers within two weeks. Individuals who had not responded were contacted through email and telephone to increase the response rate during the third week.

The study employed specific inclusion criteria to ensure participants possessed the requisite expertise and decision-making authority relevant to information quality and strategic decision-making in construction organizations. Participants were required to: (1) hold middle to senior-level positions within construction organizations, including construction managers, project directors, engineering managers, or equivalent roles with demonstrated strategic decision-making

responsibilities; (2) possess a minimum of five years of experience in the construction industry to ensure adequate exposure to information quality challenges and strategic decision-making scenarios; (3) be actively involved in organizational strategic planning, project selection, resource allocation, or performance evaluation processes; and (4) have direct experience with information systems, data management, or decision-making processes that impact organizational performance.

To ensure representative coverage of New Zealand's construction sector, participants were specifically recruited from organizations that: (1) operate within New Zealand's construction market and possess understanding of local regulatory, economic, and operational contexts; (2) engage in commercial, infrastructure, or residential construction projects with sufficient complexity to require strategic information management; (3) demonstrate organizational maturity through established planning, budgeting, and performance monitoring systems; and (4) represent diverse construction sub-sectors including building contractors, civil construction, infrastructure development, and specialized engineering services to capture varied perspectives on information quality impact.

3.10 Data Preparation

In this research, there were three phases in data preparation that were completed prior to statistical analysis: (1) Data exporting and cleaning, (2) testing for normality, and (3) testing for common method bias are all steps in the process.

First, the information gathered through online surveys was converted into a standard format that could be used for statistical analysis. When exporting data from a Qualtrics Form to an Excel spreadsheet, it is critical to identify cases with fast response time to ensure that the data is usable for statistical analysis. Surveys that are completed too quickly may indicate that the Expert has not read all the questions, so it is important to detect cases with fast response times. It has been raised in previous methodological literature that the issue of completion time in self-administered internet surveys is important (Leiner, 2019; Lowry et al., 2016; Meade & Craig, 2012; Wang & Strong, 1996; Wenger et al., 2021). A 15-minute survey completed in 3 minutes is unlikely to have resulted in respondents reading the items in their entirety (Leiner, 2019). When it comes to identifying cases of meaningless data, completion time is extremely useful (Leiner, 2019). These situations may result in the reduction of the overall data accuracy (Wang & Strong, 1996), as well as an

increase in type II mistakes (i.e., not rejecting wrong null-hypotheses) (Meade & Craig, 2012). According to Meade & Craig, (2012), some respondents put in less time and effort into activities than others, which may result in a sample that distorts the results of a study. This problem may be solved by deleting replies with an excessively short reaction time (Lowry et al., 2016; Meade & Craig, 2012). In this study, any replies completed in less than 3 minutes were deemed invalid and thus excluded from the data collection.

The data preparation process included testing for normality, a critical statistical assumption that examines whether the data follows a Gaussian distribution. Normality assessment determines if the sample data approximates a bell-shaped curve, indicating it was drawn from a normally distributed population (Allen et al., 2010). According to Tabachnick et al., (2007), screening continuous variables for normality should be done in the data preparation phase of any multivariate study using either statistical or graphical approaches. Before the modelling in this study, the data was checked for compliance with the normalcy assumptions, which was done using SmartPLS 4 statistical tools. The normality, skewness, and kurtosis index of the data were verified in this test. This study made use of normalcy criteria given by Hair et al., (2009) and Kline, (2005). According to Hair et al., (2009), absolute values of skewness and kurtosis more than 2.0 and 7.0, respectively, suggest significantly non-normal distributions. As indicated by Kline(2005), absolute kurtosis values larger than 10.0 are suggestive of troublesome non-normality, while absolute kurtosis values greater than 20.0 indicate substantial departures from multivariate normality. The data acquired for this study was double-checked to verify that it remained within acceptable normality limits.

Test for common method bias was the final stage in the data preparation process. As a technique for performing this test, Harman's single-factor test was recommended by Podsakoff, (2003) in order to discover statistically significant bias (if any) in the final dataset due to the data measurement method. Thus, the unrotated factor solutions are evaluated in order to determine the number of factors that account for the variable under consideration (Koh et al., 2003). The amount of variance that may be explained by common technique biases might vary depending on the study field and issue (Podsakoff, 2003). Before moving further with the descriptive and statistical analysis, this research ensured that the final dataset did not contain common method bias.

3.11 Quantitative Data Analysis Method

The data was analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) technique with SmartPLS 4 software. Under exceptional circumstances, PLS-SEM is a strong multivariate analysis approach that combines specialized versions of different analytic methods (Ringle et al., 2012). PLS-SEM represents informal reasoning about causal relationships that is prevalent in social science theorizing and aids the translation of such ideas into data analysis through courses such as economics. Structural-equation models may be derived from formal theory. PLS-SEM is a promising approach that offers a wide range of possibilities to researchers. It is a regression-like technique capable of decreasing residual variances and has the unique ability to function efficiently with both big and small samples, unlike AMOS, which has issues with some samples (Hair, Matthews, & Ringle, 2016; Hair, Anderson, Babin, & Black, 2010). As a result, PLS-SEM is recommended in this investigation for some reasons.

First, in this research, PLS-SEM was used for prediction, exploration, and developing theory. PLS-SEM accounts for measurement errors in terms of reliability by explicitly adding measurement error variables that correspond to the measurement error parts of observed variables (Ringle et al., 2012). As a result, findings concerning the link between constructs are not biased by measurement error and are comparable to relationships between perfect reliability variables. This is critical since data in the social sciences typically contains many measurement mistakes. PLS-SEM is well-known for its ability to test hypotheses and their compatibility, its assumptions regarding parameters, variances, and covariances of all observed variables, and its ability to test hypotheses and their compatibility (Ringle et al., 2012). Furthermore, PLS-SEM presents R^2 values that specify the significance of relationships among constructs to understand the model's performance. Contrarily, CB-SEM simply presents path modelling (coefficient and CR). However, the PLS-SEM is the most excellent technique suitable for prediction-based study, while the CB-SEM is more on model fit.

This study adopted PLS-SEM to evaluate the study model to assess the relationships between factors and mediating variables. This study also focused on testing relationships based on theoretical knowledge (Baumgartner & Steenkamp, 2001). Moreover, the PLS-SEM technique is suitable for this study to provide prediction-oriented objectives (Chin, 1998; Tully, 1998; Wong,

2013). This study's research model was evaluated using a two-step procedure such as the outer and inner models. This model validation was utilized to determine if the measurement and structural model fulfilled the experimental investigation's characteristic requirements (Urbach & Ahlemann, 2010).

3.11.1 Measurement Model Assessment

The concept validity is evaluated using a measurement model assessment. As previously stated, the discriminant validity, convergent validity, indicator reliability, and internal consistency of a reflective measurement model may be proven by verifying its internal consistency, indicator reliability, convergent validity, and discriminant validity (Hair et al., 2012; Hair et al., 2019).

3.11.1.1 Internal Consistency

Internal consistency is frequently tested with composite reliability (CR) in PLS-SEM (Chin, 1998). The reason is that CR takes into account indicators or items with various loadings (Chin, 1998). Cronbach's alpha (CA) is a statistic that may be used to assess the internal consistency of a measurement item. High Cronbach's alpha values suggest that the indicators or items that make up the examined construct have the same range and meaning. Therefore, the construct's dependability can be proved based on the indicator inter-correlations (Cronbach, 1971) whereas CA assumes that all indicators are equally weighted (Hair et al., 2012; Hair et al., 2019). Whether or not CR or CA is utilised, internal consistency reliability is excellent at a value of 0.7 or higher in the early stages of research and at a value of 0.8 or higher in the later stages of the study. Regardless of whatever reliability coefficient is employed, internal consistency reliability is considered sufficient when the value is at least 0.7 in the early stages of testing and values above 0.8 or 0.9 in the latter stages, whereas a value below 0.6 indicates a lack of reliability (Hair et al., 2012; Hair et al., 2019).

3.11.1.2 Indicator Reliability

Researchers assess the degree to which a variable or a collection of variables is connected with the calculation it seeks to make when evaluating indicators' reliability (Urbach & Ahlemann, 2010). The reliability construct is unrelated to other constructs and is assessed separately. Indicator

loadings must be meaningful at least at the 0.5 level, and the loading should be more than 0.7, according to Chin (1998). This is due to the loading rate of 0.707 and the latent variable's status of explaining at least 50 percent of the variance of its indicator. A resampling method such as bootstrapping or jack-knifing can be utilized to determine the significance of the indicator loading. When deciding to omit a predictor, discretion should be exercised and the accuracy features of PLS in general should be taken into account (Henseler et al.,2009). It only makes sense to remove an indication if its reliability is poor, and deleting the indicator corresponds to a large improvement in composite reliability.

3.11.1.3 Convergent Validity

According to convergent validity, individual items accurately represent a concept that is interconnected, as opposed to items that assess separate entities (Urbach & Ahlemann, 2010). A test for convergent validity can be performed using PLS, which makes use of the average variance extracted (AVE) from the data set. According to Fornell, & Larker(1981), enough convergent validity is achieved when a construct's AVE value is at least 0.5.

3.11.1.4 Discriminant Validity

Discriminant validity is used to differentiate between the magnitudes of a construct. Unlike convergent validity, discriminant validity assesses whether the items assess anything else by chance (Urbach & Ahlemann, 2010). In this study, the Heterotrait-Monotrait Ratio Statistics (HTMT) analysis is used as the discriminant measuring method. According to Henseler-unger and Ziele (2016), the HTMT value should not exceed 0.9 in order to obtain better discriminant validity. In contrast, a score greater than 0.9 is seen as indicating a lack of discriminant validity (Henseler et al., 2016). The review of validity criteria to evaluate a reflective measurement model is entered in Table 3.4.

Table 3.4: Summaries of Validity Principles for Evaluating Reflective Measurement Model

NO.	Validity Type	Criterion	Guidelines
1.	Internal consistency	CR	CR > 0.7 (for exploratory study) CR > 0.8 (advance research) CR < 0.6—lack of reliability
2	Indicator Reliability	Indicator loadings	Item's loading > 0.7 and significant at least at the 0.50 level
3	Convergent Validity	AVE	AVE > 0.50
4	Discriminant Validity	Cross loading Fornell and Larcker Heterotrait-monotrait ratio of correlations (HTMT)	Item's loading of each indicator is at greatest for its designated construct. The square root of the AVE of a construct should be above the correlations between the constructs and other constructs in the mode.

Sources: Henseler et al., (2016)

As a result, in this study, the measurement model's validity is acceptable if:

1. CR is above 0.7
2. Item's loading is above 0.7. 0.5
3. AVE value for each construct is higher than 0.50.
4. Item's loading of each indicator is at its highest for its peculiar constructs.
5. The square root of the AVE of a construct must be more than the correlations among the construct and other constructs in the mode (Henseler et al., 2016).

3.11.1.5 Descriptive Statistics and Normality Assessment

The descriptive statistics provided in Table 3.5 revealed that the skewness and kurtosis of the normality were within the acceptable value of +/- 1. Skewness is the measure of the symmetry of the distribution. The normal distribution is symmetric and has the value of zero for skewness. Skewness is defined as a measure of the symmetry of a distribution. A positive value indicates that

the distribution has a greater tendency to tail to the right (positively skewed or skewed to the right). A negative value indicates a greater tendency of the distribution to tail to the left (negatively skewed or skewed to the left). Skewness is 0 for a normal distribution (Shanmugam & Chattamvelli, 2016). Kurtosis is a measure of the shape of a distribution. A positive value indicates that the distribution has longer tails than the normal distribution (platykurtosis) while a negative value indicates that the distribution has shorter tails (leptokurtosis). For the normal distribution, the kurtosis is 0. as Also, kurtosis refers to the peakedness or flatness of the distribution so that the high peak data is called a Leptokurtic where the kurtosis value is greater than 3 (kurtosis >3). The perfect normal distribution of the data is called Mesokurtic, which as a kurtosis, equals 3. In contrast, the high flatness data is called Platykurtic, where the kurtosis value is less than three (kurtosis < 3) (Bulmer, 1979).

Mean is an essential concept in mathematics and statistics. It is a measure of central tendency of a probability distribution along median and mode. It is also referred to as an expected value, while the Standard deviation (SD) is useful for measuring variance within a data set and, in application, confidence in statistical results (Shanmugam & Chattamvelli, 2016). Furthermore, the analysis of mean obtained in Table 3.5 shows the respondents Strategic Decision Formulation (mean=6.247, SD=1.109), Strategic Decision Implementation Practices (mean=4.377, SD=0.787), Strategic Decision Evaluation (mean=4.214, SD=0.881), Reliance on Financial Strength (mean=6.178, SD=0.1003), Reliance on Workforce (mean=4.548, SD=0.736), Quality of Information (mean=6.180, SD=1.052), Construction Business Performance (mean=6.167, SD=1.041). This shows that there is no issue with the data collected, and it is suitable for further analysis.

Table 3.5: Measurement of Normality

Construct	Scale	Min	Max	Mean	Std. Deviation	Kurtosis	Skewness
SDF	Interval (1 to 5)	1	7	6.247	1.109	1.061	-1.156
SDIP	Interval (1 to 5)	1	6	4.377	0.787	1.508	-1.363
SDEP	Interval (1 to 5)	1	7	4.214	0.881	1.603	-0.839
RW	Interval (1 to 5)	1	5	4.548	0.736	3.345	-1.716

FC	Interval (1 to 5)	1	5	6.178	1.003	1.210	-1.266
QI	Interval (1 to 7)	1	8	6.180	1.052	1.168	-1.165
CBP	Interval (1 to 9)	1	7	6.167	1.041	0.775	-1.157

Note: Strategic Decision Formulation (SDF), Strategic Decision Implementation Practices (SDIP), Strategic Decision Evaluation (SDE), Reliance on Financial Strength (FC), Reliance on Workforce (RW), Construction Business Performance (CBP), and Quality of Information (QI).

The evaluation of normality is necessary to ensure that the data are not too far from normal, as massively non-normal data make determining the parameters' significance challenging (Hair et al., 2016). Normality refers to the degree to which the sample data distribution resembles the standard distribution. Following the descriptive statistics for the present study data, and before looking at the coming statistics test, it is better to look at whether the data follows a normal distribution or not. Several tests for assessing the normality and shape of data distribution, such as skewness and kurtosis tests, were used in the present study (Hair, Black, Babin, & Anderson, 2010).

The data in this study were checked for compliance with normality assumptions before being used in the modelling process. This was done using SmartPLS 4 statistical techniques. Skewness and kurtosis indices were examined as part of the normalcy test. The normality criteria compiled by Hair et al. (2009) and Kline (2005) were utilised for this study. The authors of Hair et al. (2009) claimed that absolute values of skewness and kurtosis of more than 2.0 and 7.0, respectively, suggest significantly non-normal distributions. Kline (2005) advised that absolute kurtosis values larger than 10.0 be considered suggestive of problematic nonnormality, and values greater than 20.0 indicate substantial departures from multivariate normality. When the normality test was performed, as shown in Table 3.5, all the skewness and kurtosis values were less than 7.0. The data obtained for this study, as a result, remained within acceptable normalcy standards.

3.11.1.6 Common Method Bias

In order to examine the measurement and structural model, the researcher used partial least squares (PLS) modelling, which was performed using the SmartPLS 4 software (Ringle et al., 2015) as the statistical tool. This method does not require a normality assumption, and survey research is typically not normally distributed (Chin et al., 2003). Because the data was acquired

from a single source, the researcher first investigated the possibility of Common Method Bias, following the recommendations of Kock & Lynn (2012) and Kock (2015), who recommended assessing the entire collinearity.

When using this approach, all the variables will be regressed against a common variable, and if the VIF is less than 3.3, it means that there is no bias from the single-source data. In this study, the analysis produced a VIF of less than 3.3, indicating that single-source bias is not a significant issue with our data. Table 3.6 shows the random dummy variables model for the full collinearity test. Based on the results of Table 3.6, it can be inferred that common method bias did not impact respondents' replies.

Table 3.6: Full Collinearity Testing

CBP	FC	QI	RW	SDEP	SDF	SDIP
2.123	2.542	2.465	2.321	2.454	2.112	2.398

3.11.1.7 Common Method Variance

For the use of a single informant data source, common method variance (CMV), also known as mono-method bias, may be introduced into research studies (Malhotra et al., 1999; Podsakoff, 2003). According to the definition, "variance due to the measuring method rather than the concept of interest" is what is meant (Podsakoff, 2003). For the most part, experts have agreed that "common method variance" is a significant concern for researchers who use self-report surveys (Lindell & Whitney, 2001; Podsakoff, 2003; Spector & Brannick, 2009). Podsakoff argued that "common method bias inflates associations between variables" in the process of self-reporting variables. This study included a wide range of practical options for mitigating the effects of CMV (MacKenzie & Podsakoff, 2012; Podsakoff, 2003). First, respondents were told that their responses and identities would remain anonymous during the research procedure. Second, all questionnaire items were created clearly, accurately, and concisely to further strengthen the scale items on the questionnaire. The scale items were also improved to reduce method biases in this study.

This was done by circumventing vague ideas in the questionnaire and using different Likert scales of 1-9 for endogenous variables, while Likert scales of 1-5 and 1-7 were used for exogenous variables and mediating variable (Robinson, 2018). All questionnaire items were written in straightforward, precise, and brief language to enhance scale items. In addition to the methodological treatments discussed above, Kline (2005) asserts that the presence of CMV in a model may be determined by the model's inability to establish discriminant validity in the first place. The low discriminant validity means that all observable variables measure one domain of the data collection process. These analyses conclude that this investigation did not detect a significant quantity of CMV. Briefly stated, the overall measurement model evaluations clearly signal that all the validity and reliability requirements are appropriate and acceptable. As a result, the structural model could be quantified with confidence.

3.11.2 Structural Model

An investigator can use a structural model to determine if the data supports the structural model's hypotheses (Urbach & Ahlemann, 2010). The structural model may usually be evaluated once the measurement model has been successfully validated. The researcher performs the Bootstrapping with a 5000-bootstrap sample size (Hair et al., 2012) and a significant alpha of 0.05. According to Sarstedt and Mooi (2019), the researcher should also look at the Standard Coefficients Beta (Standard Beta) to understand how one significant variable influences another (Ravand & Baghaei, 2016). Bootstrapping technique was used in conjunction with SmartPLS 4 to check the statistical significance of the path coefficients. Through the bootstrapping procedures and the sequentially produced P-Values, the verification of the T-Values, as well as each path coefficient, was carried out.

Hair et al. (2019) proposed examining the confidence interval to get more information about how much the population parameter fell at a given level of confidence. In all confidence intervals, zero must not be included. As a result, the researcher evaluates the interaction effects (t-value) to confirm the hypothesis (Ravand & Baghaei, 2016). Hair et al. (2016) found that when the p-value is less than 0.05 and the one-tailed test is used, the t-value must be greater than 1.645 ($t\text{-value} > 1.645$) for the hypotheses to be acceptable. The coefficient of determination and path coefficients can be used to assess a structural model in PLS. Testing every endogenous latent

variable coefficient of determination is the first relevant criterion for evaluating the PLS structural model. A researcher can measure the strength of the relationship between two latent variables by looking at the path coefficient value. Academics must check the algebraic sign, path coefficients, significance, and intensity in order to analyse the relationship between two latent variables. The path coefficients must exceed 0.100, according to Huber and Arceneaux (2007), to allow for a particular impact within the model and be meaningful at the 0.05 level of significance. The effect size (f^2), coefficient of determination (R^2), path coefficients, and cross-validated redundancy (Q^2) were used to assess the structural model in PLS. Although blindfolding was used in this study to assess the research model's predictive relevance, Sattler et al., (2010) state that blindfolding methods are only used on endogenous latent variables with a reflecting measurement model operationalization.

In addition, Shmueli et al. (2019) present PLS Predict, a sample-based holdout approach that uses a 10-fold procedure for predictive relevance to provide case-level predictions at an item or a construct level. Shmueli et al. (2019) stated that there is considerably more predictive power if all item differences (PLS-LM) are smaller. Relevance is not proven if they are greater than predicted. At the same time, there was a low predictive power if the majority were less than moderate and if the minority had low predictive power.

3.12 Ethical Considerations

It is essential to consider the underlying ethical concerns for each analysis. Ethics describes the proper form of action expected to perform analysis morally and accountable (Clark-Kazak, 2017). As a result, research ethics corresponds to considerations about how researchers articulate and describe the research's particular topic, design, and gain access to the research, obtain data, process, and archive the data, interpret data, and write down the research results morally and responsibly. Also, this study project is no exception. A very high degree of ethical practices was adopted and retained during the data collection process to guarantee credibility, increase data accuracy, and mitigate perceived bias (Lewis, 2017).

An ethics approval application was submitted to the Massey University Ethics Committee to ensure appropriate ethical considerations were taken. The application was accepted, and the level of risk associated with it was graded as low (ethics approval No: 4000025806). The probable

ethical problems that were taken into consideration include, among other things, the possibility of experts being harmed, informed and voluntary permission, the maintenance of confidentiality, and possible conflicts of interest. The protection of the experts and organisations' right to privacy and confidentiality regarding the information gathered about them during the research might be the most important ethical problem that emerges during its course. The respondent's identity and that of the organisation were concealed so that confidentiality can be maintained. The same principle was applied to the copies of the questionnaire that were carried out and recorded; the files were kept confidential and were handed over to the supervisor in accordance with the regulations of Massey University. The experts were requested to sign a consent document to address the concerns around informed consent. The consent form was provided a detailed explanation of the research's aim and any other pertinent information. In addition, a respondent may unknowingly share confidential documents or details about his or her organisation. As a result, to prevent this scenario from happening, the surveys were designed and carried out to ensure the experts would share no confidential details.

EPILOGUE: PART ONE

The first chapter establishes the foundational framework of the study, beginning with a critical examination of construction information quality management in New Zealand's project pipelines. Through systematic problem identification, the chapter highlights the significant challenges facing the industry, particularly concerning information management and project delivery efficiency. The research questions and objectives are strategically formulated to address identified gaps in both theoretical understanding and practical application. A comprehensive literature review synthesizes current knowledge while revealing critical research opportunities in construction information management. The chapter articulates the study's scope, focusing specifically on pipeline construction projects in New Zealand, and outlines its anticipated contributions to both academic literature and industry practice. These contributions include developing a framework for enhanced information quality management and strategic decision-making in construction projects. The chapter concludes by presenting the thesis structure, demonstrating the logical progression and interconnectedness of the research components, and ensuring a coherent and systematic approach to addressing the research objectives.

The second chapter has presented a comprehensive review of New Zealand's construction sector, examining project pipelines, strategic decision-making processes, and information quality's role in business performance. Through analysis of project pipeline data from 2022 to 2024, the chapter explored significant trends across residential, non-residential, and infrastructure sectors, while investigating how construction organisations rely on financial strength and workforce capabilities to execute strategic decisions effectively. The theoretical foundation, established through Ansoff's Strategic Success Theory and the Resource-Based View Theory, provided the framework for understanding how construction organisations achieve superior performance through strategic alignment and resource utilization. The chapter concluded by presenting a research framework illustrating the relationships between strategic decision-making factors, quality of information, and construction business performance in New Zealand's dynamic construction industry.

The third chapter presents a comprehensive methodological framework, adopting a quantitative approach grounded in epistemological and ontological foundations relevant to construction management research. The research strategy incorporates sampling methodologies, data collection instruments, and analytical procedures, with particular focus on questionnaire design using validated measurement scales. The data collection strategy employs an online survey instrument, developed through expert validation and pilot testing to ensure content validity and practical applicability across various levels of pipeline construction project management. The study utilizes Partial Least Squares Structural Equation Modelling (PLS-SEM) for its ability to handle complex structural models and suitability for predictive analysis. The implementation follows a two-stage evaluation process examining both measurement and structural models through multiple statistical criteria. The chapter addresses validity and reliability through methodological triangulation and statistical validation procedures, while considering ethical aspects such as data privacy and informed consent, concluding with a research process flowchart that demonstrates alignment between objectives, methods, and anticipated contributions.

PART 2

**PROJECT PIPELINES INFORMATION AND STRATEGIC DECISION-MAKING IN
CONSTRUCTION INDUSTRY**

PAPER ONE, PAPER TWO

AND

PAPER 3

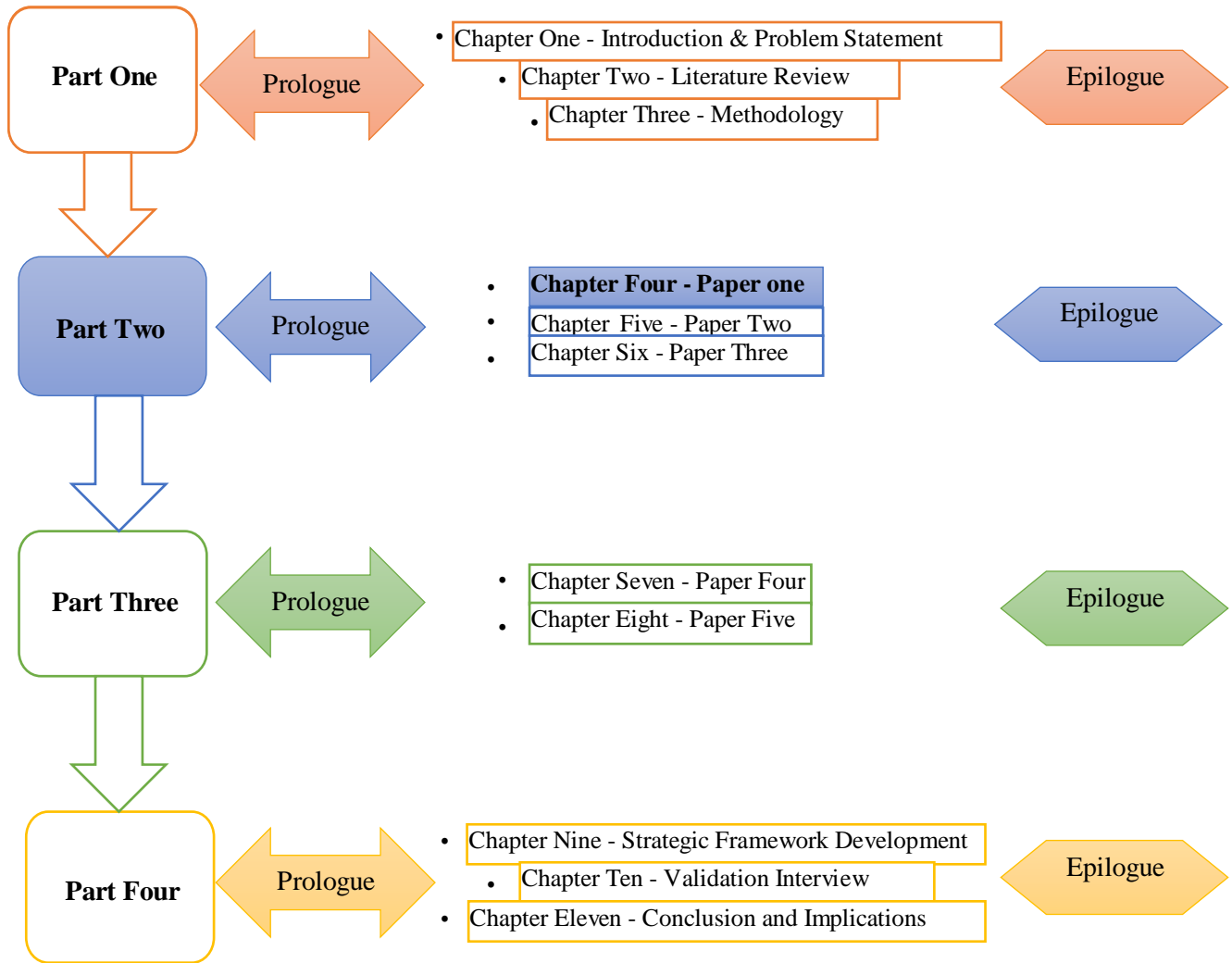
PROLOGUE

Part 2 encompasses three comprehensive chapters (Chapters 4 to 6) that establish the study's problem definition and conceptual framework through extensive literature analysis and preliminary findings. These chapters collectively identify the critical determinants for successful construction business performance in New Zealand, directly addressing Objective 1 of the research.

Chapter 4 examines project pipelines matters within New Zealand Construction Industry through a narrative review of academic literature and industry reports. The chapter analyses current challenges facing construction organisations and identifies key factors influencing business performance. It provides critical insights into industry-specific challenges and opportunities, emphasizing the strategic importance of infrastructure development in the New Zealand context.

Chapter 5 presents a systematic review of infrastructure pipeline information and its relevance to strategic decision-making in construction organisations. This chapter identifies emerging patterns, trends, and research gaps through comprehensive analysis of existing literature. It specifically examines how pipeline information influences strategic decision-making processes within New Zealand's construction industry, further contributing to Objective 1.

Chapter 6 investigates the relationship between information quality and strategic decision-making in construction organisations, developing a conceptual model that addresses industry complexities and contingencies. The chapter identifies key factors influencing information quality, examines their impact on strategic decision-making processes, and evaluates their effect on organisational performance. This analysis culminates in the development of a comprehensive conceptual framework, completing the foundation for addressing Objective 1. The chapter synthesizes findings from previous chapters to create an integrated understanding of how information quality influences construction business performance through strategic decision-making processes.



CHAPTER 4

PAPER ONE

4.0 PIPELINE PROJECTS: MATTERS ARISING IN THE NEW ZEALAND CONSTRUCTION INDUSTRY.

This chapter is based on the following published Journal paper:

Moshood, T. D., Rotimi, J. O. B., & Shahzad, W. (2024). Pipeline Projects: Matters Arising in the New Zealand Construction Industry. *Journal of Engineering, Project & Production Management*, 14(3).

Abstract: The construction industry in New Zealand has undergone significant growth in recent years with active building and ongoing infrastructure development projects. However, the industry has faced criticism due to failures, particularly in project pipelines involving public infrastructure due to its underperformance, unnecessary postponement, and delay. This study, utilizing data from a ten-year plan of the Palmerstone North City Council and employing document analysis techniques, examined the issues that have arisen in New Zealand's project pipelines. The study identified government legislation, workforce, finance, and materials as major factors for the industry's underperformance. To address these issues, the study proposes various strategies and plans to improve the industry's stability; the proposal has practical implications for government and development agencies seeking the implementation of effective strategies for future projects. Furthermore, the findings highlight the need for improved collaboration between the government and the industry's stakeholders, particularly in developing effective regulatory frameworks and ensuring a skilled workforce. The study provides valuable insights into the construction industry's challenges and opportunities in New Zealand and underscores the importance of adopting a strategic approach to infrastructure development. The proposed strategies and plans can help to

improve the industry's performance, thus contributing to sustainable growth and development in the sector.

4.1 Introduction

The New Zealand government is a significant client in the construction business with a focus on developing basic infrastructure such as roads, dams, drainage systems, educational institutions, residences, and industrial facilities. According to Lessing et al. (2017), these developmental efforts are designed to raise the living standards of the general public. The provided budgets by the government are significant, yet several public projects are not functioning well due to poor implementation of programmes (Cielo and Subiantoro, 2021). On the supply side, the construction sector grapples with operational challenges which further hamper well-intended efforts toward national growth and development. For example, du Plessis and Simpson (2021) outlined some of the challenges facing small and medium-sized construction enterprises in New Zealand thus: scale, finance, regulatory and resource challenges. Furthermore, Ogunlana et al. (1996) submit that three issues arise within significant construction activities. These issues are problems resulting from inadequate industrial infrastructures (primarily the supply of resources), problems resulting from the actions of clients and consultants, and problems resulting from the actions of incompetent contractors (Assaad and El-adaway, 2021).

An important objective for setting up the Construction Sector Accord is to create a "high-performing construction industry for a better New Zealand" where safe and durable houses, buildings, and infrastructures are produced by a productive, competent, resilient, and proud sector for the welfare of New Zealanders (BDO, 2021). This demonstrates the relative importance of the construction industry within the national economy (BDO, 2021). In spite of the construction industry's resiliency, the sector remains vulnerable to ongoing cost pressures and demand risks (New Zealand Infrastructure Commission, 2022), having an influence on its ability to effectively deliver pipeline and ongoing projects. Post Covid realities have exacerbated the construction industry's challenges.

Construction project outcomes are influenced by functionality, fitness for purpose, lack of claims or legal action, and contractor profitability, among others (Majid, 2006). The definition of a project's success depends on various criteria such as the golden triangle of time, money, and

quality (Ghandour, 2020). Nevertheless, the term "project success" can be viewed in various ways by various individuals depending on the circumstances. Each client, consultant, contractor, designer, and subcontractor has an idea of what constitutes a successful project. Chan and Chan (2004) describes project success as relying on a variety of criteria, such as the type of project, the magnitude and sophistication of the project, the number of project experts, and the skill of the project owners. Nevertheless, in construction projects, researchers opine that the so-called golden triangle consisting of the three components, time, money and quality, are significant in the assessment of project success (Abdullah et al., 2010; Endut et al., 2009; Sambasivan and Soon, 2007).

Additionally, completing projects within their allocated cost, timelines, and performance standards is becoming extremely important in today's increasingly competitive economic world (Durdyev and Hosseini, 2019). But delays are a common concern and cause of cost and schedule overruns, lower-quality deliverables, and litigations (Jatarona et al., 2016). Furthermore, delayed, deferred or postponed construction projects slow down the pace of economic activities, and has an impact on national growth and development targets; this delay has high possibility of resulting in government's economic costs. In addition, such projects portend damages to the reputation of the parties associated with the construction work (Abdullah et al. 2010). Therefore, it is important to investigate the challenges experienced in construction project pipelines in New Zealand because of the deficits that may result from the inability to provide local infrastructure and other public service facilities, such as water, roads, bicycle pathways, footpaths, sewerage, garbage and recycling, parks and sports fields, leisure centres, libraries, swimming pools, civil defence, and social housing units.

Identifying the most critical factors that contribute to delays, deferment and or postponement of project pipelines in New Zealand will aid decision-makers working in this sector to develop strategies that reduce the causes of project failure and contribute to the successful achievement of a project's objectives. The current study pursues three interrelated objectives: (1) to review the performance of some critical projects within a local council; (2) to provide some logical explanation of the challenges associated with construction pipelines undertaken by the local council; and (3) to recommend mitigation strategies for underperforming critical projects.

4.2 Literature Review

4.2.1 Overview of New Zealand's project pipelines

Project pipelines are a collection of initiatives that must be successfully planned, launched, tracked, and assessed after they have been initiated (Castagnino et al., 2020). Maintaining consistency in the project pipeline process is essential so as to ensure that projects have agreed-upon dates, and team members are allocated to a particular job to ensure unambiguous statuses, and to precisely maintain project information (Luo and Shahzad, 2020). Project management is essential to the success of projects in the pipeline. The New Zealand construction sector had an average annual growth rate of 6.6% from 2016 to 2019. The COVID-19 virus pandemic was predicted to cause the industry to expand by 7.3% in real terms in 2020 (Construction in New Zealand H1, 2021). The economic instability and difficulties that resulted from the government's stringent limitations in the first half of the year, as well as the following economic uncertainty and weakness, significantly influenced the amount of activity conducted in the industrial/construction sector. Aside from that, the financial crisis worsened because of delays in the completion of projects and the reallocation of a portion of the government's budget towards mitigating the COVID-19 epidemic.

A 12.2 per cent increase in the construction industry in New Zealand is expected for 2022, an increase over the earlier forecast of 6.2 per cent growth. This indicates how well it has been able to limit the spread of COVID-19. The fact that building activity has remained strong in the face of the COVID-19 pandemic and is anticipated to continue in that manner, reopened the country's domestic economy. Construction projects that had been put on hold have now been restarted, thus increasing the growth prediction from the prior estimate of 7.8 per cent in 2021 (BDO, 2021). According to their calculations, Statistics New Zealand believes that the value generated by the building industry increased by 25.9 per cent in the first six months of 2021. For the first time, the government stated its desire to support substantial shovel-ready infrastructure projects to spur economic development and to assist the construction industry during the early stages of the pandemic. Thus, the government established the Infrastructure Industry Reference Group (IRG) in April 2020 to identify infrastructure projects that could be started as soon as authorization to commence construction activity was obtained. IRG received applications for 1,900

projects totalling NZD136 billion (US\$79.3 billion) in response to the publication of the IRG's Q2 2020 report. The IRG selected 246 projects for financing, with each project receiving a total of NZD2.6 billion (US\$1.5 billion) as support from the government. The combined estimated value of the projects was NZD4.7 billion (US\$2.7 billion) (Construction in New Zealand H1, 2021).

The industry is expected to grow by an average of 3.6 per cent per year during the five years (2022-2025), due to the rising investment in infrastructure, the financial sector, and the renewable energy initiatives. During the 2021 Wellbeing Budget released in May, Grant Robertson, the Finance Minister of New Zealand, indicated that infrastructure investment between 2021 and 2025 will reach NZD57.3 billion (US\$41.2 billion). The New Zealand Transport Agency, which accounts for a quarter of the total, will spend NZD13.9 billion (US\$10 billion) on public transport and roads. Aside from that, the government has committed a total of NZD4.7 billion (US\$3.4 billion) to healthcare, as well as an extra NZD746.8 million (US\$537.2 million) in capital spending on education, which will be spread over a period of four years (BDO, 2021). These construction project plans will be integrated with Green Investment Finance to achieve the country's 2035 objective of 100 per cent renewable energy usage (Construction in New Zealand H1, 2021).

For example, one of the city councils in New Zealand, Palmerston North continues to expand and develop into a top regional city in New Zealand. The concept of 'Small city advantages, Big city ambition' was included in its most recent 10-year plan published in 2018. This audacious goal aims to create a sustainable eco-city with a developing, innovative, sustainable economy and a lively regional destination that is creative, comfortable, well-linked, and safe (BDO, 2021). One of the council's most important responsibilities is the provision of infrastructure for the city. This includes transportation, stormwater management, wastewater treatment, real estate, and recreational assets. All these factors contribute to achieving economic, social, cultural, and environmental well-being. The overall replacement cost of this infrastructure is estimated to be around \$2 billion. However, infrastructure is expensive to maintain, with maintenance costs approximately \$21 million each year. The government acknowledges the need to spend more money maintaining and updating infrastructure to continue providing the day-to-day services that people demand. Over the subsequent several years, the government has proposed to step up the renovation and maintenance efforts (Construction in New Zealand H1, 2021).

There are specific gaps in the council's information concerning the status of its assets. Therefore, rather than having unique knowledge of the assets, the increased expenditure on renewals and maintenance has been based on the age of the asset and industry's best practices rather than on the assets themselves. Councils are focusing more on gaining a more profound knowledge of the state of their communities. The city needs to submit a resource consent application for a new wastewater treatment facility by June 2022 to receive approval. This is included in the 10-year plan at the cost of \$350 million (plus inflation). It is the most significant financial and environmental choice the city will make in its history (Construction in New Zealand H1, 2021). Councils are responsible for managing drinking water, wastewater, and urban stormwater. According to a three-year initiative to restructure local government, three waters service delivery arrangements were designed to bring about improvements. The government proposed the establishment of a limited number of multi-regional bodies to control water and wastewater (the approach to stormwater is yet to be decided). This would have a positive impact on who would be in charge of developing, financing, and operating the new wastewater treatment plant, as well as who would be in charge of upgrading and maintaining water infrastructure. The city possesses assets, with a replacement value of around \$2 billion, which are sufficient to accommodate significant population development. Upon increasing its investment in asset management planning, the council has improved the condition evaluations of its infrastructure assets over the last few years. After considering the available information, the council has determined that it needs to increase its asset maintenance and renewal spending.

The council also decided to reduce its budgeted operating expenditure for 2020/21 while increasing rates by 1.95 per cent rather than the 4.4 per cent increase proposed initially in recognition of the potential loss of income from a range of services, considering that many people in the community may have uncertain income as a result of Covid-19. The result is that the council must make up for a lost time by increasing its operational expenditure allocations for various programmes and initiatives (Construction in New Zealand H1, 2021). Assuming that the statewide lockdown will not be repeated and that supply lines for goods and services will stay open, the 10-Year Plan was developed. There are more and more examples of international interruptions to these channels. The result is that commodities are either unavailable when needed or, if they are accessible, the cost (particularly the transportation component) would have escalated significantly.

4.2.2 Problems in New Zealand's Project Pipelines

The New Zealand government is committed to advancing the national economy. Several transformations have been developed and implemented to ensure the success of all infrastructure pipeline initiatives (Abdullah et al. 2010). These transformations, including pipeline initiatives in New Zealand, are no exception to the challenges that have been discussed previously (Castagnino et al., 2020). Many pipelines of projects have been identified as being behind schedule, over budget, and failing to meet specifications. Due to functional changes that occur throughout project execution, it is necessary to make revisions to the requirements and deliverables, resulting in increased costs and delays (Ramachandra and Rotimi, 2015). This study holds the view that cost growth is a crucial element of project performance since cost overruns are one of the most serious financing difficulties in the construction industry (Jatarona et al., 2016). Project execution failure has a detrimental effect on a country's economy since the outcomes of the pipeline of projects are substantial in nearly all other sectors, eventually leading to the misuse of public resources. The current condition of numerous project pipelines has been described as incomplete, over budget, without adherence to contract requirements, not functionally acceptable, and not fulfilling the necessary quality standards. Other projects in the pipeline are experiencing delays and not reaching specifications, and some are experiencing challenges with quality control and assurance (Sanni-Anibire et al., 2020).

As a result, some organisations are already incurring losses on projects where profits were anticipated. Others are making efforts to find a solution that allows them to win work without committing themselves to unquantifiable cost increases. Many already had a rethinking and modified how they negotiate and manage this risk for new projects, while others are still trying to find solutions. The industry has not yet come up with a workable answer (Jatarona et al., 2016). A second significant difficulty well-known and not specific to the construction industry is a severe scarcity of qualified workers to fill open positions (Yong and Mustaffa 2012). Significant increases in salaries and wages, as well as other measures, have been implemented by employers to try to keep their employees. However, these modifications do not result in the rapid production of more skilled labour that the sector solely requires.

The sector has responded quickly to these issues by rethinking and implementing new tactics. Procurement teams track individual shipment moves to keep track of their materials' location. They identify alternate providers if their current supplier cannot meet their needs. Materials are ordered and stored months before they are needed (Jelodar et al., 2021). Despite the new processes implemented to control project delays, the problems have become increasingly difficult to resolve. This will necessitate a rethink and revised contract conditions to ensure that risks are not unjustly borne by a party who has followed best practice processes but cannot obtain the materials required on time. Organisations must determine whether or not they will decline some forward work to maintain current activity levels and manage their workforce within their capacity to do so effectively (Shahzad et al., 2021). Alternatively, by taking on new projects, businesses suffer the danger of not finding enough qualified employees to manage and complete such projects correctly, resulting in financial losses. The combination of factors such as material delays, inflation, and the inability of all project experts to secure the required staff resources might have influenced growth and resulted in losses.

4.3 Research Materials and Methods

The data needed for this research was gathered methodically from reliable sources. The information was obtained from many databases, such as Scopus, Web of Science, and Google scholar. A description of the delay in construction projects literature is provided in this study. This article used qualitative and analytic techniques in gathering, processing, and evaluating the data. Study's objectives were met through content analysis techniques (Fauzi, 2019) because it is easy to use content analysis to detect the existence of specific keywords, ideas, or a set of texts in a manuscript. In this particular study, a four-step technique that adhered to a similar methodology was utilized. These steps included identifying the data, filtering the original data, determining eligibility, and finally including the data. The collection of this data is necessary to give insight and future directions for research (Fahimnia et al., 2015; Malviya and Kant, 2015). Data was collected in conjunction with the issues that arose during the execution of various project pipelines.

In addition, researchers have proposed a systematic and objective technique that may be replicated, namely, the approach outlined to lower project pipelines' risks and issues. In the opinion of Tranfield et al. (2003), examining literature may be essential to any research involving human subjects. Researchers conducted mapping and analysis of significant problems that need to

be explored, resulting in the production of questions contributing to the improvement of the pipeline of projects in New Zealand. By using prior research, the current reality may be improved upon and better prepared for in the near future (Webster and Watson, 2002). For the long-term benefit of those using this research as a strategic model in guiding project pipelines, it is essential to use the gaps discovered through this literature review to provide insights and direction (Moshood et al., 2020). The research serves as a source of insights and direction for those who would use the study as a strategic model to guide the pipeline of projects (Tranfield et al., 2003). Therefore, the ATLAS.ti 9 software package was considered adequate for storing, categorizing, and evaluating evidence in this study (Moshood et al., 2021). It is regarded as a powerful workbench for qualitative analysis where large bodies of textual and graphical data are involved.

4.4 Results and Discussion

Identifying the challenges in New Zealand's infrastructure pipelines necessitated the use of keywords found in the reasons for the delays. Furthermore, any thoughts or words from papers that are relevant to this topic were recorded and documented in detail. For each project pipeline, several variables were taken into consideration, such as the initial contract amount, the contract extension cost, the beginning and ending dates, the construction phase time frame, and the final completion time frame, as well as the factors that may have caused the construction project's delay. Afterwards, these elements were investigated and categorized according to the phases and stages that led to the failure of the pipelines in New Zealand. The variables that caused problems in the pipeline of building projects in New Zealand are summarised in Figure 4.1.

Consequently, among other things, the government must take necessary steps to ensure that previous errors are not made in subsequent projects. As a reminder, the difficulty indicated above is similar to the problem that pipelines are experiencing right now (Radman et al., 2021). Furthermore, the same issues continue to arise in practically every public initiative, despite efforts to address them (Jatarona et al., 2016). This indicates that New Zealand has not drawn any conclusions from her previous experience. The implications of these issues for New Zealand and taxpayers must be considered since they will ultimately bear the resultant brunt of the late delivery of project pipelines.

Product shortages and severe inflation in both material costs and labour are among the most serious concerns identified in the 2021 study. Notably, there has been supply shortages; we are witnessing an increase in construction companies buying goods before they are needed and hoarding them (Jatarona et al., 2016). For those who can obtain the materials, this is advantageous. Still, it makes life more difficult for others who cannot, and the ensuing imbalance in supply contributes to the problem, thus driving inflation even higher (Shahzad et al., 2021). Most contracts have fixed pricing, and the inflation rate has surpassed estimates, causing gross margins to be severely eroded (Radman et al., 2021).

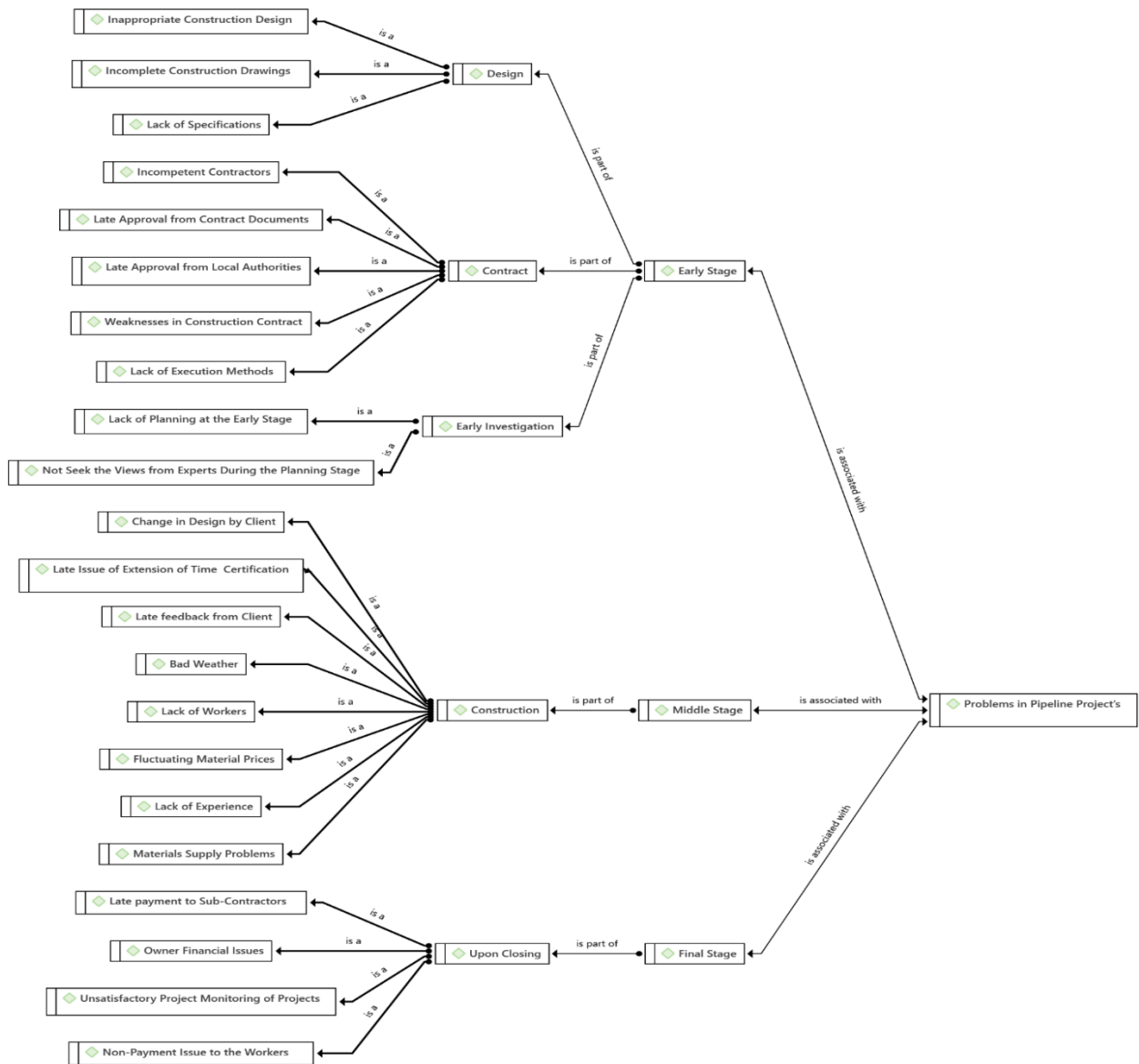


Figure 4.1: Atlas.Ti 9 Classification of Construction Project Pipelines in Line With Project Phases

The construction industry's performance, particularly in public construction projects, has long been questioned. Several suggestions for improvement have included the preparation of proper project plans, the identification of project requirements from users and authorities before

beginning work on projects, and the assurance that the committee has approved 'amendments to work' guidelines before work begins or before payments are made, and the expansion of the committee's supervision and monitoring of work on construction projects. Additionally, it is said to have struggled with several other issues, such as a delayed approval for an extension of time (EOT), insufficient specific requirements and drawings, and modifications made by the owner at the same time the project was being carried out. Figure 4.2 depicts pipeline of construction projects' four most important challenges and concerns.

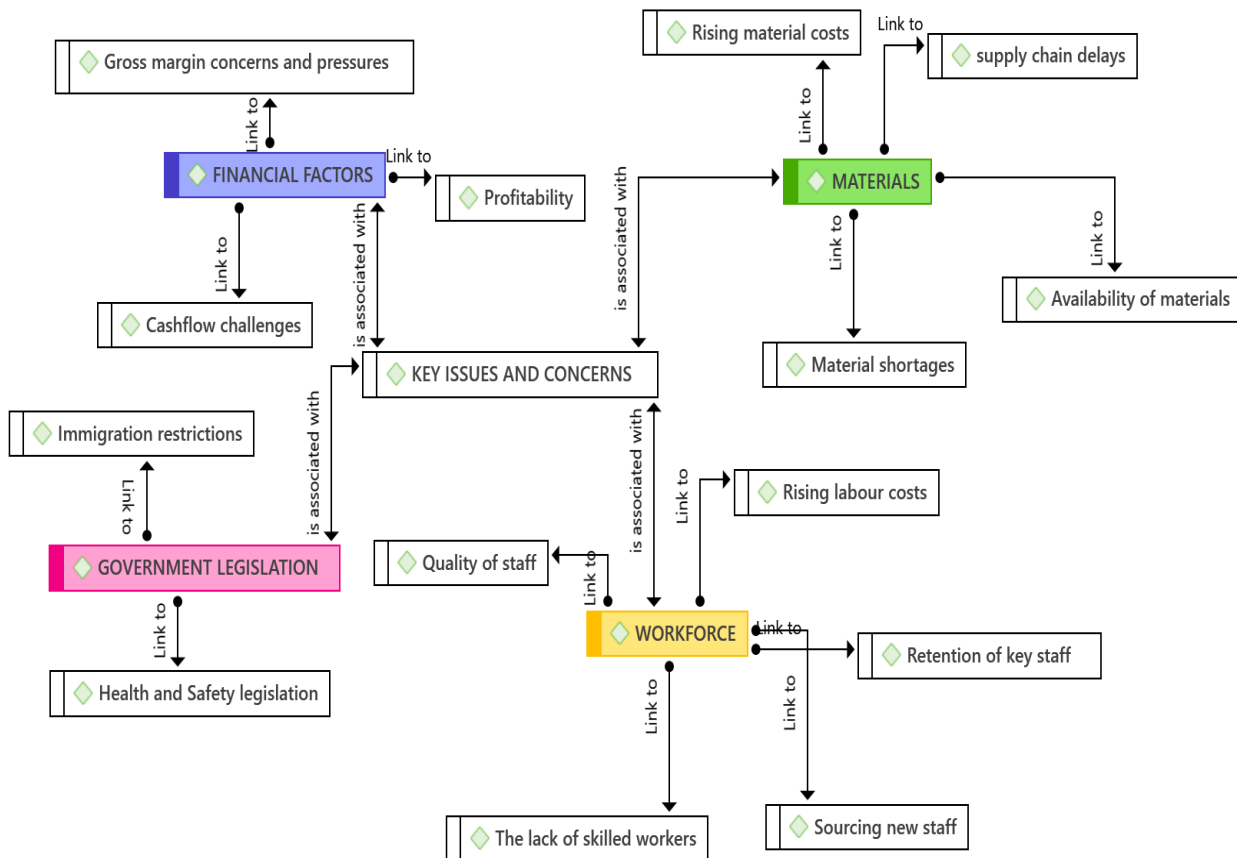


Figure 4.2: Four Priority Areas

To date, there have only been a few studies to date that have examined the general issue faced by public construction projects around the world. One of such studies by Yong and Mustaffa (2012) re-examined a construction project in Malaysia. Yet that research was focused on private

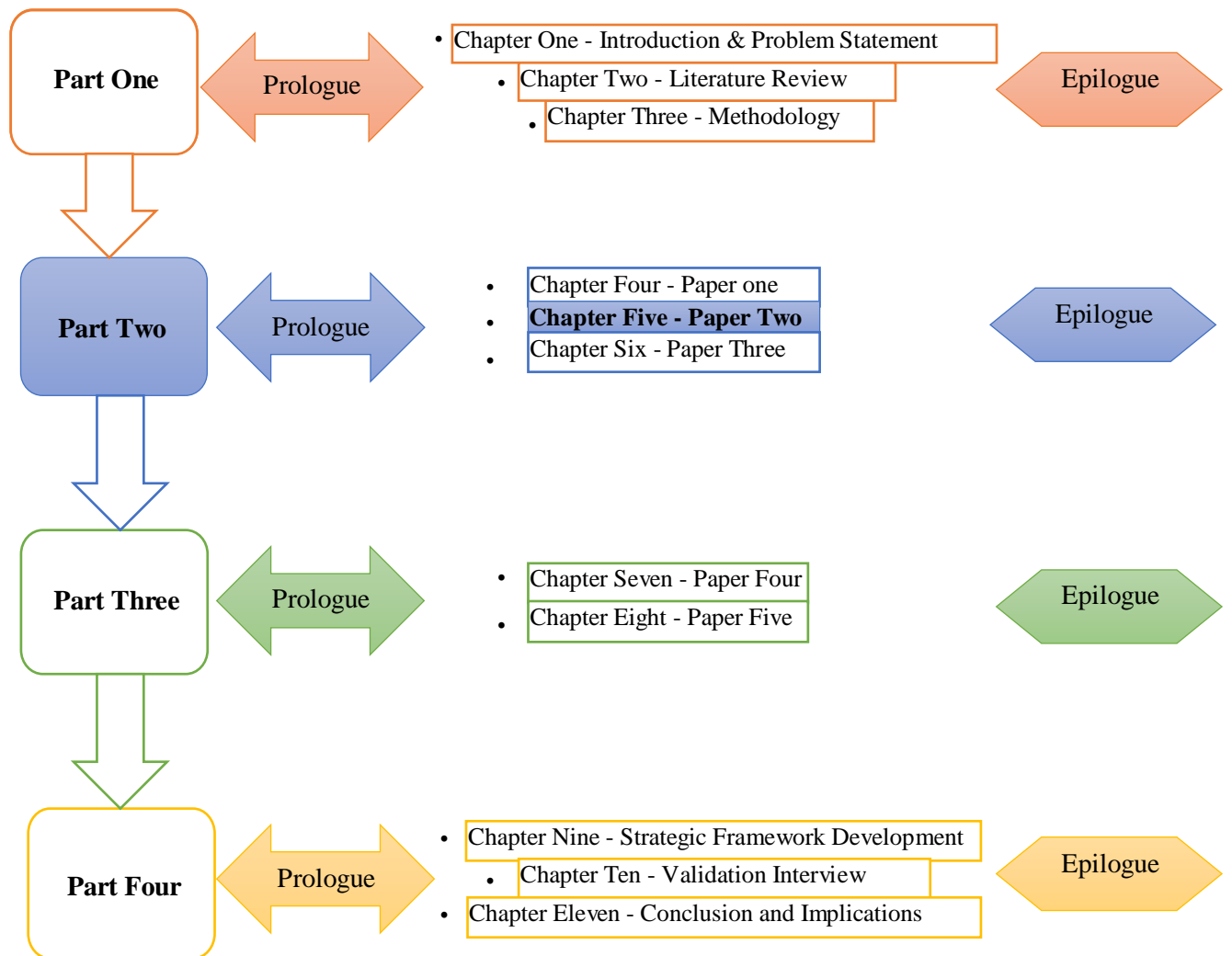
industry rather than public organisations. Other studies, such as those by Wei (2010) and Sambasivan and Soon (2007), concentrated on problem-related issues in the construction sector, such as delays, cost overruns, and labour productivity. In accordance with previously published findings, the data from these early results indicate that construction project pipelines in New Zealand are experiencing underperformance issues.

Therefore, this article emphasises the factors that caused construction project pipelines in New Zealand to perform below expectations. It hopes to serve as the basis for future studies attempting to address the poor performance difficulties associated with pipeline construction projects in New Zealand. It is important to remember that the factors that have been identified are critical factors that must be focused on and controlled because they have the potential to cause a larger problem in the construction industry in general, and in New Zealand in particular. This situation is supposed to serve as a reminder to those involved in construction project pipelines in New Zealand.

4.5 Conclusion

Findings from this study have established that pipelines have been plagued by low performance as a result of delays, poor planning, and poor quality. The recurrence of the issues throughout this report suggests that no investigation or attempt has been made to discover the underlying reason for the challenges. If this situation persists in the sector, it will lead to low quality of public projects. Furthermore, several low-performance factors that should be addressed during each phase of the construction process were identified as follows: preliminary research, early investigation/contract/design/closing phase/construction, and after-closing phase. It is vital for professionals working in the construction sector to quickly address the factors causing low performance before they become uncontrollable in the construction industry. The end-users of the various structures will undoubtedly bear the consequences of poor construction. It is very clear that if construction projects are not properly built and completed at the right time, the public could become upset because they do not enjoy the facilities paid for through taxes. For this reason, there is high possibility that this situation may result in the public's distrust in government's construction companies because of their inability to properly and effectively manage the country's construction sector, thus denting its image.

In order to prevent this from happening, the government must resolve any issues that may have a negative impact on its reputation. It is therefore recommended that practicable steps be taken to deal with all the identified problems so as to drastically reduce the possible factors that are having a negative impact on the operation of pipelines. In the process of constructing public structures, it is very important for the New Zealand government to ensure that her development policy or strategies regarding infrastructure provision are properly monitored and effectively carried out. Based on the findings and analysis of this study, it is obvious that future research could focus on creating strategies for a process model that can be utilized and implemented in all economic sectors, including the construction industry.



CHAPTER 5

PAPER 2

5.0 EXAMINING INFRASTRUCTURE PIPELINES INFORMATION FOR THEIR RELEVANCE IN CONSTRUCTION ORGANISATIONS' STRATEGIC DECISION-MAKING

This chapter is based on the following published Book Chapter:

Moshood, T. D., Rotimi, J. O. B., & Shahzad, W. (2023). Examining Infrastructure Pipelines Information for Their Relevance in Construction Organisations' Strategic Decision-Making. In *International Conference on Engineering, Project, and Production Management* (pp. 173-195). Cham: Springer Nature Switzerland.

Abstract: The construction industry in New Zealand is a vital contributor to the nation's economic growth, employment, and business expansion. However, to align with the government's objectives of affordable, secure, and sustainable housing and infrastructure, the industry must adeptly navigate the uncertainties in infrastructure pipelines. Infrastructure pipeline information is crucial in guiding construction stakeholders and the government in making strategic decisions about when, where, and how to invest in projects across New Zealand. This research investigates the significance of infrastructure pipeline information in strategic decision-making within construction project management. Furthermore, the study conducts a content analysis of 97 relevant papers from Scopus, utilizing the ATLAS.ti 9 tool to construct a model of infrastructure pipelines and strategic decision-making. The findings emphasise construction stakeholders' challenges in acquiring high-quality information for decision-making and underscore the critical importance of information quality. The research suggests that individuals at all levels should recognize and take responsibility for improving and maintaining information quality, ultimately enhancing decision-making capabilities. By implementing this recommendation, organisations can

achieve operational efficiency and cost reduction, leading to substantial benefits for the construction industry.

5.1 Introduction

The construction industry in New Zealand helps to expand the nation's economy by boosting GDP (gross domestic product) per person, generating jobs, and fostering company growth (MBIE, 2022). In 2019, the construction industry contributed 6.7% to New Zealand's GDP, and in the first quarter of 2021, it employed more than 170,000 people (Granwal, 2021). The industry has raised its goals to satisfy the government's desire for housing and infrastructure that are secure, cheap, healthy, and sustainable (Salesa, J., & Reidy, 2019). The government gives the construction industry special priority and wants to boost its capacity (TEC, 2021). Improving the power and capabilities of the construction sector creates opportunities for investment and infrastructural advancements while increasing the sector's activities (Noktehdan et al., 2015). Construction business performance requires improving the quality of information to decide on a project, productivity, workforce, risk management, and ensuring value for money (Salesa, J., & Reidy, 2019). However, the instability of the construction sector may depend on infrastructure pipeline uncertainties and strategic decision-making. The information provided by infrastructure pipelines assists in the creation of a forward view of projects, guides the construction industry, the government, and stakeholders, including contractors, and answers questions regarding when, how, where, and at what cost investments will be made within New Zealand so that the construction industry can deliver on those investments. A consistent and dependable infrastructure pipeline may be developed by investigating when, how, and where investments are made, as well as the total amount.

The construction industry is subject to increased stress and risk due to the unpredictability surrounding the information and strategic decision-making process regarding the delivery of significant pipes (T. Tan et al., 2021). Every day, choices are made about a building project, beginning with the tendering phase, and continuing through the closing process. In the construction industry, decision-makers are tasked with creating a wide variety of choices, including whether or not to accept a project, the type of technical solution to be implemented, the amount of risk reserve to be considered concerning cost and schedule, whether or not to perform in-house construction or to subcontract it out, whether to make or buy, lease or rent, which supplier to buy from, which

person to hire, and a multitude of other choices, as well as hundreds of different options (Souza et al., 2020). In order for the person to have the best chance of making the best choice, they should have access to all of the relevant information, including the facts, the repercussions, and the predictions of the decision (Peters et al., 2020). On the other hand, the quality of the information that stakeholders get in the decision-making process might increase the likelihood of achieving desirable results. This does not, however, imply that the outcome of the choice will be exactly as anticipated (X. Yin et al., 2019).

However, the relevance of pipeline data in making strategic decisions needs to be examined to guarantee that the data and information provided are accurate, comprehensive, and presented in a timely manner (L. Li et al., 2022). Many researchers have concluded that executives make strategic decisions by following a methodical process that requires careful consideration of the circumstances, alternatives, and consequences (Charles L Citroen, 2011). This strategy is referred to as a "rational process." Despite this, strategic decision-making necessitates taking into account a variety of additional contextual viewpoints, including those of top management (a choice that may be strategic or managerial), decision-specific features, environmental determinism (environmental characteristics), and organisational characteristics (Elbanna et al., 2020). Executives must have access to information that is both accurate and pertinent for them to be able to make informed judgments on the company's strategic direction.

This information may be obtained by collecting and examining data from various sources using infrastructure pipeline data. By utilising this data, executives can obtain insights into market trends, client behaviour, and operational efficiency, which may inform their decision-making process (Elbanna et al., 2020). The research indicates that information plays a significant part in making strategic decisions and that data on infrastructure pipelines may efficiently convey this information to decision-makers. On the other hand, aspects of the function of information in the decision-making process receive very little attention in management research. As a result, the purpose of this research is to assess the infrastructure pipelines projects and identify the influence the information quality on strategic decision-making within the context of pipeline construction project management.

5.2 Methodology

In order to facilitate the analysis and screening of the collected studies, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) procedure is employed (Moher et al., 2009). The PRISMA process flow, consisting of four sequential steps, is illustrated in Figure 1. This study meets the criteria for a systematic review (Saieg et al., 2018). A scientific procedure that can be replicated, known as a systematic review, is used to locate, select, and assess all published research pertinent to a given quality level (Booth & Papaioannou, 2012). One of the benefits of utilizing this methodology is that it makes it possible to research a specific area using a more logical and standardized technical approach (S. Li et al., 2020). As a result, the results can be presented to readers objectively and transparently (Jesson et al., 2011). There are some problems with the technique. Because journals tend to publish publications with findings that have a substantial influence, valuable studies with outcomes that are not significant, as well as articles written in a language other than English, will be overlooked (S. Li et al., 2020). Following the technique for conducting a systematic literature review presented in Figure 5.1, the articles found were subjected to screening, filtration, and validation to determine whether or not they should be included in the analysis.

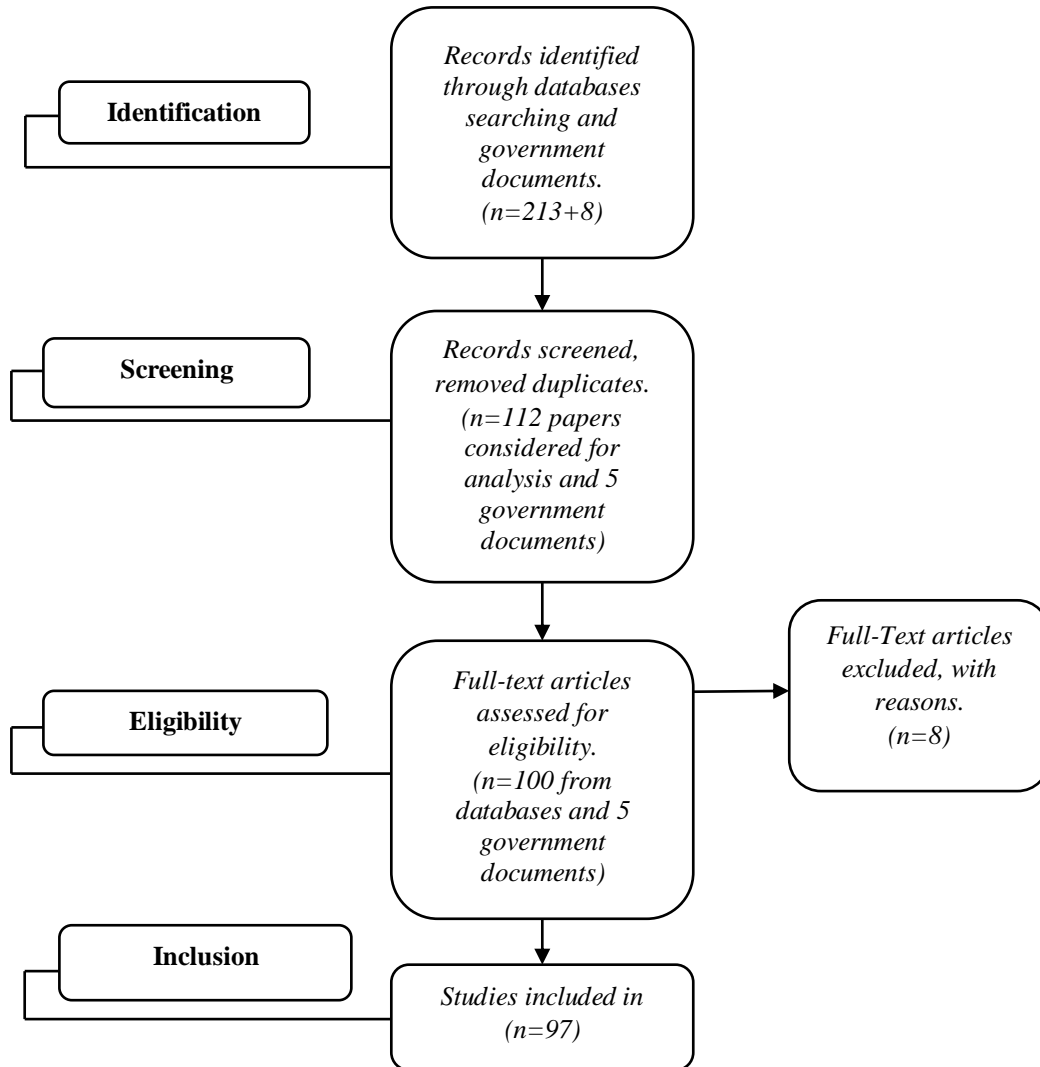


Figure 5.1: Methodology Framework

Following the prescribed guidelines for conducting a systematic review (S. Li et al., 2020; Saieg et al., 2018), this study employs a rigorous methodology to assess a specific quality and quantity of research on the topic of infrastructure pipelines—a critical information aspect for construction companies in strategic decision-making. The review provides readers with an unbiased, transparent, and standardized technical roadmap, outlining database selection, study retrieval, and criteria for selecting target studies. Furthermore, this systematic approach is designed to be replicable and updatable. The key components of this systematic strategy include: (1) formulating a research question; (2) aggregating pertinent studies; (3) selecting and appraising

relevant research; (4) performing a content analysis of the chosen studies; and (5) summarizing the findings and presenting recommendations.

5.2.1 Search Strategy and the Selection of Studies

The researcher searched for relevant literature using the Scopus and Government documents. In addition, we want to address the concerns and examine infrastructure pipeline information for their relevance in strategic decision-making within New Zealand construction organisations. As a result, this research decided to use well-known datasets as the source databases. The database researcher chose to use Scopus because it is widely regarded as the one that houses the most abstracts and citations anywhere in the world. Scopus covers 15,000 journals published by 4000 publishers, including Elsevier, Emerald, Taylor and Francis, John Wiley, Springer Nature and EPPM (S. Li et al., 2020). They include sufficient and relevant literature in terms of number and quality to make them helpful in conducting a comprehensive review of the evolution of infrastructure pipelines for their relevance in strategic decision-making within construction organisations. Both "Strategic decision-making", "Information quality", and "Quality of information" were included in the titles of all scholarly publications published in reputable journals and relevant keywords.

Infrastructure pipelines undergo a thorough examination to assess their relevance in strategic decision-making within construction companies, covering various key stages. The assessment process is meticulously structured around segments focusing on Processes, Findings, and Discussion, allowing readers to track the data production process and comprehend the implications of the findings. The articles underwent a rigorous screening, filtering, and checking process, employing an iterative selection technique in line with the systematic literature review strategy presented, determining their inclusion in the study. To identify and conclude the aspects of information quality impacting decision-making processes, a meticulous elimination of duplicates, verification of eligibility based on abstracts, and a comprehensive review of the full content of outstanding papers were conducted in alignment with the study's objectives. Adhering to the systematic literature review guidelines, all 97 papers were individually examined and verified, leading to the decision to employ the ATLAS.ti 9 software for efficient organisation, categorization, and evaluation of the study material (Moshood et al., 2021). Recognized as a potent

tool for qualitative analysis, especially with extensive textual and graphical data, ATLAS.ti 9 facilitated the systematic review process. Duplicates were systematically removed, eligibility was validated through abstracts, and the entirety of exceptional articles was assessed against research concerns to determine the suitability of infrastructure pipeline information for strategic decision-making within the investigated construction organisations. Employing a systematic literature review approach, all 97 articles underwent meticulous evaluation and were confirmed as authentic.

5.3 Literature Review

5.3.1 Overview of Infrastructure Project Pipelines in New Zealand

Over the years, the New Zealand government has significantly emphasised infrastructure development, residential construction, and non-residential building projects. The project pipelines in the country are categorized into three main types: public projects, private projects, and public-private projects (Scott, 2021). Each project owner determines the payment method, contract nature, and level of risk expected for contractors or suppliers involved. The construction project pipelines information describes and analyses all large-scale project pipelines and spending across New Zealand's regions (MBIE, 2022). The analysis includes details on the planned project spending type, the timing and value of significant projects, and a regional element of project spending (National Construction Pipeline Report, 2022b). The project pipelines data is specific information and statistics related to the various projects within a pipeline. It includes a range of data points relevant to the planning, project descriptions, implementation, timelines, project value, location, and monitoring of the projects. project pipelines create a forward view of all building and construction works (MBIE, 2022). Consistency in the project pipeline process is vital to establishing agreed-upon timelines, allocating team members to specific tasks, maintaining clear project statuses, and ensuring accurate project information (Luo & Shahzad, 2020).

The goal of construction project pipelines data encompasses a wide range of tasks, including strategic planning, investment scheduling, coordination of project execution, and collaboration between businesses and government entities (MBIE, 2022). Establishing a clear project pipeline is of utmost importance as it enhances awareness among government and industry stakeholders, providing valuable insights into potential projects and the required workforce and resources to complete specific tasks (Blair, 2019). Research conducted by Larsen et al., (2013)

further emphasises that effective project pipelines planning enables a comprehensive understanding of the project and its resource requirements while minimizing the likelihood of unexpected obstacles that may hinder or delay project completion.

Moreover, project pipelines facilitate the government and the construction sector in formulating future plans for timely and cost-effective project completion. They contribute to streamlining efficiency and offering precise insights into project forecasting and construction patterns (Christopher, 2018). Additionally, identifying and locating these projects can improve construction quality, productivity, and employment opportunities for both skilled and unskilled workers and provide valuable insights into the procurement process (MBIE, 2022).

Adopting a forward-looking approach to planning and project execution can result in an average profit margin increase of 23% for projects (Larsen et al., 2018) while concurrently reducing risks and enhancing quality. As highlighted by Leon et al., (2018), a well-organized project pipelines enables precise monitoring of project performance, ensuring that all project goals are achieved. Furthermore, forecasting project pipelines is pivotal in early monitoring and trend detection, enabling proactive decision-making to prevent anticipated project delivery delays (Christopher, 2018). Failure to prioritize the development of a highly skilled workforce that can effectively meet the demands of pipeline construction projects and quality of information, coupled with a lack of strategic decision-making in this domain, can result in an industry boom that lacks the essential knowledge and resources required for its sustainability (Amirmehdi, 2019). Without investing in workforce training and development, the industry may face a shortage of qualified personnel, hindering project execution and compromising overall quality. Furthermore, without strategic decision-making processes, the industry may struggle to anticipate and adapt to changing market dynamics, leading to inefficiencies, delays, and cost overruns (Tabish & Jha, 2011). It is crucial to recognize the significance of nurturing a skilled workforce and making informed decisions to ensure the long-term viability and success of the pipeline construction industry.

5.3.2 Sources of Infrastructure Project Pipelines Information in New Zealand

In New Zealand, various sources provide valuable information on ongoing and project pipelines. As illustrated in Table 5.1, these sources play a crucial role in capturing and disseminating project data.

Table 5.1: Sources of Infrastructure Project Pipelines Information

Organisations	Sources
Government Agencies	-Ministry of Business, Innovation, and Employment (MBIE) -New Zealand Transport Agency (NZTA) -Department of Conservation (DOC) -Ministry of Education (MOE)
Local Government	-City councils -Regional councils -District councils
Industry Associations	-Construction Industry Council (CIC) -Infrastructure New Zealand -Master Builders Association
Private Organisations	-Pacifecon NZ Ltd -Infometrics -Statistics New Zealand
Media Outlets	-Newspapers -Online news platforms -Industry-focused magazines

These sources collectively contribute to the availability of comprehensive information on ongoing and project pipelines in New Zealand. They are essential references for industry professionals, policymakers, investors, and the general public, informing them about current and upcoming projects, their scope, timelines, and the stakeholders involved (MBIE, 2022). It is worth noting that the accuracy and currency of project information may vary across different sources, and it is advisable to cross-reference multiple sources for a complete and up-to-date understanding of the project landscape. Therefore, New Zealand benefits from various sources providing project data, allowing stakeholders to access vital information on ongoing and project pipelines. The availability of such information fosters transparency, supports informed decision-making, and promotes collaboration among various parties involved in the construction and infrastructure sectors.

Each source of information on construction project pipelines in New Zealand offers distinct advantages and disadvantages based on the type of information provided. Coordinating and tracking all pipeline construction projects in the country is time-consuming, prompting the government to prioritize establishing reliable and accessible sources for project information (MBIE, 2022). However, it is essential to note that specific future construction projects may be politically classified or subject to regulatory time frame restrictions before public disclosure and publication. To enhance the availability of project information, the Ministry of Business, Innovation, and Employment (MBIE) commissioned Pacifecon (NZ) Ltd and BRANZ to produce the annual national construction pipeline report in 2021 (MBIE, 2022). Pacifecon (NZ) Ltd specializes in providing pipeline construction project data across non-residential, residential, and infrastructure constructions (Pacifecon, 2021).

Additionally, in 2019, the New Zealand government established the New Zealand Infrastructure Commission (NZIC), intending to ensure quality infrastructure investment to improve the construction sector's sustainable long-term economic performance and social well-being (The Treasury, 2019). The NZIC provides information about infrastructure pipeline construction projects, emphasizing certainty and project phasing details (NZIC, 2021). These initiatives by the government and the involvement of specialized organisations contribute to a more comprehensive and reliable information ecosystem for construction project pipelines in New Zealand. Stakeholders can access data from the national construction pipeline report, Pacifecon (NZ) Ltd, and the NZIC to obtain valuable insights into ongoing and upcoming projects across various sectors (Pacifecon, 2021). However, it is crucial to consider that the availability and accuracy of information may evolve, and cross-referencing multiple sources is advisable for a comprehensive understanding of the project landscape.

5.3.3 Strategy Management in Construction Industry

Defining strategy proves challenging due to its intricate nature encompassing various processes and activities within an organisation (Ng'andu, 2022). Bakar et al., (2011) offer a multifaceted perspective, presenting strategy as a plan, play, position, pattern, and perspectives. While each of these viewpoints contributes to understanding strategy, none is individually adequate to grasp its entirety. Scholars have sought to provide nuanced interpretations of the

concept, with Pamulu, (2010) defining it as the long-term direction and scope of an organisation, achieving advantages by configuring resources and competencies to meet stakeholder expectations in a dynamic environment. Tan et al., (2012) emphasises strategy as delineating objectives and providing a roadmap to achieve them. Mintzberg & Rose, (2003) conceptualize strategy as creating a distinctive and valuable position through a unique set of activities. Ng'andu, (2022) asserts that strategy involves aligning internal organisational characteristics with the external environment, emphasizing the development of core competencies and strengths to navigate threats and capitalize on opportunities (Dobrovič et al., 2018).

While these definitions offer clarity, the practical essence of any business strategy lies in an overarching plan of action defining the firm's competitive position (Ng'andu, 2022). Organisational strategy is often characterized as a deliberate set of actions aimed at attaining a competitive advantage, providing coherence and direction to the organisation (Ng'andu, 2022).

4.3.4 Levels of Strategy

There are three levels at which strategy is practised in organisations;

- Corporate levels
- Business strategies or Competitive strategies
- Functional strategy or Operational strategies.

Corporate strategy involves the structuring and management of business activities, encompassing the definition of the firm's overall mission and objectives. It plays a pivotal role in validating suggestions from organisation and functional levels and allocating resources based on strategic priorities (Hax, 2010). In the construction industry, corporate strategies like subcontracting and joint ventures (JVs) are instrumental for growth and business development (Afrifa et al., 2009). Joint ventures, particularly with established larger businesses, provide opportunities for construction companies to expand domestically and secure contracts through the bidding process that might be challenging to win independently (Adendorff et al., 2011). Diversification in the construction industry involves exploring related markets like property development, housing, building materials supply, plant and equipment hiring, and mechanical and electrical engineering. This strategic approach aims to enhance market presence and facilitate business expansion (Adendorff et al., 2011).

The second tier of strategic planning involves business strategy, which focuses on sustaining a competitive advantage within each strategic business unit (Nyariki, (2016). Coulter et al., (2008) explain that business strategies involve how an organisation competes within a specific industry, focusing on critical success factors and outperforming competitors (Nyariki, (2016). In construction, strategies include adopting generic approaches like cost leadership, differentiation, and focus. Adendorff et al., (2011) assert that a differentiation strategy is appropriate when a business can distinguish its products along valued attributes at a cost lower than the anticipated extra revenue. The goal is to make customers perceive the product's value as significantly exceeding its cost compared to other alternatives (Albert Ping Chuen Chan et al., 2017). This strategy aims to reduce the price sensitivity of the business's products, wherein customers prioritize factors other than price in their purchasing decisions (Adendorff et al., 2011).

The third level involves functional or operational strategy, as delineated by Ehlers & Lazenby (2004). Functional strategies encompass short-term goal-directed decisions and actions in various organisational functional areas, including marketing, operations, production, finance, and human resources. To bolster business and corporate strategy, the company must uphold a competitive strategy across each functional area (Silverio-Fernández et al., 2021). In the construction industry, an effective functional strategy involves a robust marketing campaign for products and services. Despite the available options for functional strategies in construction, choosing the most suitable approach remains challenging due to the unclear literature on the subject (Demirkesen & Ozorhon, 2017). Ehlers & Lazenby (2004) echo the complexity of strategy-making styles among owner-managers and entrepreneurs, emphasizing the tendency to prioritize aspects closest to home, such as competencies, capabilities, and resources (Ng'andu, 2022). This insight highlights the challenges inherent in deciding on the optimal strategy within the construction industry, given the dynamic landscape and diverse strategic options available.

- **Competencies:** Referring to activities that an organisation excels in, often deemed as 'core' competencies, these are the actions employees undertake to generate profit or establish a competitive advantage (Ng'andu, 2022).
- **Capabilities:** Collections of competencies systematically linked and synergized to yield strategic outcomes, competitive advantages, or superior profitability constitute capabilities (Ng'andu, 2022). In the construction industry, organisational capabilities often involve the

aggregation of competencies centered around specific skills or tasks, stemming from the entrepreneur's vision of the "right" core competence. This knowledge is then transferred to other staff members, contributing to the development of capabilities, the multiplication of which enhances profitability and growth (Demirkesen & Ozorhon, 2017).

- **Resources:** Tangible and increasingly intangible aspects of the organisation's infrastructure that support competencies and capabilities constitute resources. For burgeoning small businesses, effective resource management is crucial, as limited resources can impede the availability of necessary cash and assets for sustaining initial development (Ng'andu, 2022). Hence, guided by the resource-based view theory, the construction industry's strategy selection depends on the competencies, capabilities, and resources, both tangible and intangible, available to the owner and the organisation to some extent.

5.3.5 Infrastructure Pipelines Information as a Factor in Strategic Decision-Making

As the world becomes increasingly interconnected, businesses face a growing amount of data that they must analyse and interpret to make strategic decisions (G. Liu et al., 2022). One area where this is particularly important is infrastructure pipelines. This infrastructure pipeline information is critical for construction organisations, and their efficient operation can significantly impact a company's bottom line (Yu et al., 2022). Information's role in making strategic decisions is rarely acknowledged, discussed, or analysed as such in management research publications. This is likely because management information is viewed as an easily accessible production factor and is frequently "taken for granted" in studies on organisation performance (Belhadi et al., 2022).

In strategic decision-making, information input is often discussed in terms of considering factors like the business environment, internal and external issues, and changing conditions (Belay et al., 2022). However, the characteristics of information in strategic management, including its quality, sources, and actual use during decisions, are frequently overlooked (Parsamehr et al., 2023). Various scholars in information management, such as Galliers & Leidner, (2014); Coakes et al., (2010); Moshood et al., (2022); Payne & Frow, (2016), have explored the role of information in managerial choices.

According to Choo & Bontis, (2002)), an organisation operates as an open system that absorbs information from the external environment, transforming it into knowledge, processes, and structures to generate commodities or services. Information is strategically utilized for decision-making, knowledge creation, innovation, and understanding environmental changes (Fang et al., 2023). Pertinent information for strategic choices encompasses internal organisation dynamics, market structures, competitors, consumer attitudes, technology, legislation, public affairs, as well as best practices and trends in these areas (Al Hijji et al., 2018; Ch L Citroen & Hooghoff, 2003; Mahesworo et al., 2019; Moshood et al., 2022). Additionally, assessing market opportunities, threats, and risks is crucial. Formalized routines, as per Robert Baum & Wally, (2003), improve information flow across the organisation, expediting strategic decision-making. Yet, there's a need to balance information gathering costs and time against expected benefits to prevent diminishing returns and ensure efficient decision-making (Yu et al., 2022; Shamim et al., 2019).

5.3.6 Data/Information Needs and Strategic Decision-Making in the Construction Industry

Companies typically rely on the experience and intuition of their management when making decisions. This strategy hasn't worked well, especially when no digital form data is available (Xia et al., 2017). By failing to implement a new approach to analyse their underutilized fragmented data and produce meaningful information systematically, organisations risk losing their ability to compete in the market (Cheng, 2017). According to Lu et al., (2018), managers should aim to pursue informed and sensible judgments rather than entirely accurate ones. This indicates that decision-makers should be aware of their actions' facts, impacts, and implications, even if the final results are less favourable than anticipated. Additionally, Du et al., (2020) assert that three constraints are placed on judgments by the limited rationality theory, as illustrated in Figure 5.2. First, there is a lack of information regarding potential options and their effects, followed by a capacity issue with the information presented, and ultimately, there is a decision-making time issue.

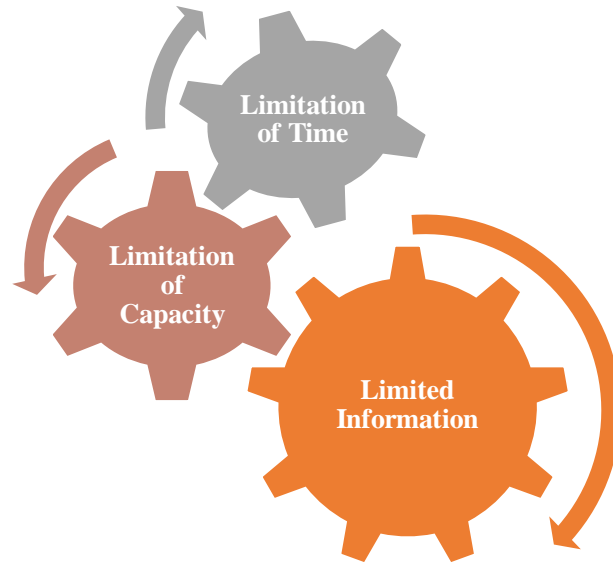


Figure 5.2: Constrained Rationality Theory

Considering the three restrictions, the bounded rationality theory logically describes how people make decisions in the actual world (Lorkowski & Kreinovich, 2018). The two types of rationality boundaries are external and internal, respectively, according to Herbert Simon's 1955 bounded rationality theory (Lorkowski et al., 2018a). The external constraint, or so-called uncertainty, arises from the imperfection of our knowledge of the outside world. This indicates that people don't use their free time, if they have it, to learn about all the factors that could impact their choices and results. Instead, they presumably receive the data that is thought to be the most pertinent for choosing a certain amount of time (Lorkowski & Kreinovich, 2018). The restrictions to compute and handle a lot of data are, on the other hand, internal limitations. Because of the temporal and internal cognitive constraints that characterize human reason, even if we know all relevant facts and inputs for a particular topic, we cannot process them all (Lorkowski et al., 2018b).

Moreover, the approach is influenced by both internal and external constraints. Marwala (2014) characterizes rational decision-making as "a process of making decisions based on relevant information in a logical, timely, and optimized manner." The process initiates with an examination of the decision-making context, proceeds to identify the necessary pertinent information, and culminates in a logical and coherent presentation of this information to the decision-maker

(Marwala, 2014). However, as Simon, (1991) argues that the three boundaries make a perfectly rational choice practically impossible, these limitations can only be partially overcome by utilizing cutting-edge information processing techniques (Marwala, 2014). When the boundaries of reason are enlarged in this situation, the theory of limited rationality is changed to the theory of flexibly bounded rationality.

5.3.7 Strategic Decision-Making Under Quality of Information

According to Chassiakos & Sakellaropoulos, (2008), the information and data created during the lifetime of construction projects become increasingly extensive in terms of volume and variety as the projects themselves get more complicated and more extensive. According to Kliuchnikova & Pobegaylov, (2016), as a result of this, it isn't easy to handle all of this information in an efficient and trustworthy manner. According to Chassiakos & Sakellaropoulos, (2008), one practical and effective strategy for overcoming this obstacle would be to use databases and other online information management technologies. According to Nisar et al., (2021), the decisions made by project leaders during all phases of the project, but particularly during the pre-construction phase, are seen as a crucial component in determining whether or not the project will be successful. According to Al Shobaki et al., (2016), managers should ensure that all of the relevant information is right and can offer the appropriate inputs to the decision-making process during these phases. This will help managers avoid potential risks and difficulties. It is common practice for businesses to defer to highly compensated managers who have amassed a wealth of expertise throughout their careers when it comes time to make choices about their operations (Cheng & Lok, 2015).

This is particularly true when data is unavailable or requires a significant investment to acquire in digital format. This method of decision management, which places reliance on the intuitive reasoning of leaders, has been demonstrated to be insufficient (Kliuchnikova & Pobegaylov, 2016). It is necessary to move toward making judgments based on facts to improve the quality of decisions and the pace at which they are made (Cheng & Lok, 2015). Consequently, the total performance will improve in the intermediate and long-term periods. According to Safa & Hill, (2019), having readily available and easy-to-understand data can make it more conceivable for construction leaders to uncover patterns, relations, and facts that could improve the steady

development of the project. According to Murphy & Seriki, (2021), management can know more about the current state of their company and take appropriate action based on the information they have gathered, linked, and analysed from raw data. According to Basar, (2018), big data analytics produce valuable information and knowledge, which can help humans make better decisions. According to Pan et al., (2012), businesses can transform the outcome of processing data into actionable information, knowledge, and ultimately wisdom when they use particular and automated procedures. Raw data can take the form of a numerical formula or simple facts, as illustrated in Figure 5.3. Information may be gleaned through the systematic analysis of this unstructured material. On the other hand, knowledge is produced via the justification of information.

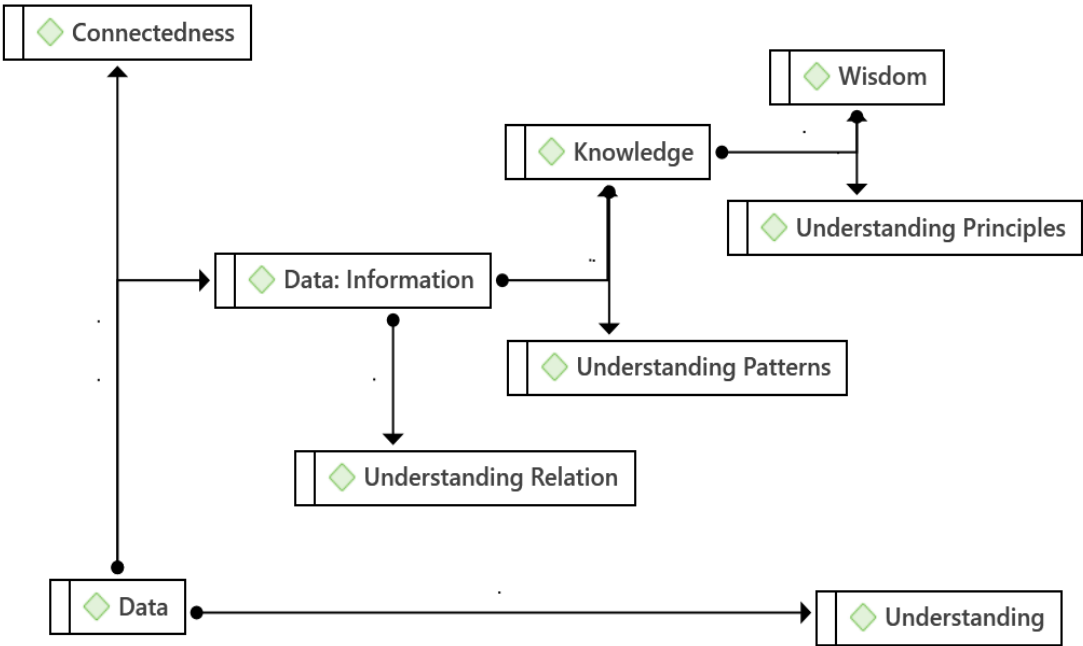


Figure 5.3: Data, Information, Knowledge, and Wisdom

In order to make intelligent judgments that are grounded in reality, one must have information that is accurate and up to date. According to ALnuaimi et al., (2015), an increasing number of businesses are moving away from an intuitive method of gathering strategic data in favour of a more comprehensive and systematic one. According to Cheng & Lok, (2015), digital facts-based systems make it possible to bring disparate and piecemeal services together under a

single Big Data platform. In this environment, managers get integrated reports that include both an overview of the work that has been performed and the current state of the task. Because of this, they are better equipped to make judgments based on reasonable considerations (Jing & Jin, 2009). In addition, Jansen et al., (2013) assert that businesses' ability to make decisions more expediently may be an essential aspect of their ability to benefit from market competition. According to Mutale et al., (2013), making decisions more quickly by delivering the appropriate data in the proper time and in the suitable format to the relevant decision-maker is possible.

5.3.8 Known Challenges in Quality of Information on Strategic Decision-Making

The infrastructure project pipelines are beset with data gaps, missing data, and inadequate information. The key information management problem for organisations is evaluating and enhancing data quality for strategic decision-making, and practitioners are very concerned about the quality of the data they deal with (D. Paulus et al., 2023). This study distinguishes between non-random systematic error (also known as bias) and random non-systematic error in scientific measures (Jato-Espino et al., 2014). Random mistakes might result from unanticipated and uncontrollable occurrences, noise in the measurement or data-gathering environment, or other factors. Systematic errors, often known as bias, can result from persistent structural issues that tilt a measurement in a particular direction (Vicente et al., 2015). Every measurement has random mistakes, which may be rectified by repeatedly using the same measurement strategy. Systematic mistakes (also known as biases) cannot be rectified using repeated measurement procedures since they do not change between measurements but remain consistently skewed (Eweje et al., 2012).

Given the unpredictable nature of random errors arising from operational constraints, shifting circumstances, technological glitches, and individual capabilities in data collection, it becomes essential to delineate between non-systematic and systematic errors (bias) to uphold the quality of information management (Kavale, 2012). Systematic bias can stem from underlying structural issues like historical, social, and political disparities or organisational and environmental (Jo & Gebru, 2020; Wollmann & Steiner, 2017). Biases have the potential to distort representations of social groupings, geographic regions, or concerns, impacting decision-making in both operational and strategic contexts within construction enterprises (D. Paulus et al., 2023). The

interplay between systematic and non-systematic data inaccuracies across various organisational levels is illustrated in Figure 5.4, indicating the profound impact on the system.

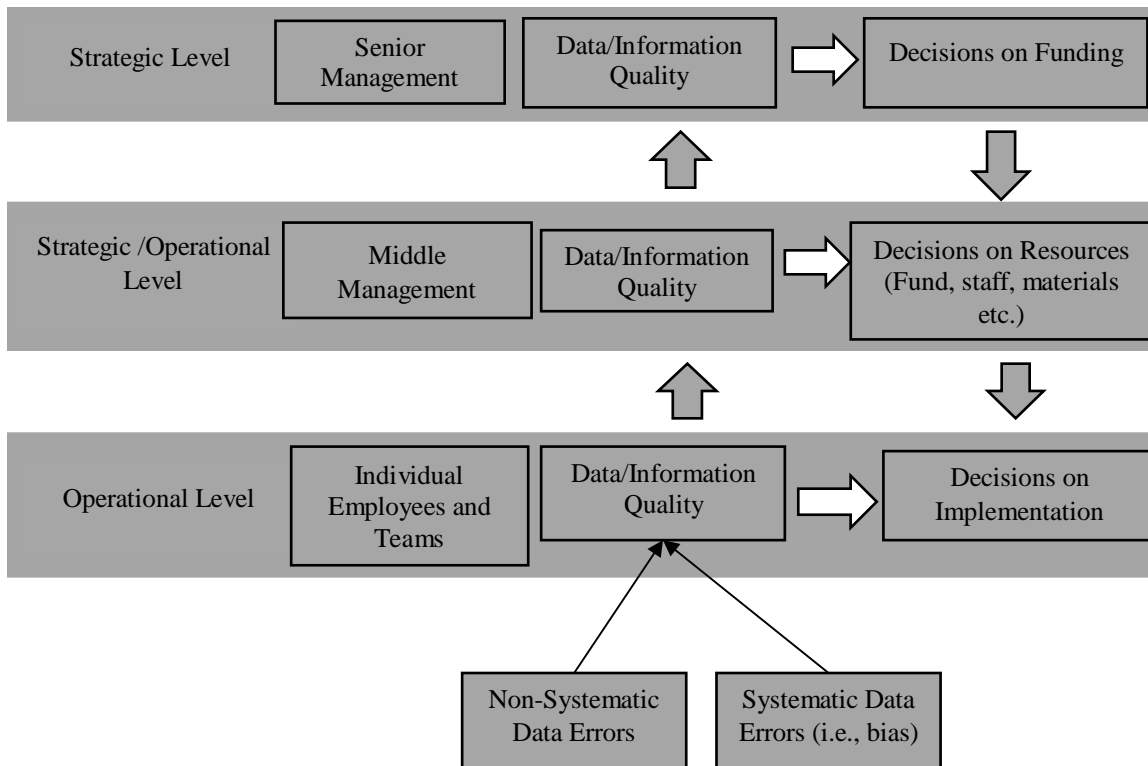


Figure 5.4: Information-Decision-Interdependences Within the Multi-Actor System

This study made a distinction between systematic and non-systematic data biases. Biases that cascade across the kind of data required to make decisions at various organisational levels can subtly influence how the data are understood throughout the system. This study addresses the need for a thorough knowledge of how information quality emerges in intricate strategic decision-making in construction organisations (Wollmann & Steiner, 2017). To the best of our knowledge, there hasn't been a thorough evaluation of data bias in strategic decision-making in construction organisations. In the past, researchers were primarily concerned with how much a model estimator deviated from the actual value of the estimated parameter in the real world when studying the quality of information (A. D. F. Price et al., 2003). The scientific discussion around information bias has grown dramatically with artificial intelligence and machine learning development.

In addition to computer science, sociology and the humanities are now studying the origins and effects of information bias more often due to deliberately skewed training data (S. Lee, 2017). In this study, the term "quality of information bias" characterizes datasets that, whether intentionally or unintentionally, deviate from the actual real-world phenomena they intend to represent. Biased datasets exhibit a "divergence between the true distribution and digitized input space" (Jo & Gebru, 2020). While prior research has identified factors influencing information quality, it hasn't explicitly linked these factors to potential biases that consistently impact information quality. Previously documented issues include format incompatibility, data shortage/overload, low information priority, source identification challenges, storage media-activity misalignment, unreliability, and unwillingness (Pushpamali et al., 2020; R. J. Yang et al., 2014).

According to Bharosa et al., (2010), organisations face difficulties sharing information since they are eager to gather knowledge but fail to share it with actors who need it. According to Schwendimann, (2011), access restrictions brought on by political and bureaucratic involvement, security and safety concerns, and capacity limitations impede data collecting. To address challenges related to information uncertainty, ambiguity, and time constraints, Wolbers et al., (2018) delved into the concept of information delays and breakdowns, emphasizing the utility of fragmentation as a crisis-coordinating method. Comes et al., (2020) underscored the fragmented nature of dynamic organisational networks, wherein data exchange occurs primarily among organisations within specific sub-networks, neglecting potential benefits from sharing information with entities outside these networks.

5.4 Discussion

The study highlighted the indispensable role of infrastructure pipeline information in shaping strategic decision-making within the construction industry, particularly within the unique context of New Zealand's economy. New Zealand's construction industry stands as a linchpin in propelling the nation's economic engine. It yields a substantial contribution to the country's GDP and offers a plethora of employment opportunities. These endeavours align harmoniously with the government's overarching objectives, which encompass the promotion of secure, affordable, sustainable, and healthful housing and infrastructure for its citizens. Evidencing its unwavering commitment, the New Zealand government prioritises the construction sector, granting it a

distinctive and priority status. This strategic focus aims to bolster the industry's capacity and facilitate infrastructural progress, consequently fostering lucrative investment prospects and driving robust economic growth.

Nevertheless, amidst its significant stature, the construction sector grapples with inherent instability, primarily attributed to uncertainties surrounding infrastructure pipeline information and the intricacies of strategic decision-making. Within the realm of construction, decision-makers are confronted with a multitude of intricate choices, and the calibre of information they access undeniably wields substantial sway over the outcomes of these pivotal determinations. At the heart of this intricate dynamic lies infrastructure pipeline data, a veritable compass that provides a forward-looking perspective on projects. This indispensable resource acts as a guiding light for stakeholders across the construction spectrum, including government bodies and dedicated contractors. This data is the key to unravelling critical inquiries pertaining to project timing, location, budgetary considerations, and the scope of investments within New Zealand's diverse landscape.

Strategic decision-making within this industry emerges as a multifaceted and intricate process. It fuses rational and contextual elements, with the rational facet entailing meticulous scrutiny of circumstances, alternatives, and their repercussions. Concurrently, the contextual dimension considers top management's insights, decision-specific intricacies, environmental determinants, and the quirks of organisational characteristics. The quality of information serves as the lynchpin of sagacious strategic decision-making. Infrastructure pipeline data is a trove of insights into market trends, consumer behaviour, and operational efficiencies within this construct. Such data empowers decision-makers to embark on well-informed journeys, even when pursuing absolute accuracy remains a formidable challenge in today's rapidly evolving digital landscape. The construction sector employs a triad of strategic tiers encompassing corporate, business, and functional strategies. Corporate strategies delineate the overarching mission and objectives of the organisation, while business strategies are tailored to secure competitive supremacy within specific markets. Concurrently, functional strategies are oriented towards steering short-term decisions across diverse functional domains, encompassing marketing, operations, and finance. These strategic choices pivot on the bedrock of competencies, capabilities, and the available resource

arsenal within the organisation. These integral components collectively shape the trajectory of strategic vision within the construction industry.

In today's digital epoch, data-driven decision-making ascends in prominence as a transformative imperative. Construction enterprises must harness data to illuminate their decision-making path, even amidst the inherent complexities that accompany the pursuit of absolute precision. Data access unveils invaluable patterns and empirical insights that propel project development and overall performance. Regrettably, infrastructure project pipelines grapple with data voids, absent information, and lacunae within their datasets. Distinguishing between systematic and non-systematic errors (commonly termed bias) within these datasets emerges as a pivotal facet of information management. Systematic biases, rooted in structural and contextual anomalies, exert profound and far-reaching ramifications on decision-making, thereby necessitating vigilant redress. The pivotal role of information quality reverberates across the organisational echelons, governing decisions ranging from everyday operational choices to the formulation of overarching strategic blueprints. Acknowledging and rectifying data biases emerges as a non-negotiable imperative, ensuring that decisions are grounded in wisdom and accord with the hallowed goals of the organisation.

Therefore, infrastructure pipeline information stands as the bedrock upon which strategic decision-making in the construction industry is anchored. The accessibility and quality of data wield profound influence, shaping the trajectory of the industry's growth and its resonating impact on New Zealand's robust economy. As we navigate this dynamic landscape, the profound recognition of the criticality of accurate, timely, and comprehensive information reverberates as the cornerstone of long-term success and sustainability in New Zealand's construction landscape.

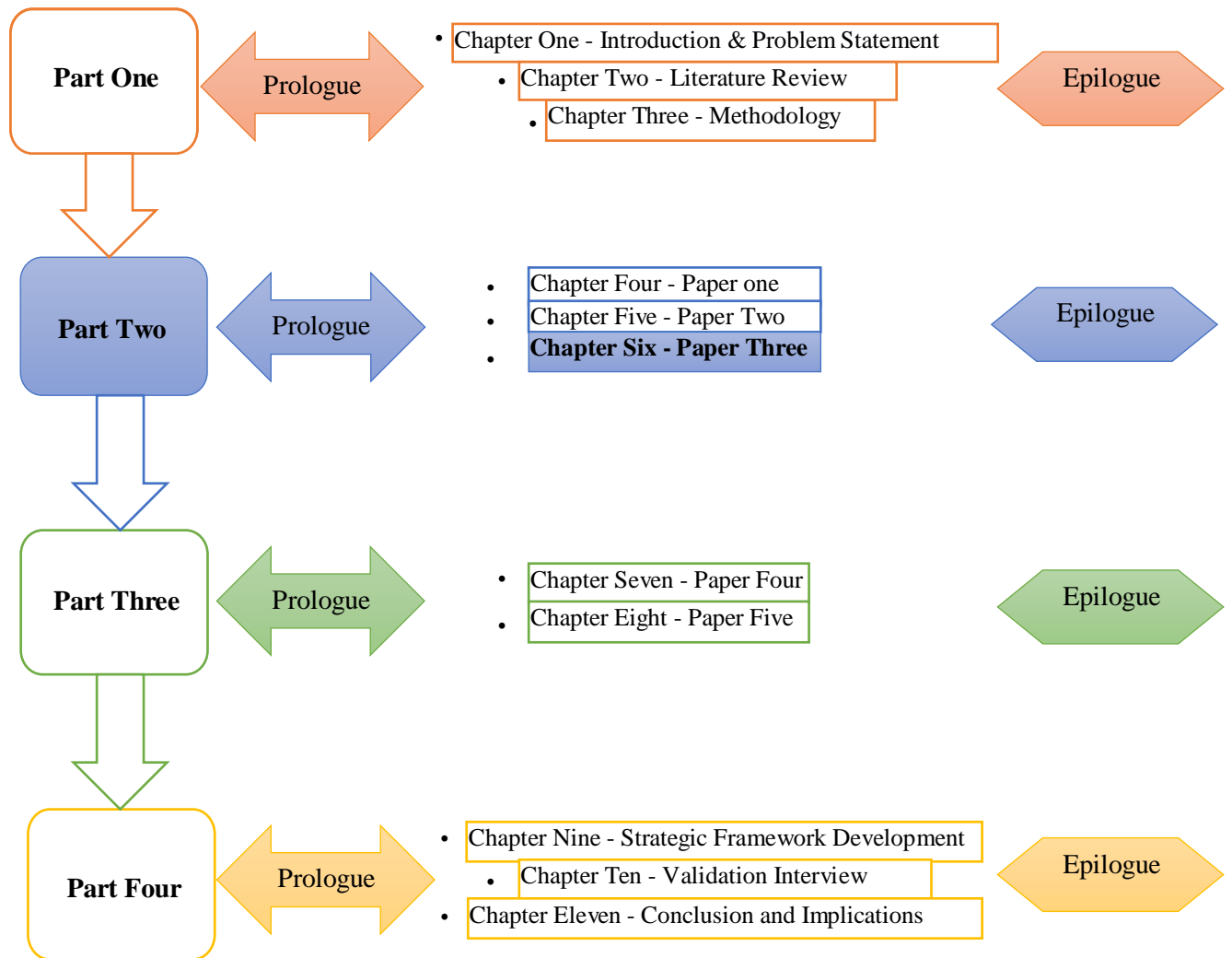
5.5 Conclusion

In conclusion, infrastructure pipelines play a crucial role in the strategic decision-making process of construction organisations. However, pipeline data's relevance in decision-making must be examined to ensure accuracy, completeness, and timeliness. This study has presented insights for improving infrastructure pipeline data and their significance in strategic decision-making, incorporating insights from a literature review, content analysis of articles, and interviews with construction firm executives in New Zealand. The construction industry in New Zealand is a

significant contributor to the nation's economy, boosting GDP per person, generating jobs, and supporting company growth. It is essential to improve the capacity and capabilities of the construction sector to meet the government's goals for secure, affordable, healthy, and sustainable housing and infrastructure.

The quality of information plays a vital role in strategic decision-making, and infrastructure pipelines provide valuable data that informs decision-makers about market trends, client behaviour, and operational efficiency. The research indicates that information from infrastructure pipelines can effectively support the decision-making process, but its function in decision-making requires more attention in management research. Companies often rely on the experience and intuition of their management for decision-making, but this approach may be insufficient, particularly when dealing with fragmented or underutilized data. Organisations must adopt strategies to systematically analyse their data and derive meaningful information to enhance their competitive advantage. The infrastructure project pipelines face challenges such as data gaps, missing data, and inadequate information. Ensuring data quality for strategic decision-making is a critical concern, and practitioners are highly aware of the importance of data quality. It is necessary to differentiate between random and systematic errors (bias) in data measurement, as biases can influence decision-making and lead to misrepresenting social groupings, geographic regions, or concerns.

Recognizing and rectifying biases in data is crucial to avoid operational and strategic issues in construction enterprises. Systematic and non-systematic data inaccuracies can impact the decision-making process and the organisation's overall performance. Information plays a significant role in strategic decision-making, and infrastructure pipeline data can effectively convey relevant information to decision-makers. However, the position of information in the decision-making process requires further attention in management research. This study focuses on understanding the types of information construction executives require and how they utilize it to make strategic decisions for their organisations. By improving the quality of information, addressing data quality issues and biases, and leveraging infrastructure pipelines, construction organisations can enhance their operational efficiency, reduce costs, and make more informed decisions about ongoing and future projects.



CHAPTER 6

PAPER 3

6.0 IMPACT OF INFORMATION QUALITY ON STRATEGIC DECISION- MAKING IN CONSTRUCTION ORGANISATION: UNRAVELLING COMPLEXITY AND CONTINGENCIES

This chapter is based on the following published Journal paper:

Moshood, T. D., Rotimi, J. O. B., & Shahzad, W. (2024). Impact Of Information Quality on Strategic Decision-Making in Construction Organisation: Unravelling Complexity and Contingencies. *Management Research Review*.

Abstract: This study investigates the crucial role of information quality in the construction industry and its impact on organisational performance. The research objectives are threefold: (1) to identify and analyse key factors influencing information quality in construction organisations; (2) to examine how information quality affects strategic decision-making processes in the industry; and (3) to assess the extent to which information quality impacts overall organisational performance. The study commences by gathering data from databases such as Scopus, Elsevier, Taylor & Francis, and Emerald Insight. The collected data is then analysed using ATLAS.ti 9 to construct a model linking information quality with strategic decision-making and organisation performance. The research outcomes offer an empirical foundation for evaluating information quality in decision-making within the construction industry, identifying specific information quality dimensions and their association with strategic decision-making in the studied context. The literature review analysis reveals the complex interplay between information quality, strategic decision-making, and organisational performance in the construction industry. Key findings include identifying critical factors influencing information quality, such as technological infrastructure, organisational processes, and personnel skills. The study highlights the necessity

for organisations to recognize potential challenges in information management and formulate strategies to overcome them.

6.1 Introduction

It is essential for the decision-making process of stakeholders and the successful completion of construction projects for information to be readily available and for that information to be used effectively. Forms such as organized, semi-structured, and unstructured information can all include high-quality information, but each has advantages and disadvantages (T. Tan et al., 2021). Due to the fact that it is so challenging to apply unstructured information in practical settings, transforming unstructured information into structured information requires a significant amount of effort. On the other hand, using structured and unstructured information is fraught with challenges (Aitken, 2007). Though information sources and channels may be readily available and abundant, some of the information is both out-of-information and irrelevant to the context. In the construction industry, information may be easily accessed. Yet, it can be challenging to identify context-specific information that may be ready just in time to be utilized at any point along the information life cycle (Crovini et al., 2020; Tang et al., 2006).

Quality of the information has broad implications for decision-making processes of varied scopes and for several reasons (Xu et al., 2002). The quality of the information affects all levels of the organisation, including the strategic, operational, and tactical levels (Netz et al., 2020). The efficiency of a wide range of organisational processes and outcomes is directly proportional to the quantity and quality of the information that is made available to it (Su et al., 2019). For example, information quality is crucial to the effective completion of enterprise-wide programmes such as Enterprise Resources Planning (Xu et al., 2002), Risk Management (Ramchandra & Srikant, 2006), and Customer Relationship Management (Henderson & Murray, 2005). Evidence suggests that the quality of information is essential in achieving successful outcomes when installing information systems, business intelligence systems, and data warehouses. These systems are all designed to help businesses make better decisions (Conradie & Kruger, 2006). Decisions made throughout organisations at every level are based on high-quality information that must be dependable (Tabesh & Vera, 2020). From casual users of information resources to decision-makers who use corporate information systems to collect information from various departments, they must ensure that the quality of information is kept at appropriate levels (Zhang et al., 2022). Therefore,

it is important to investigate the factors that determine how the quality of information can be improved to make them more suitable for enhancing construction organisations' operation and overall effectiveness.

Many indicators discovered in the literature suggest that people's behaviour and attitudes towards information, as well as information values and information management procedures within organisations, all affect the quality of information (Adinolfi, 2021). These information behaviours are evaluated in conjunction with other, frequently technical criteria such as the quality of the information system and the software (Abu-Rahma & Jaleel, 2019). Furthermore, the concept of information culture is connected to information values and management practices carried out inside an organisation (Suedfeld & Tetlock, 2019). Donald A Marchand & Kettinger (2011) describe such internal organisation practices as information orientation, which refers to the ability to manage, utilize and leverage information resources effectively to achieve strategic goals and performance. Given the importance of information quality in the construction industry and its impact on organisational performance, this study aims to address the following research questions:

1. What are the key factors influencing information quality in construction organisations?
2. How does information quality affect strategic decision-making processes in the construction industry?
3. To what extent does the quality of information impact on the overall performance of construction organisations?

6.2 Methodology

6.2.1 Search String

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) procedures were employed to facilitate the analysis and screening of the collected studies. Using the PRISMA approach in this systematic review amplifies the calibre and dependability of the findings by introducing a uniform methodology for conducting, disclosing, and evaluating the chosen studies. The process of finding articles involves four key steps: identification, screening, eligibility, and inclusion, as outlined by Mohamed Shaffril et al., (2021). Following these steps, the authors systematically discovered and synthesized relevant studies to conduct a comprehensive

systematic literature review (SLR). This section outlines the various phases and methodologies employed in the rigorous analysis of published literature on the impact of information quality on decision-making processes within construction. Relevant articles were identified and retrieved using aggregator databases such as Scopus, which encompasses publishing platforms like Elsevier, Taylor & Francis, and Emerald Insight.

Scopus was selected for its high-quality publications and substantial influence on research advancement across multiple disciplines. Researchers acknowledge that the exclusive use of this database represents a limitation of the study. Scopus, although extensive, does not encompass all available scientific publications. This choice may have led to excluding relevant research published on other platforms or indexed in different databases. However, the Scopus database has been identified as one of the largest citation databases of peer-reviewed literature, offering global research output across various fields (Fahimnia et al., 2015). To mitigate this limitation, the researcher employed a rigorous systematic review process and analysed a large sample of 81 publications. The findings indicate that Scopus indexes a wide range of influential journals in this field. Keywords utilized in the search included “quality of information” OR “information quality” AND “strategic decision-making” AND “construction industry.” Further details regarding the screening process are provided in Table 6.1. The period from 2005 to 2023 was selected as the target date range to ensure the inclusion of the most recent data available from the sources.

Table 6.1: Criteria of Inclusion and Exclusion

Criterion	Inclusion	Exclusion
Timeline	2005 – 2023	Earlier than 2005
Document Type	Articles, Review article, Conference	Proceeding and Book, Editorial
Language	English	Non-English
Subject Area	Decision Management Engineering Social Sciences Decision Sciences Information Quality	Immunology and Microbiology, Chemical Engineering, Chemistry, and Medicine

The data collected spans from 2005 to 2023 and comprises 1,264 publications from the Scopus database, subjected to metadata analysis. From this pool, 81 papers were objectively selected to provide insights and future prospects. The analysis encompassed articles, review

articles, and conferences to ensure the inclusion of the most credible and influential academic sources. Non-English language articles were excluded from the study, which focused on the influence of information quality on decision-making processes. The selected publications underwent screening, filtering, and evaluation following a systematic literature review process for inclusion in the analysis. An iterative selection strategy was employed, as illustrated in Figure 6.1, to ensure thoroughness and rigour in the research methodology.

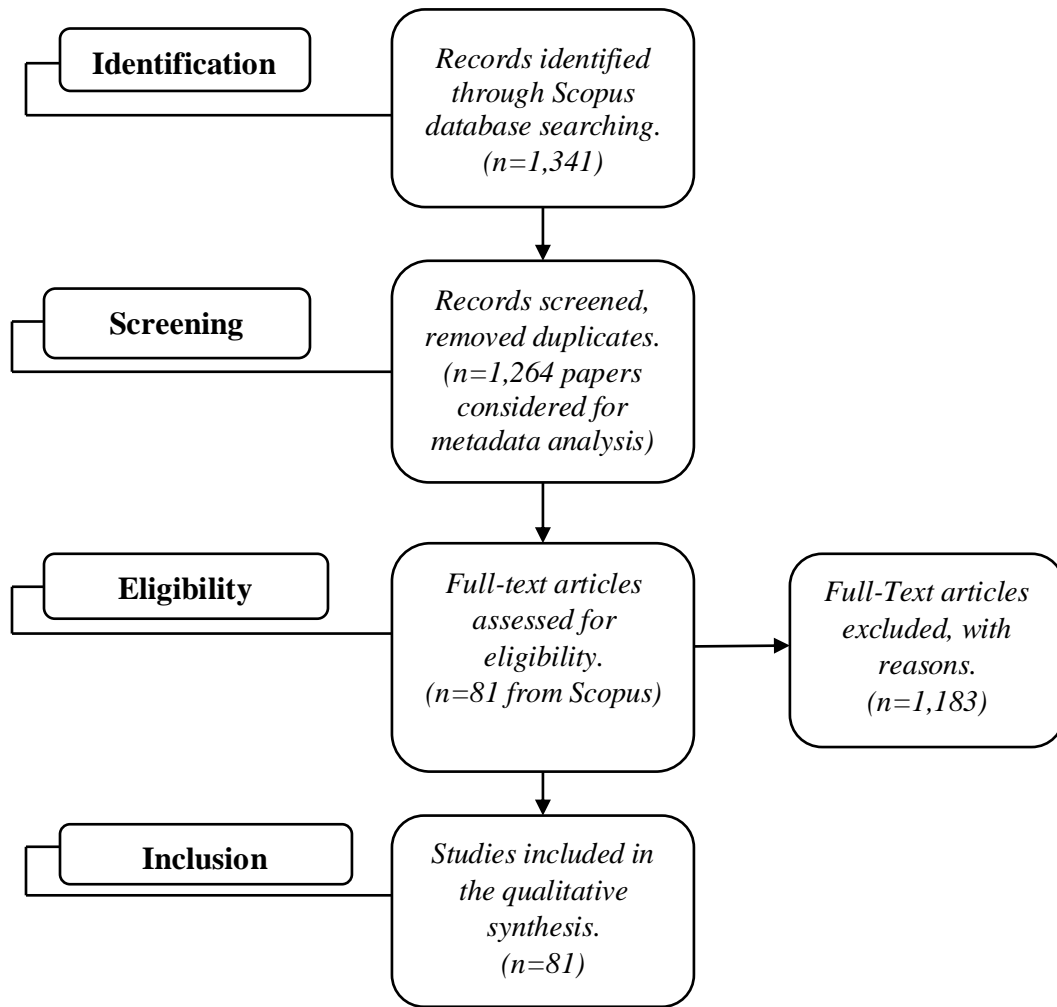


Figure 6.1: An Overview of The Literature Identification, Selection and Inclusion Process

6.2.2 Analysis Process

The methodology outlined in this study provides insight into one approach among many possible methods for conducting qualitative research on textual data. It delves into various stages involved in preparing and investigating the study data. The evaluation phase is structured systematically, encompassing Processes, Findings, and Discussion sections, facilitating understanding of the data assessment process, its implications, and the resulting insights.

The systematic literature review approach involves screening, filtering, and validating articles for inclusion using an iterative selection method. This process entails removing duplicates, confirming eligibility based on abstracts, and thoroughly reviewing relevant papers to assess the influence of information quality on decision-making processes. In this study, the systematic literature evaluation process was meticulously followed, and all 81 publications underwent a thorough investigation to ensure their credibility. Subsequently, the ATLAS.ti 9 software package was deemed appropriate for organizing, categorizing, and analysing the evidence emanating from the study. ATLAS.ti 9 is recognized as a robust tool for qualitative analysis, particularly for managing extensive textual and graphical data (Moshood et al., 2021).

6.3 Results and Analysis

6.3.1 Publications by Year

Figure 6.2 illustrates the annual publication count over the study period (2005 to 2023). The data reveals a consistent upward trend in publications related to quality information and strategic decision-making. Most of the publications occurred in 2022 and 2023, with 107 and 112 articles, respectively. This significant increase in publications in 2023 compared to previous years demonstrates a growing interest and focus in this knowledge area.

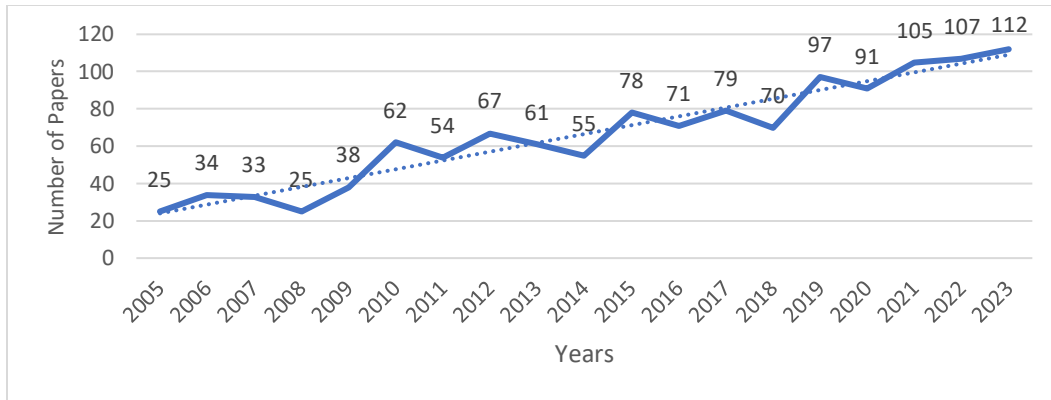


Figure 6.2: Article Count by Year Publication

6.3.2 Publications by Authors

The study analysed the most influential and prolific researchers in the field, particularly focusing on their contributions to research on information quality and strategic decision-making. Data on the top ten most productive scholars and their respective publication counts is shown in Figure 6.3. Notably, Botega, L.C. emerges as the most prolific author, having published nine articles out of a total of 1264 in the dataset. This is followed closely by Gao, J. and Ge, M., who ranked second and third in terms of the number of articles they published.

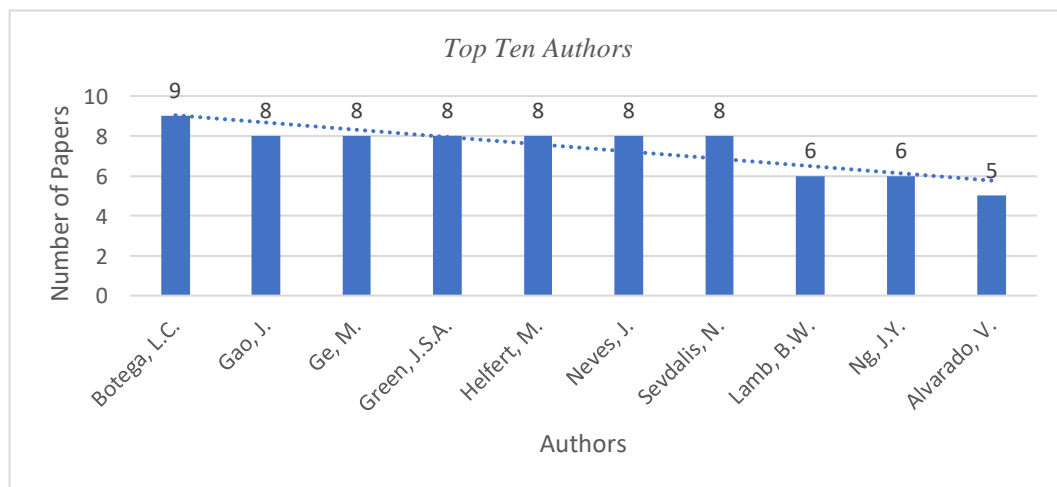


Figure 6.3: Top Ten Authors in Quality of Information and Strategic Decision-Making Research

6.3.3 Publications by Countries

From the analyses, the United States is the leading contributor to the literature on quality of information and strategic decision-making within the construction industry, as illustrated in Figure 6.4. There are 285 papers attributed to the United States. The United Kingdom follows closely with 143 papers. Also, China published 102 papers, Australia 99 papers in that order and the Netherlands 41 (ranked 10th in global publications related to this subject).

These findings underscore the dominance of America, Europe, and Asia in the discourse surrounding the quality of information and strategic decision-making. Furthermore, it is noteworthy that the United States and the United Kingdom collectively account for an average of 428 publications, reflecting their substantial contributions to this knowledge area. These trends may indicate heightened awareness and advancements in construction practices within these nations, which, given their large population, prioritize improving the performance of their respective construction industries.

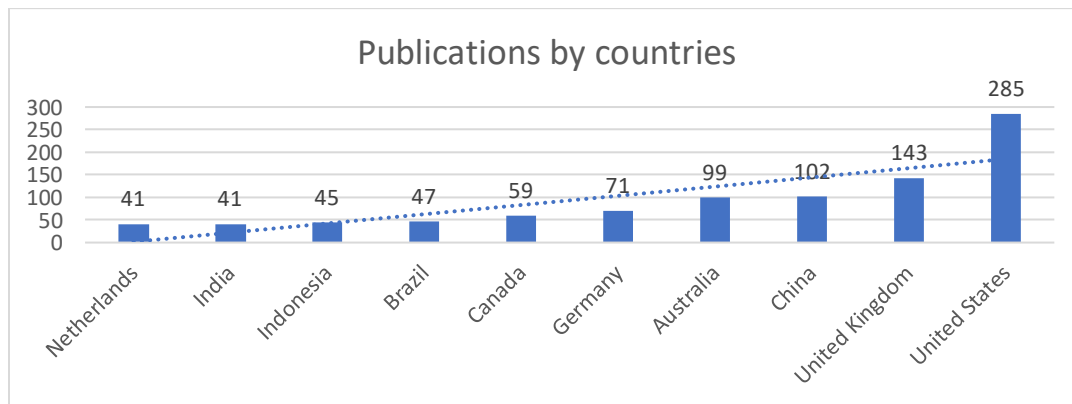


Figure 6.4: Top Ten Countries

6.4 Insights on Information Quality and Strategic Decision-Making

The focus of the current study is to generate insights into the attributes of information quality and decision-making quality and their implications for the performance of construction organisations. An objective review and synthesis of 81 Scopus articles was undertaken. Several

themes emanating from this literature on quality of information and strategic decision-making are described in the following subheadings. Also, some structured frameworks for comprehending the existing literature were developed through the theme.

6.4.1 Project Pipelines in New Zealand

New Zealand's government has significantly emphasised infrastructure development, residential construction, and non-residential building projects over the years. The country's project pipelines (Future/Proposed Projects) are classified into three main categories: public projects, private projects, and public-private projects (Scott, 2021). The payment method, contract nature, and level of risk expected for involved contractors or suppliers are determined by each project owner. The construction project pipelines information comprehensively analyses all large-scale project pipelines and spending across New Zealand's regions (MBIE, 2022). This analysis details the planned project spending type, the timing and value of significant projects, and a regional breakdown of project spending (National Construction Pipeline Report, 2022b).

project pipelines data is specific information and statistics related to the various projects within a pipeline (Future/Proposed Projects), including a range of data points relevant to planning, project descriptions, implementation, timelines, project value, location, and monitoring. project pipelines create a forward view of all building and construction works (MBIE, 2022). Consistency in the project pipeline process is crucial for establishing agreed-upon timelines, allocating team members to specific tasks, maintaining clear project statuses, and ensuring accurate project information (Luo & Shahzad, 2020).

The objectives of constructing project pipelines data are multifaceted, encompassing strategic planning, investment scheduling, coordination of project execution, and collaboration between businesses and government entities (MBIE, 2022). Establishing a clear project pipeline is paramount as it enhances awareness among government and industry stakeholders, providing valuable insights into potential projects and the required workforce and resources to complete specific tasks (Blair, 2019). Larsen et al., (2013) emphasise that effective project pipelines planning enables a comprehensive understanding of the project and its resource requirements while minimizing the likelihood of unexpected obstacles that may hinder or delay project completion.

Furthermore, project pipelines enable the government and the construction sector to formulate future plans for timely and cost-effective project completion (Moshood et al., 2023). They contribute to streamlining efficiency and offering precise insights into project forecasting and construction patterns (Christopher, 2018). Identifying and locating these projects can improve construction quality, productivity, and employment opportunities for both skilled and unskilled workers while providing valuable insights into the procurement process (MBIE, 2022).

Adopting a forward-looking approach to planning and project execution can result in an average profit margin increase of 23% for projects (Larsen et al., 2018) while simultaneously reducing risks and enhancing quality. Leon et al., (2018) highlight that a well-organised project pipelines enables precise project performance monitoring, ensuring that all project goals are achieved. Moreover, forecasting project pipelines is crucial for early monitoring and trend detection, enabling proactive decision-making to prevent anticipated project delivery delays (Christopher, 2018).

Failure to prioritize the development of a highly skilled workforce capable of effectively meeting the demands of pipeline construction projects and ensuring the quality of information, coupled with a lack of strategic decision-making in this domain, can result in an industry boom that lacks the essential knowledge and resources required for its sustainability (Amirmehdi, 2019). Without investing in workforce training and development, the industry may face a shortage of qualified personnel, hindering project execution and compromising overall quality. Furthermore, without strategic decision-making processes, the industry may struggle to anticipate and adapt to changing market dynamics, leading to inefficiencies, delays, and cost overruns (Tabish & Jha, 2011). Recognizing the significance of nurturing a skilled workforce and making informed decisions is crucial to ensure the long-term viability and success of the pipeline construction industry. Infrastructure project pipelines are vital in New Zealand's construction industry, contributing to economic growth, job creation, and improved infrastructure. Effective planning, management, and execution of these projects require a clear understanding of the project pipeline, consistent processes, and strategic decision-making. By prioritizing workforce development and adopting a forward-looking approach, the industry can overcome challenges, enhance efficiency, and ensure the successful completion of project pipelines. As the construction industry evolves, it

is essential to recognize the importance of quality information and informed decision-making in driving sustainable growth and meeting the nation's infrastructure needs.

6.4.2 The Strategic Decision-Making Process

Strategic decision-making has been described as the long-term and forward-looking projections into an organisation's future (Calabrese et al., (2019). Walger et al., (2016) emphasized the critical nature of strategic decision-making, highlighting its role in shaping the trajectory of an organisation, regardless of its size. Strategic decisions involve pivotal choices that determine an organisation's future direction. Those pivotal choices are a series of decisions influenced by market conditions, regulatory environments, cultural differences, political situations, economic indicators, and operating environments, which are made amid ambiguity (Utama et al., (2018). These perspectives underscore the complexity and uncertainty inherent in strategic decision-making processes, where decisions must often be made with incomplete or unclear information. Schwenk (1984) emphasises the existence of a standardised decision-making process, which encompasses specific steps: outlining the organisation's objectives, pinpointing the issues to be dealt with, generating potential solutions, evaluating options, and ultimately selecting the most optimal alternatives. It is necessary to tailor an organisation's policies and strategies to align precisely with the demands of operating markets (Edwards, 2012). Strategic decision-making must be systematic and structured (Utama et al., 2018) and involves senior representatives selecting from a variety of feasible options to achieve an optimal outcome (Duan et al., (2019).

Managers are entrusted with this pivotal task (Le et al., (2020), and the decisions they make can wield a significant impact, either positively or negatively, on an entire organisation (A. Miller et al., 2018). Osadchy et al., (2018) underscores a decentralized decision-making process, explaining that this may prove more efficient than a centralized one. According to Acciarini et al., (2020), executives' involvement in decentralized decision-making leverages their experiential knowledge, providing valuable insights that enhance the efficacy of the strategic decision-making process. Gallivan et al., (2018) highlight the potential for CEOs directly involved in the decision-making process to make more successful judgments compared to decisions originating from their parent organisations. The ATLAS ti 9 software generated a localised decision-making process chart for the construction sector (refer to Figure 6.5). This decentralized strategic decision-making

process was altered from the standard procedure for making strategic decisions by including participation from local experts and making a choice at an organisation’s regional level.

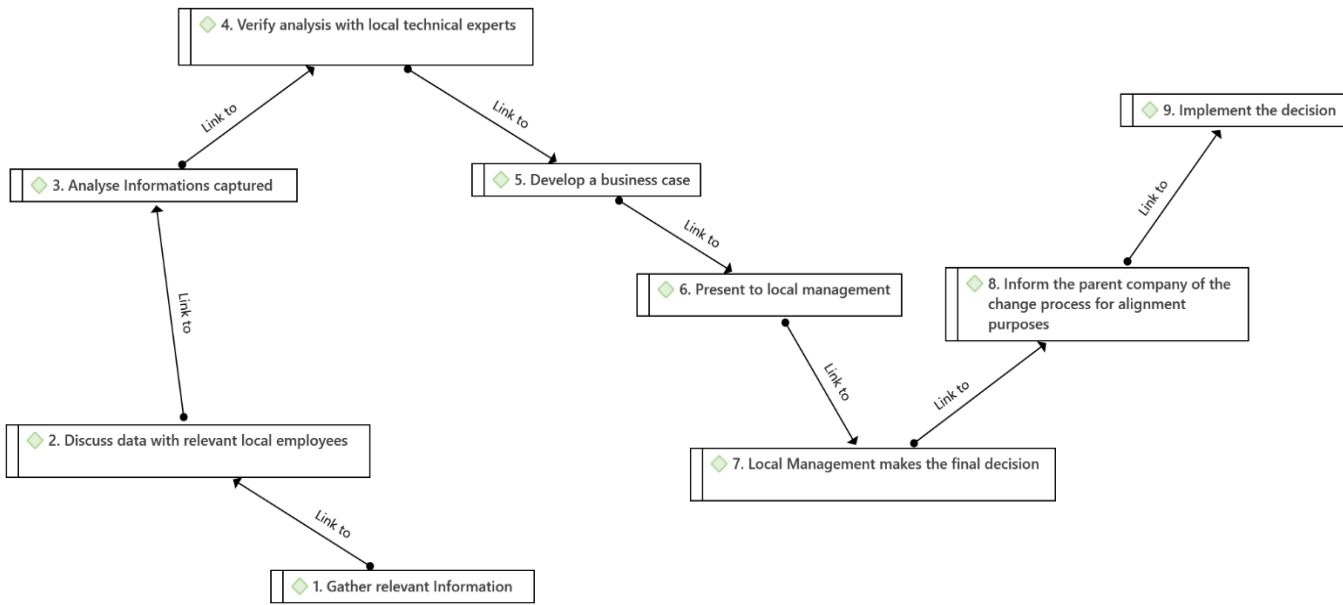


Figure 6.5: Decentralized Decision-Making Process

Naidoo (2017) suggests a similar process for centralized strategic decisions in construction organisations is depicted in Figure 6.6. In contrast to the decentralized decision-making process, this particular approach emphasises the heightened involvement of top management in the local subsidiary, ensuring the elicitation of the most optimal conclusions.

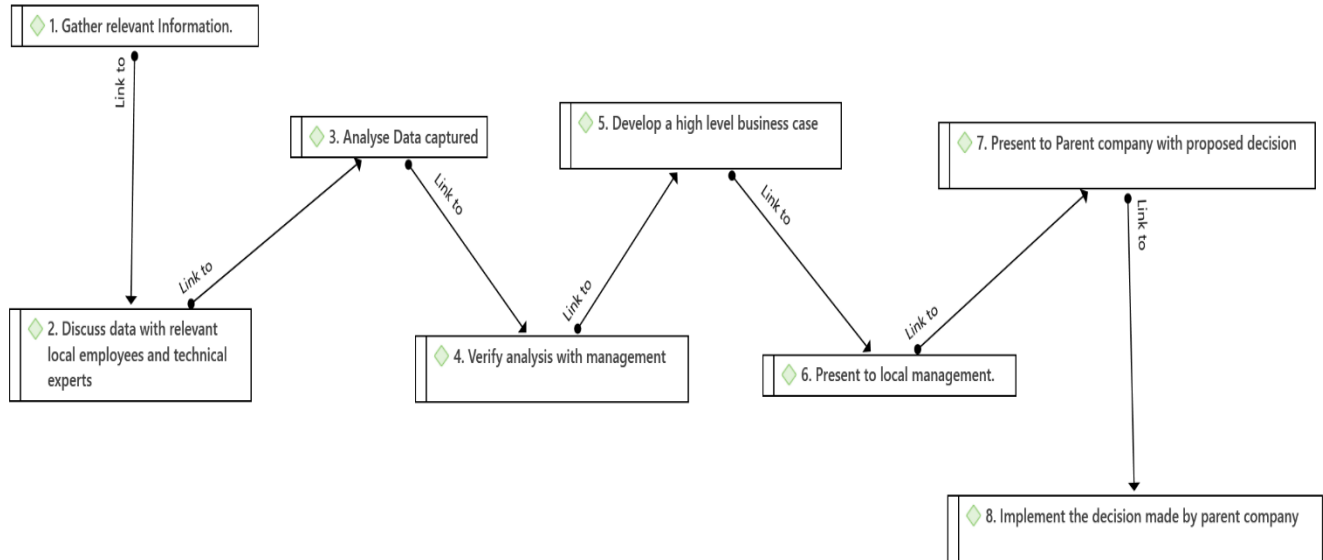


Figure 6.6: Centralized Decision-Making Process

6.5 Information

Davenport & Prusak (1998) describe information as discrete, objective facts about an event. They rationalise that information conveys a message and comprises a sender and a receiver to shape how the receiver perceives something. Buckland (1991) suggests three primary applications of the word ‘information’: (1) that it may refer to the process of getting informed, (2) that information can refer to knowledge that is shared, and (3) that information can refer to items such as documents and records, i.e. artefacts that convey a message. Although it represents an item, the information demonstrates its power by influencing the behaviour of other things and bringing about shifts in those objects (Maksimov & Lebedev, 2020). According to Floridi (2010), it is not easy to suppose that a single idea of information can adequately account for the different applications that may be performed using information.

Cawkell (2003) describes the interplay between information and knowledge. When assembled correctly in an intelligible form (or processed into a meaningful form), information is capable of communication and application (Bawden & Robinson, 2015). Cawkell (2003) explains how information is processed and transformed into knowledge through textual representations. According to Davis (2000), knowledge is information organized and processed to convey

understanding, experience, accumulated learning, and expertise. On the other hand, knowledge is defined as a human or organisational asset that allows effective choices and action in context, according to the ISO 30401:2018 standard for knowledge management systems (Naidoo, 2017). This pragmatic definition of knowledge is combined framed experience, values, contextual information, and expert insight that provides a framework for assessing and assimilating new experiences and information" (Davenport & Prusak, 1998). In other words, knowledge is actualized and used in the minds of those who possess it, and in contrast to facts and information, it includes an element of judgement (Davenport & Prusak, 1998).

6.5.1 Information Quality

The quality of information has been a central focus in scholarly writing, as it plays a pivotal role in various aspects of organisational success (Mbeti & Tanamal, 2020). Many studies have underscored the profound impact of information quality on project outcomes, as it directly influences the efficacy of planning, strategy formulation, and decision-making processes (Phuong & Dai Trang, 2018). High-quality information ensures that researchers, policymakers, and practitioners can access reliable, accurate, and pertinent data, empowering them to draw well-founded conclusions, develop evidence-based strategies, and make informed decisions. Conversely, poor-quality information can lead to misinterpretations, flawed analyses, and suboptimal outcomes, undermining the credibility and value of research findings and potentially leading to detrimental consequences for organisations (Ridwan et al., 2020). The significance of information quality is particularly pronounced in project management, where the success of initiatives heavily relies on the accuracy and reliability of data used to inform critical decisions. Inaccurate or incomplete information can lead to misallocated resources, unrealistic timelines, and ultimately, project failure. Therefore, organisations must prioritize the acquisition, management, and dissemination of high-quality information to ensure the success of their projects and overall performance.

Moreover, the impact of information quality extends beyond the confines of individual projects and permeates the entire organisational structure. High-quality information enables effective communication, collaboration, and knowledge sharing among employees, fostering a culture of informed decision-making and continuous improvement. Conversely, poor-quality

information can lead to confusion, mistrust, and a breakdown in organisational efficiency, hindering the ability of companies to adapt to changing market conditions and maintain a competitive edge. In light of the critical importance of information quality, organisations must invest in robust information management systems, rigorous data validation processes, and ongoing employee training to ensure the accuracy, reliability, and relevance of the information they rely upon. By prioritizing information quality, organisations can enhance their decision-making capabilities, improve project outcomes, and ultimately achieve long-term success in an increasingly complex and dynamic business environment. To fully grasp the concept of information quality and its influence on organisations and their projects, it is essential to reference information theory, which focuses on accurately reproducing source information while minimizing errors during transmission (Grenn et al., 2014). Shannon (1948) suggested that the fundamental challenge in information transmission is accurately reproducing a message selected at one location to another (Kerr et al., 2007). The logic behind information theory lies in facilitating error-free transmission of information (Grenn et al., 2014). Shannon (1948) highlights eliminating uncertainty within the transmission process. Information quality encompasses distinct attributes that ensure the transmission of relevant and unambiguous information (Lillrank, 2003).

Information quality in construction projects significantly impacts decision-making, influencing planning and operational strategies (S. Lin et al., 2007; Ridwan et al., 2020). The quality of information is shaped by various factors, including technological infrastructure, organisational processes, policies, personnel skills, knowledge, and motivation (S. Lin et al., 2007). Moreover, the size of an organisation is suggested to influence the quality of gathered information (Shepherd et al., 2011), with larger organisations potentially having access to more resources and expertise to ensure high-quality information. Given the critical role of information quality in construction projects, organisations must prioritize developing and maintaining robust information management systems and continuously improving their personnel's skills and knowledge. By investing in these areas, construction organisations can enhance the quality of information they utilize, leading to more effective decision-making, improved project outcomes, and, ultimately, a competitive edge in the industry.

6.5.2 Dimensions of Information Quality

There is no widespread consensus about the criteria for determining the quality of information (Sebastian-Coleman, 2012; Wand & Wang, 1996). Shamala et al., (2017) generated 13 dimensions, which they later reduced to six, that can influence the quality of information within the context of information security risk management. Alshikhi & Abdullah (2018) also refer to 13 dimensions comprising dimensions and classifications. However, they suggest that four of these dimensions were a core set of quality of information characteristics that reflect a single element or construct of quality of information.

On the other hand, because each data environment is unique, this might be more challenging (S. Lin et al., 2007). A standard definition of information quality is that it should be suitable for the intended purpose of the information consumer. Despite its apparent lack of complexity, this framework offers an essential starting point for analysing the credibility of information. Therefore, a contextual perspective must be developed to assess the quality of the information being viewed. This perspective considers the kind of information consumer and the operations and activities that the information consumer carries out (Kerr et al., 2007). When this is done, a clear and easily explicable construct of the information quality dimension may be established. According to Alshikhi & Abdullah (2018), issues about the quality of information go beyond those related to correctness and encompass those about other aspects, such as completeness and accessibility. It was pointed out by (Todoran et al., 2015) that a knowledge of the concept from the point of view of an informed consumer is necessary to increase the quality of the information.

As seen in Table 6.2, the features, traits, and metrics used to evaluate information quality can take various forms (Hamzah et al., 2021). The context of each study and the assumptions underlying each quality evaluation model and technique cause certain traits, qualities, and metrics to vary from one research endeavour to the next. Researchers have unearthed and categorised the components of information quality in several different ways, depending on the researchers' points of view (Sinitsyna, 2014). These categories may be found below. According to recent studies' findings, the qualities and features of high-quality information may be classified into several separate categories. Table 6.2 summarizes the quality of information characteristics/attributes.

Table 6.2: Summary of Quality of Information Characteristic/Attributes

Researcher	Category	Characteristics/Criteria
Wang & Strong, (1996)	Intrinsic Information Quality	Believability Accuracy Objectivity Reputation
	Contextual Information Quality	Value-added Relevancy Timeliness Completeness An appropriate amount of Information
	Representational Information Quality	Interpretability Ease of understanding Representational consistency Concise representation
	Accessibility Information Quality	Accessibility Access security
Naumann, (2001)	Subject criteria	Relevancy Reputation Understandability Value-added
	Object criteria	Completeness Customer support -Documentation -Objectivity -Price -Reliability -Security -Timeliness -Verifiability
	Process criteria	-Accuracy -Amount of Information -Availability -Consistent representation -Latency Response time
Price & Shanks, (2005)	Syntactic	-Conforming to meta-Information
	Semantic	-Complete -Unambiguous -Correct -Consistent -Meaningful
	Pragmatic	-Accessible -Suitably presented -Flexible presented -Timely -Understandable
	Information Culture	-Information values

Researcher	Category	Characteristics/Criteria
Sinitsyna, (2014)		-Information management and IS management
	Information Behaviour	-Formality -Proactiveness -Transparency -Integrity -Sharing -Control

Similarly, each framework and model have its own set of information quality criteria that distinguish them from one another. This leads to uncertainty and misunderstanding when selecting the information quality characteristics most advantageous for a particular business context or research objective. The information orientation model that (David A Marchand et al., 2001) created offers a practical and thorough framework for assessing the information values and behaviours inside an organisation. Table 6.3 shows the information quality criteria.

Table 6.3: Dimension and Definitions of Quality of Information

Dimensions	Description
Accuracy	High-quality data must authentically represent the real values it signifies. Inaccuracies arise when data fails to faithfully mirror reality, often because of inadequate linkages across systems, hindering accessibility and modification (Alketbi, 2014). Substantial inaccuracies not only affect individual data points but also cast doubt on the overall integrity of the dataset, compromising its precision.
Timeliness	High-quality data should accurately mirror the ongoing and consistent changes happening in the real world. This attribute holds significance across various domains. Alketbi (2014) stress the need for educational institutions to have adaptable data systems capable of keeping pace with rapid operational changes. Chapman (2005) underscores the importance of timeliness in gathering and analyzing data concerning scientific events. Therefore, the temporal accuracy of data significantly impacts its overall quality.
Completeness	Data completeness refers to the degree to which the information accurately encompasses all available data. To qualify as complete, data must possess all relevant values in a usable state (Singh & Singh, 2010). Underlining its importance, Alketbi (2014) advocates for prioritizing small yet comprehensive datasets over larger, incomplete data volumes to ensure

robust data quality. Therefore, ensuring completeness remains a crucial element in upholding high-quality data.

Consistency High-quality data necessitates flawless consistency, indicating that similar values must align with the same data type. Consistency in data is generally categorized into two types: structural and semantic consistency (Alketbi, 2014). Structural consistency entails maintaining uniformity in entities, attributes, and data types following a standardized format within the database. Achieving this involves building a database with strong structural integrity. On the other hand, semantic consistency involves presenting data in a clear, unambiguous manner that is devoid of any confusion.

The information orientation of a company can be defined as the degree to which it views information as a strategic resource, as well as the degree to which it can implement and uphold appropriate information management, practises, information technology practises, and information behaviours and values. The essential qualities of informational quality are depicted in Figure 6.7, which may be found below.

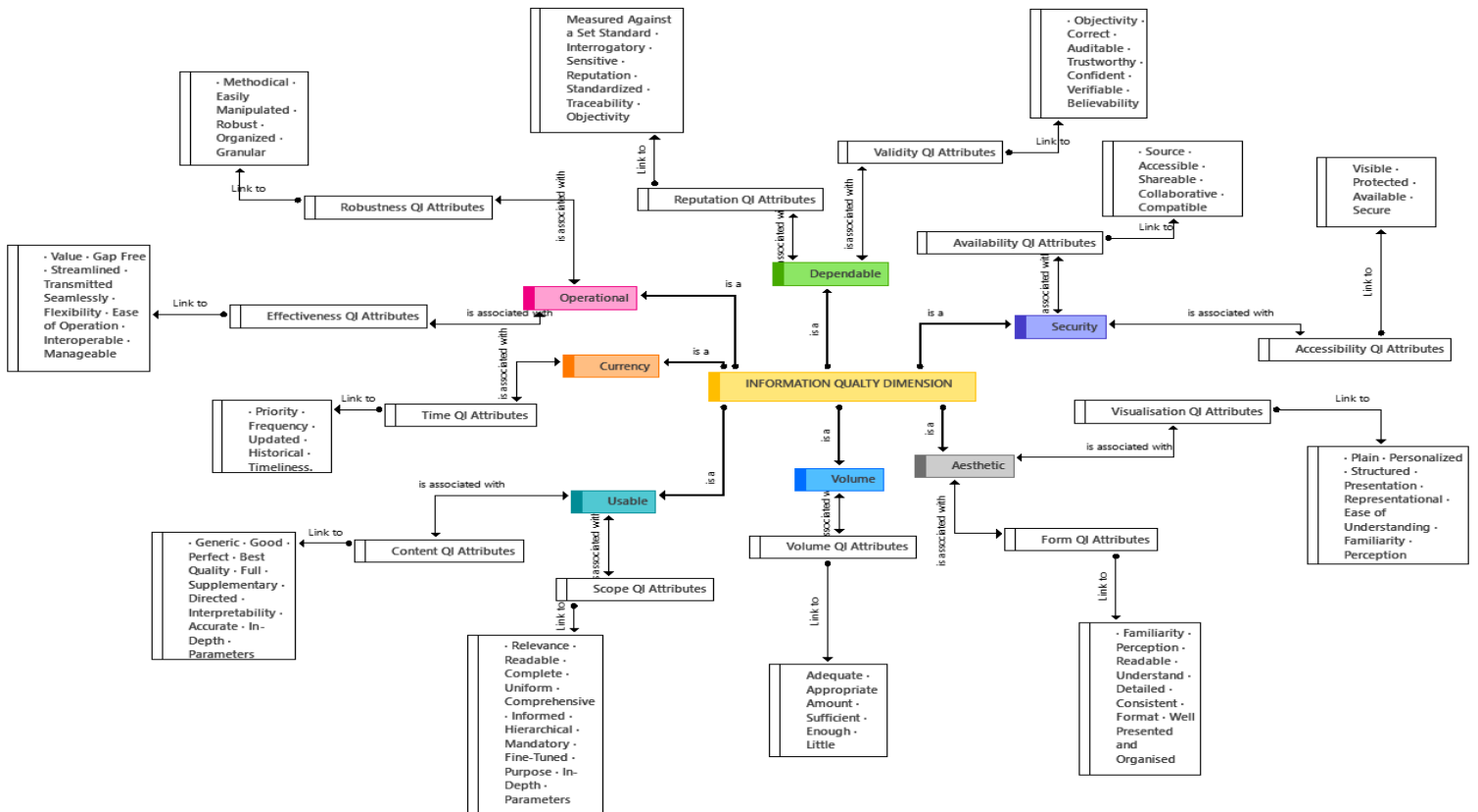


Figure 6.7: Framework of Quality of Information

6.5.3 Factors Influencing Quality of Information

Mayasari (2016) conducted an empirical study on the barriers to information quality. They found that poor information quality affected many other aspects of the organisation, including increased operational costs, inefficient decision-making, decreased job satisfaction among employees, and impacts on organisational culture, trust, and acceptance among business users and customers. Redman (1998), who also breaks this down to the various levels of the organisation, such as the strategic, tactical, and operational levels, has provided evidence that this is true. This evidence has been confirmed. Redman (1998) accepts that the quality of the information influences the various levels of the organisation by saying that this is one of its findings. Despite this, there is no evidence to suggest that the organisation's structure impacts the quality of the information. Lin et al., (2007) provide the findings of a study that investigates the quality of the information in asset management organisations from the perspectives of technology, organisational structure, and individuals. Table 6.4 provides a comprehensive overview of the various factors that influence the quality of information in the construction industry, categorized into three main groups: technological, organisational, and individual. By considering and addressing these factors, construction organisations can improve the quality of information they rely upon, leading to enhanced decision-making, project success, and overall organisational performance.

Table 6.4: Factors Influencing Quality of Information in the Construction Industry

Perspective	Factor	Explanation
Technology	System Integration	Insufficient integration between business and technological systems creates informational isolation. Because of this, it is challenging to incorporate real-time data from the site into the business processes to support decision-making driven by data.
	Data Access	A gap exists between the person who uses the asset and the person who created it. Consequently, the information is not transmitted to the user in a manner they may utilise.
	Data Exchange	The government, the agency, and the construction sector share relatively little information.
	Data Collection Process	As a result of taking a manual approach to the data-collecting process, which takes a lot of time, the organisation has concluded that the information gathered is not valuable enough to warrant the expense.

	Coding of Information	The inconsistencies in the coding of information from one database to another make comparing data obtained from several sources challenging.
Organisational	Organisational Readiness	Technical system implementation requires comprehensive organisational change that affects the organisation's model, structure, management style, culture, and people. Organisational preparedness is needed. Organisational readiness is having the appropriate people focused on the right things at the right time, with the right tools, working with the right attitude, and producing the proper outcomes. It reflects company culture.
	Management Commitment	The level of commitment from management to information quality is low. As a result, only a small number of resources are set aside to address issues related to information quality.
	Lack of Codified Business Standard	Because organisations lack a set of rules for their business information, it is feasible to check the quality of the information they provide.
Individual	Training	In order to guarantee the accuracy of the data stored in project management systems, users must have the knowledge and skills necessary to make effective use of the system. Training helps improve one's proficiency in these areas.
	Data Recording	The people's motivation and degree of expertise are two of the personal elements that contribute to effective data recording. If this is missing, the quality of the delivered information will be low.
	Communication and Management Feedback	People's concerns, connections, aspirations, and personal ambitions were sometimes considered, resulting in inadequate communication and feedback. This results in an overall decrease in the quality of the delivered information.

According to Haug et al., (2011), several different issues have worsened poor information quality. For instance, because information technology has become an integral component of most businesses, it now assists in collecting a significant amount of data; yet, this has unintentionally led to issues with the information's overall quality (Haug, 2021). As a result, organisations believe that updating their software to the most recent version would improve the quality of the information they collect (see Figure 6.8). Still, this practice frequently exacerbates existing issues (Haug, 2021).

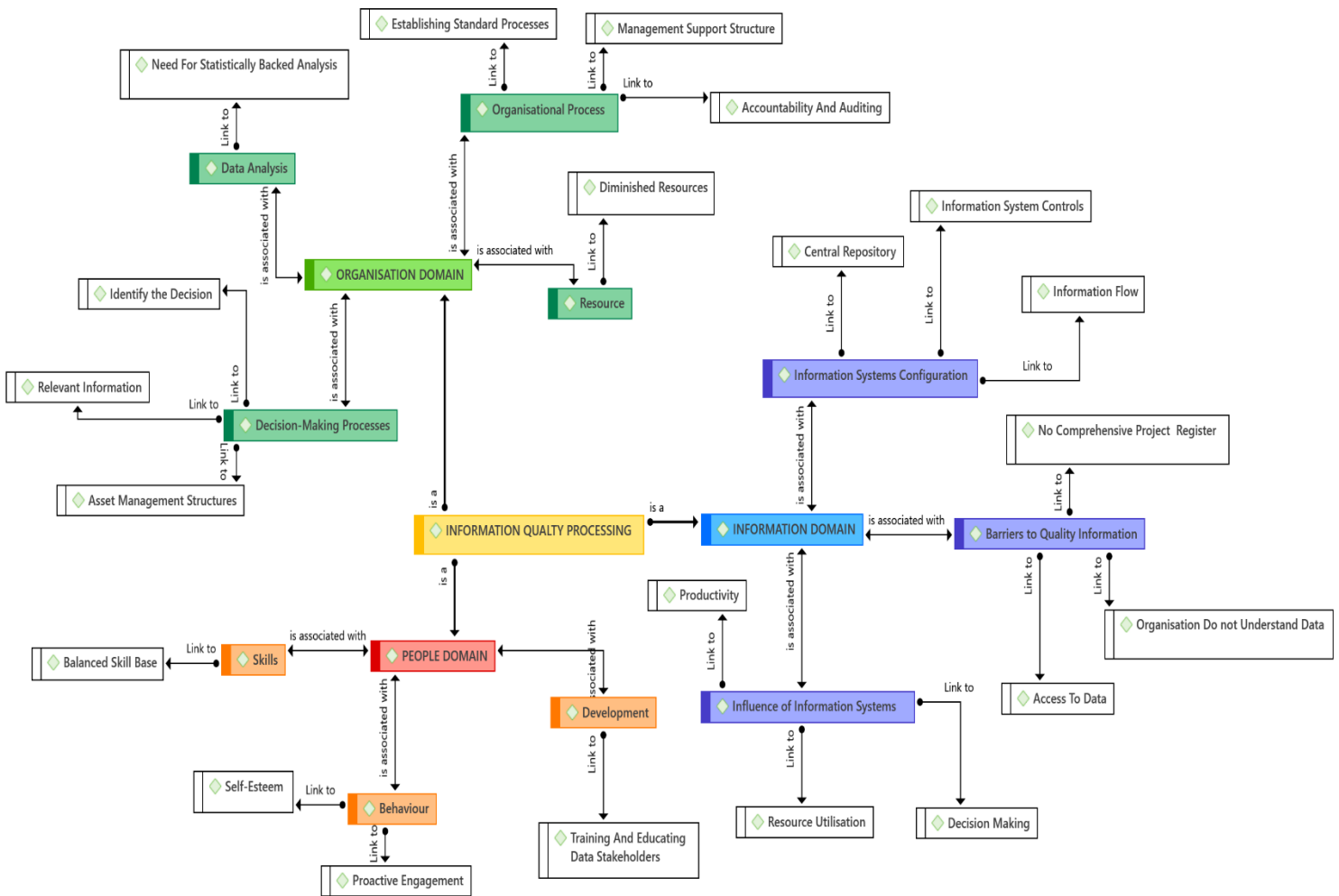


Figure 6.8: Information Quality Processing

Research concentrating on information management, knowledge management, and facilities management have all used mind maps (Birks et al., 2013; Mingers & Taylor, 1992; von Gersdorff Jørgensen et al., 2012). Therefore, by utilizing mind maps, we can graphically outline the information, ideas, topics, and related concepts (Beel et al., 2011). Information is a crucial component of effective asset management (Hanis et al., 2011), and asset data is its basis. Information contributes to asset management's efficacy and translates into improved results for decision-making (S. Lin et al., 2007). The information domain explained the aspects that impacted the information quality of construction industry projects. The following are some of the categories

that have been developed based on the findings of this study, which identify various themes that affect the quality of the information: 1) Obstacles in the path of high-quality information, 2) The result of having insufficient information 3) The setup of the information system 4) The impact of various informational systems The organisation domain provides specifics on the procedures and hierarchies that make it possible for the construction sector to get high-quality information. Within the confines of this realm, there have been four primary themes, which include the following: 1) The procedure for making decisions, 2) Data analysis, 3) Organisational Processes, and 4) Resources. The people domain focuses on individuals' concerns, such as job description, job security, motivation, education and training, and psychological needs (Naidoo, 2017), and how these factors influence the asset quality of information. For example, job description issues include job security, motivation, education and training, and psychological needs. There were three main themes, which are as follows: 1) Behaviour, 2) Development 3) Skills.

6.5.4 Strategic Decision-Making Effectiveness

Shirindza (2015) defines strategic decision-making efficacy as the extent to which a decision aligns with management's established objectives at the time of its implementation. According to Liberman-Yaconi et al., (2010), effective strategic decision-making stands as a linchpin for organisational success, directly influencing its overall performance. Studies have identified multiple factors influencing strategic decision-making effectiveness, encompassing organisational design, procedural rationality, political behaviour, environmental context, strategic decision-making processes, internal firm characteristics, decision-specific traits, and external elements (Dean Jr & Sharfman, 1996; Elbanna & Child, 2007; Shepherd & Rudd, 2014). The integrated model of strategic decision-making effectiveness is depicted in Figure 5.9 below. While the dimensions within the strategic decision-making process directly influence decision efficacy, the effectiveness is further shaped by decision-specific traits, external environmental characteristics, and the firm's own traits (Moshood et al., 2024). These factors moderate the efficacy of strategic decisions (Elbanna & Child, 2007). The review findings illustrate a comprehensive examination of decision-making, predominantly through qualitative research over time. Previous studies have focused on established biases as foundational to successful strategic choices.

As delineated by Shirindza (2015), the decision-making process encompasses initiation, ratification, implementation, and monitoring stages. Schwenk (1984) detailed the simplification process involving goal formulation, issue identification, alternative development, and assessment. Lyles (1985) delved into organisational learning and adaptation and highlighted decision-making steps involving context identification, alternative assessment, and selection. Simon (1993) explored the link between strategy and structure, suggesting organisational structures align with broader strategies. Robert Baum & Wally (2003) investigated centralized versus decentralized decision-making, emphasizing benefits in dynamic markets. Eisenhardt & Zbaracki (1992) viewed decision-making as a political system, highlighting influential individuals' impact. Shirindza (2015) categorized management activities into monitoring, interpreting inputs, and aligning solutions. Acciarini et al., (2021) also noted decision-making stages, covering initiative identification, information gathering, strategy selection, action implementation, and outcome monitoring. The arrows in Figure 6.9 suggest that the quality of information as mediation variable, internal factors, and external factors influence the strategic decision-making process. In turn, the strategic decisions made by the construction industry directly impact its organisation performance in terms of productivity, profitability, and plan efficiency. Also, the Figure 6.9 highlights the complex interplay of various factors that contribute to the success of a construction business, emphasizing the importance of informed strategic decision-making based on high-quality information and a thorough understanding of both internal capabilities and external challenges.

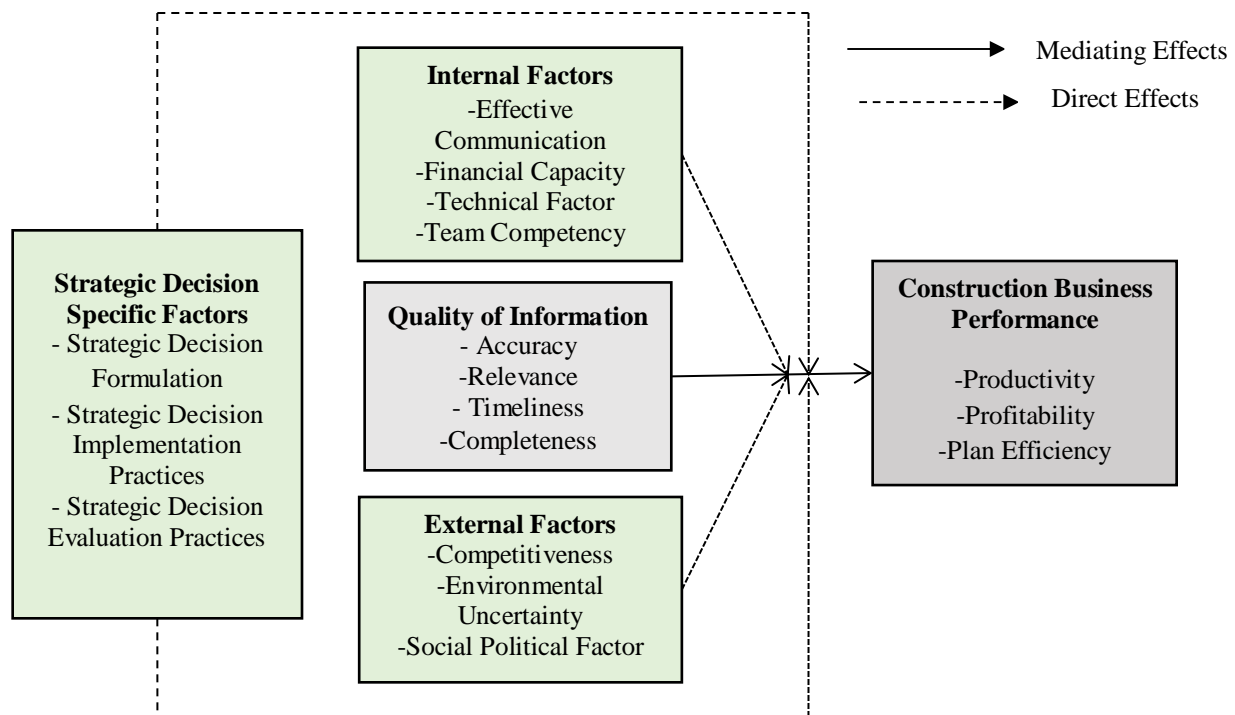


Figure 6.9: Quality of Information as a Mediator

Exploring strategic decision-making in multinational corporations revealed that inadequate strategic planning was the primary cause behind unsuccessful decisions. Christensen & Knudsen (2013) posit that poor organisational design, limited grasp of decision issues, and unawareness of cost implications contribute to suboptimal strategic choices. Shirindza (2015) emphasises that managerial shortcomings in data analysis and collection can lead to subpar strategic judgments. Environmental hostility can also impact the pace of strategic decision-making.

Improving strategic decision effectiveness demands managers learn from prior experiences in decision-making (da Silva & Roglio 2015), preventing the recurrence of past errors. Hunter et al., (2011) caution that past decision errors can perpetuate due to the sunk-cost effect, where managers remain fixated on a decision despite its inaccuracies due to invested resources. Cyert & Williams (1993) underscore the pivotal role of organisational structure and information flow in facilitating strategic decisions. Nooraie (2012) suggests that an industry's profitability hinges on its structure, significantly impacting strategic decision processes.

6.5.5 Quality of Information as a Strategic Resource

It has long been recognized that decision-making efficiency is influenced by many factors (Gao et al., 2012). Although it is preferable for the information used to be of high quality, this is not always the practice case (Rogova & Bosse, 2010). There are several reasons for this, ranging from the expense of acquiring quality information to the inherent difficulty or even the impossibility of doing so for specific categories of information (Naidoo, 2017). However, experienced decision-makers, particularly those who have worked in a particular environment for an adequate amount of time, develop a feel for the nuances and eccentricities of the information used and intuitively compensate for them (H. L. Shepherd et al., 2011). Decisiveness often stems from experience within a specific environment, an intuition that fades as businesses lean more on data repositories like data warehouses. While these sources cater to unique needs, they lack professionals' intuition. Recording additional information about data accuracy alongside the raw values could be beneficial (Phomlaphatrachakorn, 2019). Embracing fact-based decision-making improves both the speed and quality of decisions, leading to enhanced overall performance over the intermediate and long-term periods (Cheng & Lok, 2015). Accessible, understandable data assists construction leaders in uncovering patterns and enhancing project development (Safa & Hill, 2019). Management's ability to interpret and act on linked and analysed data from raw sources is critical (Murphy & Seriki, 2021). According to Basar (2018), big data analytics offer insights aiding human decision-making. Transforming data into actionable wisdom occurs when businesses utilize specific, automated processes (Pan et al., 2012). Raw data embodies numerical formulas or straightforward facts (Figure 6.10), while information is gleaned through systematic analysis.

Figure 6.10 highlights the importance of strategic decision-making practices, skilled workforce management, and high-quality information in driving construction business performance. While financial strength alone may not significantly influence performance, effective strategic decision-making processes, supported by accurate information and a competent workforce, are critical for organisational success in the construction industry. Quality of information significantly impacted construction business performance, acting as a mediating factor between strategic decision-making and construction business performance. The role of quality of information in decision-making is crucial, impacting decision speed and quality. Accessible,

understandable data aids construction leaders in uncovering patterns and enhancing project development. Transforming data into actionable wisdom through big data analytics offers insights aiding human decision-making.

These findings emphasize the importance of comprehensive strategic management practices, effective implementation, and continual evaluation in fostering organisational success within the construction industry. They also emphasise the pivotal role of quality of information in guiding decision-making processes and optimizing construction business performance. Moreover, the findings highlight the significance of enhanced collaboration between the government and industry stakeholders, particularly in developing effective regulatory frameworks and ensuring a skilled workforce. By providing valuable insights into the industry's challenges and opportunities, the study advocates for a strategic approach to infrastructure development. The proposed strategies and plans have the potential to enhance industry performance, fostering sustainable growth and development in the sector.

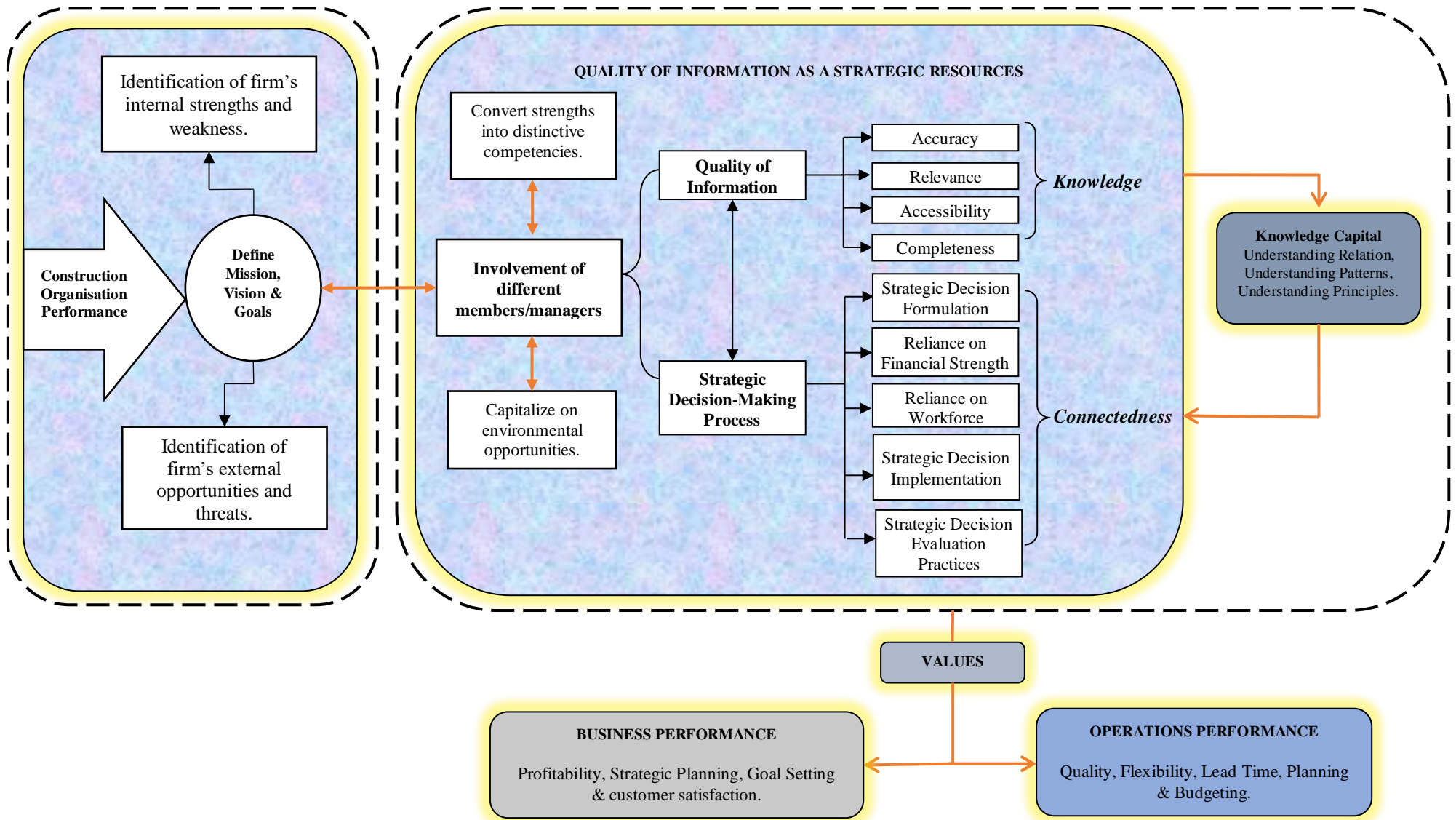


Figure 6.10: Quality of Information as a Strategic Resource

It is essential to ensure that the quality of the information aspects in the organisation is maintained at high levels at all times. In addition, improvements in the quality of information, including cooperation, visibility, and efficiency, contribute to improvements in organisation management. Within an organisation, cooperation refers to the working relationship between different departments. It is vital to do this to lower costs and cooperate towards a shared objective. Higher collaboration, in terms of its effect on visibility, results in increased visibility. This can give an accurate image for practical analysis and assessment, allowing for the early discovery of prospective possibilities, while efficiency is essential to maximize both profit and competitiveness. Utilization of information to its full potential is required for successful collaboration, visibility, and efficiency. By improving the quality of information, addressing data quality issues and biases, and leveraging project pipelines information, construction organisations can enhance their operational efficiency, reduce costs, and make more informed decisions about ongoing and future projects.

For this reason, accurate collaboration with the entirety of the company, made possible by the quality of the information, is necessary for successful decision-making. Additionally, Baskarada et al., (2005) observed that the performance of an organisation's operations depends on the interdependent aspects of people, organisational structure, and the quality of information. For this reason, these should be handled as a single set of enterprise resources at higher levels within the organisation to attain the desired levels of corporate performance. Baskarada et al., (2005) also stated that organisations should concentrate on managing these interdependencies, which are the driving force behind their operations, from a strategic point of view.

6.6 Discussion

Several factors contribute to the deterioration in information quality, which has become an increasingly pressing problem in both the academic and business worlds. An organisation will incur considerable expenses, both financially and in other ways, as a result of having poor information. On the other hand, the problem of the quality of the information has not been investigated in great detail in the field of the building business. As a result, within the framework of the construction industry, this has resulted in failures in the decision-making process for construction projects and presents a substantial problem in the decision-making process by stakeholders within the construction industry.

Therefore, it is of the utmost significance to all parties involved that enhanced quality of information is achieved within the construction sector for the construction project. In order to accomplish this goal, a wide variety of approaches and structures for evaluating and improving the quality of information have been created. In addition, there has not been a comprehensive investigation into how prevalent problems with the quality of information are in the decision-making processes that stakeholders in the construction business engage in.

Consequently, there is insufficient information to determine how widespread this problem is throughout the building sector. It has been observed that companies that do not have access to high-quality information have higher costs associated with their operations (Popovič & Habjan, 2012). In addition, Jylhä & Suvanto (2015) demonstrated the significance of analysing the quality of information within the context of an organisation. In addition, they noted that preliminary information results in inaccurate information processing, which in turn results in a reduction in the value of the information. In order to achieve this goal, this study aimed to explore the prevalence of information quality issues that impact decision-making. The study of the relevant literature revealed some early evidence of several elements that affected the quality of the information in organisational decision-making. These factors were roughly categorized into three (3) categories: the technology, organisational, and individual domains. Following an analysis of the relevant literature, several crucial characteristics that impact the quality of the information were found (see Figures 6.9 and 6.10). In order to validate each of the discovered factors, we looked them up in the relevant research literature and checked their accuracy. These aspects were broken down into categories known as themes, each of which had subthemes. All of these aspects, which are connected to the quality of the information used in decision-making, play a significant part in defining, deciding, driving, and explaining the outcomes (competitive advantage, performance, success, survival, and sustainability) of businesses. Construction organisations must prioritize establishing robust internal control systems to enhance their competitive edge and overall performance. Future research should aim to gather data from larger and more diverse populations, intensify information acquisition, and conduct comprehensive literature reviews on the interrelationships between information quality and decision-making aspects to fulfil the research objectives.

6.7 Conclusion

This research explored the intricate relationships between information quality, strategic decision-making, and construction organisation performance through a comprehensive literature review. The study employed rigorous review methods, including the use of ATLAS.ti 9 software for thematic analysis, to uncover factors influencing information quality and establish a framework for evaluating its impact on decision-making in the construction sector. The literature review approach proved suitable for conducting in-depth research on information quality, contributing substantially to the existing body of knowledge. The rigorous review methods enhanced the dependability and credibility of the results, leading to the identification of specific categories of information quality dimensions based on the contextualization of the investigated phenomena.

The study establishes a foundation for future analytical endeavours within the construction industry, facilitating the evaluation of information quality's impact on decision-making. It highlights the potential application of methodologies from other domains to assess information quality in construction, which can produce visual representations and simplify analysis. The research culminates in developing a comprehensive framework that provides practitioners with procedures to evaluate information quality. This framework enables construction industry practitioners to gain insights into improving information quality for decision-making within the sector. Various stakeholders can also use it to support organisations in enhancing the quality of information. One of the key findings is identifying critical factors influencing information quality, such as technological infrastructure, organisational processes, and personnel skills. The study underscores the importance of high-quality information in enhancing strategic decision-making processes, ultimately impacting project success and organisational performance.

Furthermore, the research identifies several barriers the construction industry faces in improving information quality, including data integration issues, lack of standardized processes, and inadequate training. The developed frameworks provide a foundation for evaluating and enhancing information quality in construction projects. This research significantly advances our understanding of the interrelations between information quality, strategic decision-making, and construction organisation

performance. The established framework and findings offer valuable insights and practical tools for practitioners to assess and improve information quality, ultimately contributing to better decision-making and organisational success in the construction industry. The study also highlights the emerging trends in the field, such as the impact of digital transformation, big data analytics, and artificial intelligence on information quality and decision-making processes. These findings provide a basis for future research directions and practical applications in the rapidly evolving construction industry landscape. This research contributes to the theoretical understanding of information management in construction and offers practical tools and strategies for industry professionals to enhance their decision-making processes and improve overall project outcomes.

6.8 Implications and Future Research

The findings of this study offer valuable recommendations for future research endeavours, emphasizing the paramount importance of the impact of information quality on strategic decision-making in construction organisations. From a theoretical perspective, this study makes significant contributions to the existing body of knowledge. It establishes a framework for evaluating the impact of information quality on decision-making in the construction sector, advancing the understanding of the interrelations between information quality, strategic decision-making, and construction organisation performance. The research highlights the potential application of methodologies from other domains to assess information quality in construction, which can produce visual representations and simplify analysis. Moreover, the study provides a comprehensive examination of decision-making, predominantly through qualitative research over time, focusing on established biases as foundational to successful strategic choices.

In terms of practical implications, the developed framework provides practitioners with procedures to evaluate information quality in construction projects. The research offers valuable insights and practical tools for practitioners to assess and improve information quality, ultimately contributing to better decision-making and organisational success in the construction industry. The findings emphasise the importance of comprehensive strategic management practices, effective implementation, and continual evaluation in fostering organisational success within the construction industry. Furthermore, the study advocates enhanced collaboration between the

government and industry stakeholders, particularly in developing effective regulatory frameworks and ensuring a skilled workforce.

However, the research does have some limitations. The study is confined to a literature review, which limits the empirical validation of the proposed models and frameworks. It primarily relies on the Scopus database, which may have led to the exclusion of relevant research published on other platforms or indexed in different databases. The focus on the construction industry may limit the generalizability of findings to other sectors. Additionally, the research does not provide a comprehensive investigation into how prevalent problems with the quality of information are in the decision-making processes that stakeholders in the construction business engage in. Future studies should aim to validate the findings through empirical research, potentially adopting a mixed-method approach. Researchers should gather data from larger and more diverse populations to enhance the generalizability of the findings. Future research could focus on intensifying information acquisition and conducting comprehensive literature reviews on the interrelationships between information quality and decision-making aspects. Studies could explore the application of the developed frameworks in different contexts or industries to test their broader applicability. Research could be conducted to investigate the prevalence of information quality issues in the decision-making processes of construction industry stakeholders. Future studies could examine the long-term impact of improved information quality on project outcomes and organisational performance in the construction industry. Lastly, researchers could investigate the role of emerging technologies (e.g., artificial intelligence, blockchain) in enhancing information quality and decision-making processes in construction projects.

EPILOGUE: PART TWO

This research journey through New Zealand's construction industry landscape has yielded significant insights into the intricate relationship between infrastructure pipeline information, strategic decision-making, and organisational performance. The findings presented across Chapters 4 to 6 have illuminated several critical aspects that warrant reflection and indicate promising directions for future development. Through careful analysis and systematic investigation, this study has demonstrated that successful construction business performance in New Zealand is fundamentally tied to organisations' ability to effectively process and utilize project pipelines information. The conceptual framework developed through this research establishes information quality as a crucial mediating factor between available pipeline data and strategic decision-making effectiveness.

The findings from this study have immediate practical applications for construction industry stakeholders. Organisations can now approach their strategic planning with a more nuanced understanding of the critical role of information quality in decision-making processes, the specific challenges and opportunities within New Zealand's construction context, and the importance of systematic approaches to pipeline information management. This enhanced understanding provides a foundation for improved organisational performance and more effective strategic planning processes.

The construction industry in New Zealand stands at a crucial juncture where the quality of information available about infrastructure pipelines directly influences organisational success. This research has demonstrated that the path to improved business performance lies not just in having access to information, but in the quality of that information and how effectively it is integrated into strategic decision-making processes. As the industry continues to evolve, the frameworks and insights developed through this research provide a robust foundation for organisations seeking to enhance their strategic capabilities and operational effectiveness. The findings suggest that future success in New Zealand's construction sector will increasingly depend on organisations' ability to adapt and respond to changing information landscapes while maintaining focus on quality-driven decision-making processes. The research presented here not only

contributes to the theoretical understanding of these relationships but also provides practical guidance for industry practitioners seeking to improve their strategic decision-making capabilities. As the construction industry continues to face new challenges and opportunities, the insights gained from this study will serve as valuable reference points for both academic research and practical application in the field.

PART 3

PRELIMINARY FINDINGS: RESULTS AND ANALYSIS

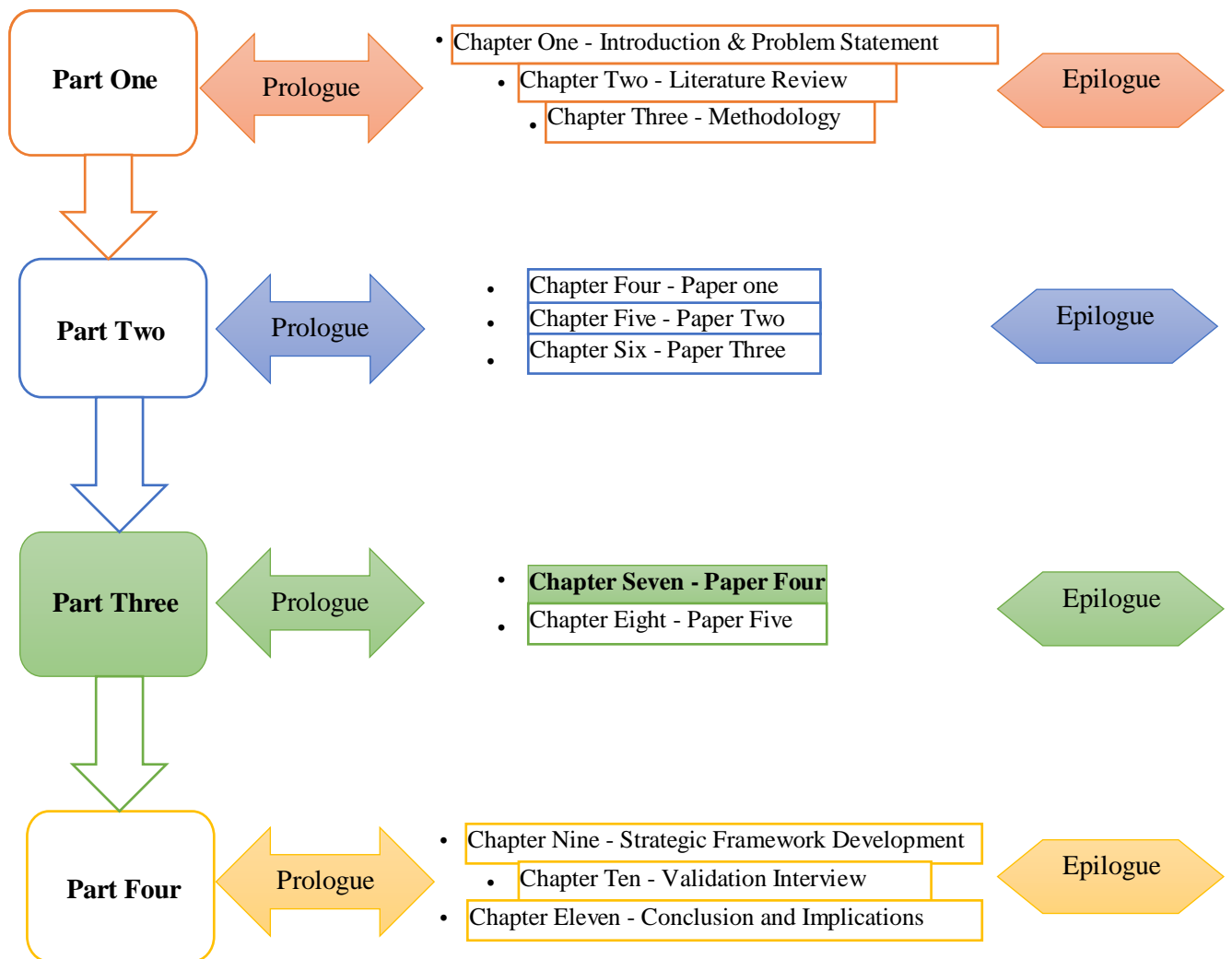
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PAPER FIVE

PROLOGUE

Part three of this thesis examines the relationship between strategic decision-making and construction business performance in New Zealand, addressing Objective 2 through statistical analysis of multiple hypotheses. Chapter 7 explores the nexus between strategic decision-making and construction business performance, fulfilling sub-objective 2a. The study reveals that strategic decision-making processes significantly influence organisational outcomes, with both internal and external factors shaping these decisions. Using partial least squares structural equation modelling (SmartPLS4), the research tested five hypotheses and developed a conceptual framework that offers valuable insights for industry practitioners while expanding the existing knowledge base. Chapter 8 builds upon these findings by investigating how information quality mediates the relationship between strategic decision-making and construction business performance in New Zealand, addressing sub-objective 2b. The study employed statistical analysis to evaluate the impact of strategic management practices on business performance, with a specific focus on information quality as a mediating factor. The research confirmed a positive correlation between strategic decision-making and business performance, with information quality playing a crucial mediating role. This relationship was validated through testing eleven hypotheses using SmartPLS4.



CHAPTER 7

PAPER 4

7.0 IMPROVING CONSTRUCTION PROJECT SUCCESS: UNRAVELING THE NEXUS BETWEEN STRATEGIC DECISION-MAKING AND CONSTRUCTION BUSINESS PERFORMANCE

This chapter is based on the following manuscript under review (Journal Paper):

Moshood, T. D., Rotimi, J. O. B., & Shahzad, W. (2025). Improving Construction Project Success: Unravelling the Nexus Between Strategic Decision-Making and Construction Business Performance. *Systems*.

Abstract: The New Zealand government aims to foster a sustainable construction sector, but the industry faces project delays due to various factors, including decision-making and information quality. This study investigates the interplay between strategic decision-making and organisation performance in New Zealand's construction context, seeking to provide insights and recommendations for enhancing information management practices, decision-making frameworks, and project performance. A survey was conducted to investigate the impact of key variables on strategic decision-making and construction business performance. The research employed advanced statistical techniques, including PLS-SEM with SmartPLS4, to analyse the data, ensuring robustness and reliability. The findings contribute to the advancement of knowledge and provide valuable insights for practitioners and researchers. The study found that strategic decision-making processes significantly influence construction organisations, which in turn impact business performance. Internal and external factors also shape decision-making. A conceptual framework was developed, and hypotheses were confirmed, providing valuable insights for practitioners and contributing to the existing body of knowledge. This study offers a unique approach by examining the impact of stakeholder strategic decision-making based on information quality within construction companies.

7.1 Introduction

Over the course of the last century, the evaluation of organisational and corporate performance has concentrated chiefly on financial elements. This is primarily attributable to innovations in performance measurement that have their roots in financial and management accounting (Wentzel et al., 2022). These innovations are the direct cause of the shift in emphasis that has taken place. The exclusive use of financial indicators in performance evaluation has been scrutinised recently, particularly within the past two decades. This is because financial ratios in and of themselves may not be reliable due to the use of "creative accounting" practises in certain businesses, particularly failing ones (Mafundu & Mafini, 2019). This issue stems from the possibility that financial ratios in and of themselves may not be credible because certain businesses engage in practises known as "creative accounting" (Arditi et al., 2000). In addition, academics have realised that aspects of a company's success that are not related to its financial performance can contribute to that company's overall success. For example, Russell & Zhai, (1996) concluded that economic factors might have a significant influence on the success of a firm, particularly in the construction industry. This was particularly true of the industry. Arditi et al., (2000) made an effort to determine the numerous elements that contribute to the failure of construction enterprises. They concluded that the most critical aspects are organisational (both human and organisational) and environmental (macroeconomic and industry). On the other hand, financial performance metrics are more like symptoms than causes of the collapse of construction enterprises (Xuan, 2021).

In addition, even though business performance is extremely important in the construction industry, it has received very little attention in the canonical literature on construction management. This is especially true regarding its role in providing practical assistance to improve construction business performance (Hu et al., 2021). At the moment, construction business performance is primarily focused on project specifics and profit orientation (considering "tangible" or "hard" factors). Still, it does not take into account the broader "stakeholder decision-making" issues (which are predominantly "intangible" or "softer" issues), which encroach upon these phenomena (Malik et al., 2019). According to Bajracharya et al., (2018), in this context, it is completely inappropriate to evaluate projects, contractors, procurement methods, and the like solely on the extent to which they meet client objectives and goals without taking into consideration the nature of their business environment, the structure of the organisation,

the level of technology employed, and so on (Ingle & Mahesh, 2022). This evaluation method is deemed wholly inappropriate because it disregards the nature of the business environment, the structure of the organisation, the level of technology employed, and so on.

Nevertheless, performance measurement research in the construction industry has traditionally taken a limited approach, generally failing to acknowledge the profoundly complex and interrelated character of what is, in essence, a dynamic social system that is open to an endless number of permutations (Tolson, 2020). To fully comprehend why some businesses are more successful than others, one must have a comprehensive understanding of the contextual, technological, structural, and human elements involved (Behúnová et al., 2018). These aspects are not mutually exclusive; instead, many overlap and are in continual communication with one another, which is how critical social processes are set in motion. It is common to practise neglecting social processes while seeking a comprehensive understanding of corporate organisations (D. Lin et al., 2018). Therefore, it is necessary to look beyond the (traditional) narrow and reactive measures to acquire a holistic perspective of business performance. Instead, one must concentrate on the broad and longer-term considerations of the organisation's corporate strategy, business processes, and the requirements of customers (R. Yang et al., 2020).

Construction companies need to have a solid understanding of how they are doing and how they will need to perform in the future if they want to maintain their competitiveness in both domestic and international markets (Love & Holt, 2000). These expectations have never previously been more significant than they are now, given that the global economy is becoming increasingly competitive and smaller (Jang et al., 2019). Ignoring this necessity leads to short-termism and management strategies that are "blinkerred," with attendant dangers developing from better structured and "slicker" enterprises pushing upon previously safe markets. If metaphor is used, it has truly become a case of "survival of the fittest." This argument is driven home by the reality that the previous 20 years have seen a significant number of mergers and acquisitions in the construction industry, which has led to the current predominance of enterprises that are part of larger conglomerates (R. Yang et al., 2020). Effective construction business performance is required in this circumstance. It should be effective because it should make it possible for a construction firm to analyse and establish its position in relation to the business environment in which it operates (Afzal & Lim, 2022). On the other hand,

the success of a construction company typically depends on "conventional" (bottom-line) performance indicators, such as the effectiveness of the plan, productivity, and profitability (Naji et al., 2022). Several commentators have been justified in their criticism of these measures, primarily due to the following reasons: they over-rely on financial aspects, are retrospective (and are therefore always to some extent out-of-date), and do not accurately reflect the interests of stakeholders.

In addition, it is generally acknowledged that using inappropriate performance measures can encourage short-term thinking, lack of strategic focus, failure to provide data on quality, responsiveness, and flexibility, failure to provide information on what customers truly want (and what they are actually getting), and failure to identify how competitors are performing (Nguyen, 2020). Tripathi et al., (2021) argued that business performance measurement should go beyond traditional financial metrics and include essential business drivers that determine and influence a company's future business (volume/direction, etc.). Several new performance measurement frameworks incorporating financial measures and business drivers have emerged in the management literature in response to calls for improved business performance measurement. These frameworks were developed in response to calls for enhanced business performance measurement. The performance measuring matrix (Keegan et al., 1989), the performance pyramid (Lynch & Koshland Jr, 1991), and the balanced scorecard (Kaplan & Norton, 1996) are some examples.

Other examples include measuring particular aspects of a company's performance has been the primary focus of the work of several authors. Take, for instance, consumer satisfaction (Berry et al., 1994), staff satisfaction (House & Price, 1991), and the success of a corporation (Chakravarthy & Gargiulo, 1998). In addition, the problem of the significant part that workers play in ensuring the success of a construction company (what is commonly known as the "people factor") has not been ignored (Love & Holt, 2000). In light of this circumstance, this research aims to highlight the need for a shift in orthodox beliefs concerning the performance of businesses involved in the construction industry (Oyewobi et al., 2021). Although the problem of expansive business performance measurement (in the context of any business) is not a new one, the particular aspect of "stakeholder strategic decision-making based on the quality of information" interests in a construction company, as well as the incorporation of such interests into the development of strategic construction business planning, is a relatively new phenomenon.

7.2 Levels of Strategic Decision Making in Organisations

Regarding organisations, the strategy may be implemented on three levels: corporate, business, and functional. The overarching goal of a corporate strategy is to determine what the company should be and how its operations should be organised and controlled (Назаров, 2021). This strategy is accountable for establishing the general goal and objectives of the company, assessing ideas that emerge from business and functional levels, and allocating resources in accordance with a sense of strategic priorities (G. Li et al., 2021). Because there are many levels of strategy, business executives can create goals for their companies at every level, from the most general corporate level to the most specific functional level. Sadler, (2003), suggests that essential strategic questions such as the following are posed at the corporate level:

- What is the purpose of the organisation or mission, as well as the values and principles that employees of the organisation should adhere to when conducting themselves?
- What are some ideal qualities that should be present in the culture of the company?
- Which fields of business or areas of the market should it enter or exit, and why?
- What sort of organisational structure would be most beneficial to the plan, and what kinds of control methods would be most effective?
- How can value be added by things like different brands, different strengths, different images, and different reputations?

Because the strategic decision-making at the corporate level is the highest point in an organisation, the decisions taken at this level will ultimately inform the primary aim of the firm, as well as the goals of the lower levels within the organisation (BusinessBecause, 2022). The decisions that are made at the corporate level regarding strategy are those made by senior management to penetrate different sectors or marketplaces and achieve a competitive edge.

Business strategies constitute the second level of strategy within organisations. According to Nyariki, (2016), the primary focus of a company strategy is to ensure that each strategic business unit continues to hold a competitive edge. According to Coulter

et al., (2008), business strategies and competitive strategies are concerned with how an organisation plans to compete in a particular sector or line of work. This level of strategy also entails accurately identifying the essential success elements in a given market and operating the company in such a way that it meets the critical success factors more successfully than its competitors. According to Adendorff et al., (2011), a differentiation strategy is an appropriate strategy to pursue when a company is able to differentiate its products along with some attributes that customers value. The cost of doing so is lower than the extra revenue anticipated to be generated due to pursuing the differentiation strategy (BusinessBecause, 2022).

To put it another way, the consumer believes that the price of the product, concerning the various other options that are accessible, is significantly lower than the product's value (Louis & Dunston, 2018). According to Adendorff et al., (2011), the objective of the differentiation strategy is to reduce the degree to which the company's product is affected by price competition. In other words, shoppers place less importance on cost considerations when purchasing.

The third level of strategy is known as the functional or operational strategy, depending on how it is used. According to Ehlers & Lazenby, (2004), functional strategies, also known as operational strategies, are the decisions and actions taken by an organisation's various functional areas, such as marketing, operation, production, finance, and human resources, that are directed towards achieving short-term goals. Examples of these functional areas include marketing, production, finance, and human resources (BusinessBecause, 2022). In order for the corporation to be able to support the business and corporate strategy of the company, the corporation has to guarantee that its competitive strategy is maintained throughout each and every functional area (G. Li et al., 2021). For the functional-level strategy to be successful, it is the responsibility of the project managers to ensure that the day-to-day operations in each department align with the desired results of the company as a whole. In order to do this, it will be necessary to set specific metrics into place so that they can monitor whether or not each sector is achieving the broader goals (Eberhardt et al., 2022). Examples of functional strategies include a company's approaches to research and development, marketing, financing, and manufacturing.

An illustrative instance pertains to the company's approach to research and development. Each of these diverse strategies necessitates a unique set of decisions to effectively execute their respective tasks, aligning with the company's overarching strategy. Proficient communication emerges as a crucial competency for departmental leaders responsible for functional-level strategy (BusinessBecause, 2022). These executives must adeptly translate organisational strategy into actionable functional strategies and offer insights for refining organisational strategies when necessary. Moreover, they must grasp the skill of converting higher-level strategies into functional-level strategies.

Initiating the discourse, it's essential to outline that the process of strategic management encompasses envisioning a guiding vision, formulating a strategic mission, defining objectives, conducting situational analysis, crafting strategies, executing plans, and assessing outcomes (G. Li et al., 2021). As evident from literature, strategic management involves a recurring sequence of interlinked stages, enabling companies to establish, execute, and oversee the achievement of long-term business objectives. Notably, this process remains dynamic and continuous, implying that changes in one facet can trigger a cascade effect across the entire strategy.

In the realm of strategy formulation, factors encompassing economic, social, political, technological, ecological, and industry environments come under consideration (Karam et al., 2019). These factors span entry barriers, competitive dynamics, substitutes' availability, and the bargaining influence of buyers and suppliers. Following the successful formulation of an efficient strategy, organisations must diligently assess their strategic choices to sustain competitiveness in the long run. Subsequently, as organisations set long-term goals and pinpoint suitable strategies, the strategic management process seamlessly transitions into the implementation phase.

The adoption of strategic management practices profoundly impacts a firm's performance, as it provides a conceptual framework to comprehend strategic positioning and navigate future choices. Pearce and Robinson (2007) echo this perspective, emphasizing that embracing strategic management is pivotal for mitigating uncertainties, devising strategies that sustain operations, and minimizing risks. Furthermore, within the construction industry, the application of strategic management practices holds paramount importance in enhancing financial performance and overall business outcomes.

7.3 Hypotheses Development and Theories

In social and behavioural sciences research, establishing a rationale or theoretical framework is crucial. This framework (see Figure 7.1), often known as a theoretical foundation, serves as a conceptual model explaining the interactions among various elements essential to solving a specific problem (Chen et al., 2018). In this study, the theoretical framework derives from theories emphasizing the significance of strategic decision-making on construction business performance. Several theories, like the Ansoff strategic success theory and the resource-based view theory, underpin this study. Ansoff initially introduced the strategic success formula for strategic management, later developed by Harry Igor Ansoff & Donnel, (1990). This formula suggests that exceptional company performance aligns with an organisation's strategy adapting to environmental turbulence while its capabilities match the strategy's aggressiveness (Moussetis, 2011). To achieve optimal performance, it is crucial for an organisation that the aggressiveness of its strategy matches environmental turbulence, its capability's responsiveness aligns with strategic aggressiveness, and its components support each other (Kiple & Lewis, 2009). Essentially, this strategic diagnosis tool guides organisations in adjusting strategy and internal capabilities for future success (Njeru, 2015).

Similarly, the resource-based view theory, pioneered by Wernerfelt, (1984) and extended by Barney, (1991), asserts that a firm's strategy results from its resource assortment (Freeman et al., 2021). It suggests that an organisation's resources are more critical than industry structure in gaining and maintaining a competitive edge (Njeru, 2015). According to this view, an organisation's resources and capabilities define its efficiency and effectiveness. Organisational resources, including material, financial, informational, and human capital, drive competitive advantage and enhanced company performance (Safari & Saleh, 2020). This theory implies that strategic decision-making in the construction sector depends on available resources, often influenced by factors like size, industry, and legal formation, impacting the industry's success. Therefore, the stakeholders' strategic decisions play a pivotal role in strengthening construction organisations. The conceptual framework elucidates the relationships between variables, showcasing their interdependence as independent, and dependent variables.

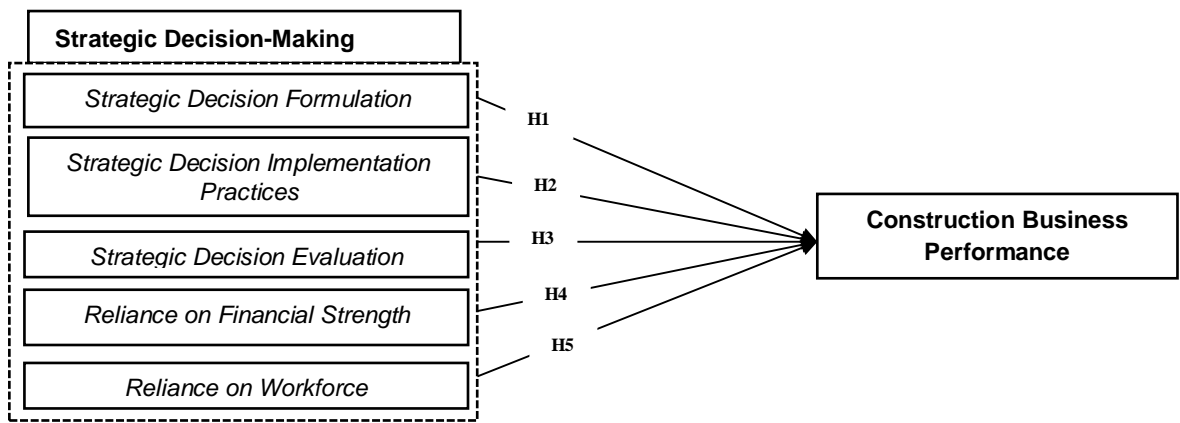


Figure 7.1: Conceptual Framework

Based on robust research evidence, this hypothesis was formulated, focusing on the pivotal role of strategic decision-making in influencing construction business performance. Strategic decision formulation is a multifaceted process that encompasses defining organisational objectives, exploring alternative courses of action, and ultimately selecting the optimal path. This intricate undertaking requires a careful consideration of an organisation's core competencies and the ever-changing external environment (Yildiz & Ahi, 2022). Notably, this decision-making process operates in an environment rife with aggregated, incomplete, and uncertain information related to various strategic options.

In the contemporary business landscape, executives find themselves not only responsible for managing internal activities but also navigating the complex challenges posed by their organisation's immediate and broader environment (Ng'andu, 2022). The realm of strategic management, therefore, extends beyond mere decision-making to encompass a series of deliberate actions aimed at formulating and executing plans. These plans are specifically designed to achieve the company's objectives, emphasizing forward-thinking, large-scale strategies to effectively engage with the environment and successfully accomplish overarching goals.

H1: *There is a positive effect of strategic decision formulation on the construction business performance.*

A compelling strategic plan goes beyond mere documentation; it transforms into a series of actionable steps intricately tailored to the distinctive nuances of goods

production (Chen, 2015). Precision and clarity are paramount in articulating these plans, but their essence lies in serving as guiding instruments steering an organisation towards success. This involves not only adhering to specific details but also maintaining flexibility, enabling the organisation to capitalize on emerging opportunities and adapt to dynamic market changes.

The strategic planning process is an evolving one, subject to constant adjustments in order to effectively accomplish the overarching mission (Babalola et al., 2019). It is a dynamic approach that acknowledges the fluidity of the business landscape. The diverse array of stakeholders, including stockholders, employees, management, creditors, consumers, and suppliers, have distinct expectations. These range from anticipating adequate returns on investment and fair wages to timely payments and value for purchases. Failure to consider and address these varied stakeholder interests in the formulation of strategies may result in a withdrawal of their support (Doz, 2020). Therefore, strategic planning should be a holistic endeavour that not only outlines specific actions but also takes into account the multifaceted needs and expectations of all stakeholders.

H2: There is a positive effect of strategic decision implementation practices on the construction business performance.

The assessment of strategic decisions holds significant importance in validating the effectiveness of management's strategies and determining their ultimate success or failure. This evaluation serves as a critical juncture for organisations to reassess their trajectory and make necessary adjustments to the strategic plan if performance falls short of expectations (Ng'andu, 2022). Following the successful implementation of a well-formulated strategy, it is imperative for organisations to engage in consistent reviews of their strategic choices to sustain competitiveness. Strategy evaluation emerges as the linchpin for deciding whether to persevere with the current vision, objectives, strategies, and execution approaches or to make necessary modifications (Barbhuiya & Das, 2023).

When a company's direction harmonizes effectively with industry conditions and performance targets are met, management gains the opportunity to focus on refining the strategy and enhancing execution (Y. Pan & Zhang, 2021). The ongoing process of strategy evaluation plays a crucial role in ascertaining the appropriateness of objectives, policies, and plans. It serves as a mechanism for confirming or challenging underlying

assumptions (Mintzberg et al., 2002). In essence, strategic decision evaluation is not just a retrospective exercise; it is a forward-looking practice that informs the ongoing evolution of an organisation's strategic approach, ensuring alignment with its goals and the ever-changing business landscape.

H3: There is a positive effect of strategic decision evaluation on the construction business performance.

Financial performance serves as a comprehensive gauge of a company's overall financial stability and its relative standing when compared to industry peers. The examination of financial statements to discern aspects of profitability and stability is crucial in gaining insights into a firm's financial health (Mishlanova, 2019). Utilizing financial ratios as diagnostic tools further illuminates the strengths and weaknesses across critical dimensions such as liquidity, efficiency, leverage, and profitability. Numerous studies underscore the efficacy of financial ratios in providing a nuanced evaluation of organisational performance (Fahami et al., 2019).

By meticulously scrutinizing these key financial indicators, stakeholders are empowered to make well-informed judgments about the viability of a project and its potential returns (Taofeeq et al., 2020b). The assessment of a company's financial performance is of paramount importance to various stakeholders—ranging from managers and shareholders to creditors, investors, and even tax authorities. This significance becomes particularly pronounced in the rapidly evolving global landscape where dynamic economic conditions necessitate a thorough understanding of a company's financial standing (Styhre, 2019). Consequently, the meticulous evaluation of financial performance is not merely an internal concern; it is a pivotal aspect that informs decisions and perceptions across a spectrum of stakeholders in the broader business ecosystem.

H4: There is a positive effect of financial strength on the construction business performance.

The presence of unskilled labour poses a substantial productivity challenge, particularly in the construction sector, leading to adverse impacts on project performance. The scarcity of skilled labour compounds this challenge, significantly affecting the long-term economic viability and success of construction projects. Projects grappling with a shortage of skilled labour often find themselves under pressure to adhere to tight

schedules in order to meet project targets (Hussain et al., 2018). The persistent issue of poor labour productivity emerges as a critical factor influencing project performance within the construction industry (Shehata & El-Gohary, 2011).

Effectively managing resources becomes imperative to alleviate the adverse impacts on construction projects, encompassing considerations related to time, cost, quality, and safety. Construction managers and contractors need to be well-versed in strategies and methodologies for assessing workers' productivity across different skill levels (Hussain et al., 2020). This knowledge is essential for addressing the challenges posed by unskilled labour and the scarcity of skilled workers, ultimately fostering improved project outcomes and overall success within the construction sector.

H5: There is a positive effect workforce on the construction business performance.

7.4 Research method – Questionnaire

This part lays out the plan for the quantitative research study. The field of quantitative research is where you will most often find a survey being employed (Saunders et al., 2012). The data collection was planned based on an evaluation of the study's design. In correlational research, surveys are frequently used to collect individual responses that reveal their ideas, beliefs, and attitudes (Creswell, 2014). A survey assists researchers in verifying facts, estimating correlations, and making predictions based on the study's aims and objectives. In order to better understand the relationships between strategic decision-making and construction business performance in New Zealand, this study have employed survey approaches.

Furthermore, surveys performed in person or online anonymity; here is where online-based surveys excel because they may provide anonymity to those who participate (Gosling et al., 2004). In addition, online surveys provide several benefits, such as the convenience of collecting data and the timeliness of obtaining responses (Ilieva et al., 2002). This research approach was used to give descriptive data on the profiles of organisational variables on the strategic decision-making and construction business performance in New Zealand to identify the state and standards of construction business performance in New Zealand.

7.4.1 Questionnaire Design

First and foremost, rating scales are a prominent technique in quantitative research (Dawes, 2008). Second, a scale's range of potential answers varies, and textbooks on the subject often depict the most prevalent 5- or 9-point versions (Malhotra, 2006). Third, all scales utilised to measure the researched components in this study were of the 5- to 9-point Likert type. Fourth, scales derived from well-known instruments were revalidated for face validity and reliability and concept validity and reliability.

A self-administered online survey was employed in this study. A well-designed questionnaire can also aid in increasing response rates. Furthermore, responses were judged legitimate if experts comprehended the questions and could readily follow the flow of questions. It is critical to plan the flow of the questions carefully. This was accomplished using an approach Saunders et al. (2012) developed for sequencing questions. As a result, research experts arranged questions logically and naturally. The survey concluded with a series of questions designed to collect demographic data. Before performing the official online survey, a pre-test and pilot test was organised in this research to ensure the validity of the question sequence. There was a total of 37 questions on the survey, and its completion was estimated to take between 15 and 20 minutes.

7.4.2 Population and Sample

The population can be defined as the conceptual idea of a huge proportion of several cases from which a researcher takes a sample which is applied to the outcomes of a study. In contrast, sample size can be defined as a small set of cases selected from a large pool by a researcher and generalized to the population (Neuman, 2013). All persons or objects have a common feature, attribute, or personality within a population. One of the most critical aspects of the study is the population. The target population refers to the entire set of people or objects on which researchers want to reach a conclusion. The theoretical population is what it's called. The subset of the target population is also known as the sample.

In this research, the unit of analysis is organisation as the response comes from different construction organisation in New Zealand. In this study, the researcher focuses on New Zealand construction organisation large population. According to Stuff.com,

there are 70,629 construction companies in New Zealand. As of 30 June 2024, there were 1,327 senior managers in the construction industry (defined as the top 3 tiers of managers with chief executives being tier one). Thus, the target population of this study were middle to senior-level construction managers, directors, engineers etc., who are involved in strategic decision-making within their respective constructing organisations. The aim is to improve decision-making and construction organisations' performance through better quality information.

Sampling can be seen as a research strategy for assigning effective experts of the population in certain research (Sekaran & Rani, 2010). The sampling method used in this study is the voluntary sample technique. A voluntary sample is one of the most common forms of non-probability sampling procedures and is also one of the most effective. A voluntary sample is made up of individuals who choose to participate in the survey by self-selection. Frequently, these individuals show a significant interest in the main topic of the survey.

Sekaran (2006) acknowledged that the corresponding sampling reflects the same percentage of a collection of thresholds during the survey process. The minimum sample size was drawn based on G*Power by considering statistical power, effect size, error probability and the number of predictors. As a result, G*Power is a tool for calculating statistical power in a variety of t-tests, F-tests, tests, Z-tests, and other tests. G*Power may also be used to determine effect sizes and display power analysis results graphically. The sample size is calculated as a function of the viewer-assigned values for the observed population effect size (f^2), the required significance level (α), the predicted statistical power ($1-\beta$), and the total number of predictors using G*Power software (Bakker et al., 2020; Faul et al., 2009). A total of 102 experts were sufficient for this study in accordance with the G-Power assumptions for PLS-SEM.

7.4.3 Data Collection Method

A post-positivist views the world objectively (Merriam & Grenier, 2019). According to Scheuren (2004), the term "survey" is frequently used to describe a technique of collecting data from a group of people. The online questionnaire survey began in August 2023 and continued until December of the year 2023. This research uses closed-ended questions for this study. The survey technique tracks and identifies people's

thoughts, feelings, and views. The survey is the most properly utilized tool regarding the time and quantity necessary to gather sufficient data. Data for all variables were gathered through a self-administered online-based survey approach to ensure impartiality, prevent researcher bias and to ensure a diverse Expert pool.

Recruitment was primarily targeting members of Building Contractors, New Zealand Institute of Building, Infrastructure New Zealand, The National Association for Civil Construction in New Zealand as well as professionals associated with various construction organisation through platforms like LinkedIn. School of Built Environment engagement contact list was also utilised to contact relevant industry experts. Initiating contact with potential experts began through email communication. The online survey used Qualtrics system to gather the needed information for this research. This initial contact contained an official invitation letter outlining the study's purpose and importance. Alongside the letter, an expert consent form, and a direct link to the survey questionnaire was provided. Any Expert expresses interest in participating, they have the opportunity to proceed with the survey. The reasons for choosing this online survey method are that it is easy, fast, and inexpensive. Using this technique, the researchers can cut their costs, including documentation, transportation, and printing costs. The respondents also can feel more comfortable and convenient because they can answer the questionnaire anytime and anywhere. Following the delivery of the questionnaires, it was intended that the sample individual would return them with their answers within two weeks. Individuals who did not respond were contacted through email and telephone to increase the response rate during the third week.

7.5 Findings

7.5.1 Demographic Distribution of the Respondents

Table 7.1 gives a breakdown of the demographic information of the study experts. The demographic information was collated to show similarities and differences in: position, gender, age, qualification, and geographic location, in line with (Hair et al., 2013; Sekaran and Bougie, 2016). A total of 102 surveys were completed and utilized to analyse the questionnaire that was sent out to experts.

Table 7.1: Profile of Respondents

Profiles Items	Frequency	Percentage%
1. Position in Organisation		
Project Manager	14	13.73
Project Engineer	15	14.71
Executive Director	30	29.5
Contract Manager	09	8.8
Site Manager/Engineer	05	4.9
Quantity Surveyor/Estimator	02	1.96
Marketing Manager	04	3.9
General Manager	18	17.6
Others	05	4.9
2. Company Project Specialization		
Non-Residential Buildings	17	16.7
Residential Buildings	38	37.3
Commercial Buildings	18	17.6
Infrastructure	24	23.5
Other	05	4.9
3. Number of Direct Workers		
0-25	07	6.9
26-50	21	20.6
51-100	41	40.19
Above 100	33	32.3
Total	102	100

7.5.2 Measurement Model Assessment

To ensure the validity and reliability of this research findings, a construct validity, convergent, discriminant test was used to assess the measurement model. Construct validity refers to the degree to which a measurement instrument accurately reflects the theoretical concept or construct it is intended to measure (O’Leary-Kelly & Vokurka, 1998). The study's results may be compromised if construct validity is not properly evaluated (Taofeeq et al., 2020a). To thoroughly assess a measurement model's validity, two distinct indicators - convergent validity and discriminant validity - are required. A measurement theory was established before the assessment, as shown in Figure 7.2.

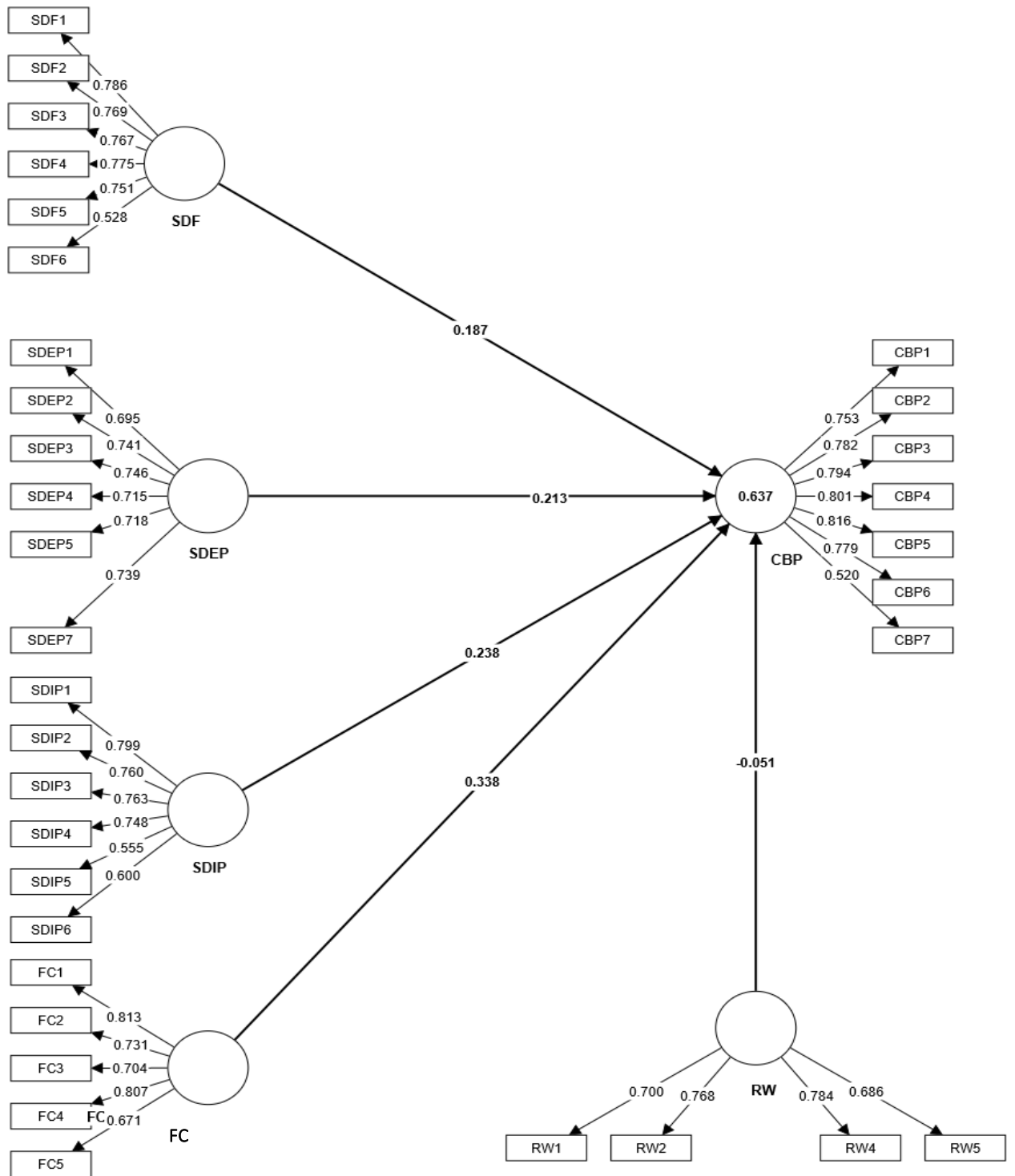


Figure 7.2: PLS Path Model

Convergent validity requires outer loadings, average variance extracted (AVE), and composite reliability. The measurement model's variance for each construct was examined using outer loadings, and the reliability of the indicators was assessed using the AVE (Joe F Hair et al., 2016). Composite reliability was used to evaluate the internal consistency reliability of each component and their relationship. A summary of the convergent validity assessment is shown in Table 7.2.

Table 7.2: Convergent Validity

Item Code	Outer Loading	Cronbach's Alpha	CR (rho_a)	CR (rho_c)	CR (AVE)
CBP1	0.753	0.871	0.881	0.902	0.571
CBP2	0.782				
CBP3	0.794				
CBP4	0.801				
CBP5	0.816				
CBP6	0.779				
CBP7	0.520				
FC1	0.813	0.716	0.722	0.824	0.541
FC2	0.731				
FC3	0.704				
FC4	0.807				
FC5	0.671				
RW1	0.700	0.800	0.808	0.863	0.558
RW2	0.768				
RW4	0.784				
RW5	0.686				
SDEP1	0.695	0.821	0.822	0.870	0.527
SDEP2	0.741				
SDEP3	0.746				
SDEP4	0.715				
SDEP5	0.718				
SDEP7	0.739				
SDF1	0.786	0.825	0.831	0.874	0.540
SDF2	0.769				
SDF3	0.767				
SDF4	0.775				
SDF5	0.751				
SDF6	0.528				
SDIP1	0.799	0.804	0.828	0.857	0.504
SDIP2	0.760				
SDIP3	0.763				
SDIP4	0.748				
SDIP5	0.555				

Additionally, a new method for assessing the discriminant validity of variance-based SEM is the heterotrait-monotrait ratio of correlations (HTMT) (Henseler et al., 2015). Henseler believes that the Heterotrait-Monotrait ratio of correlations (HTMT) method is the best suitable for assessing the Discriminant Validity (DV) of the constructs (Henseler et al., 2015). To achieve DV (Gold et al., 2001; Javed Memon et al., 2013; Teo et al., 2008), HTMT values should not exceed either the HTMT.85 value of 0.85 or the HTMT.90 value of 0.90 (Clark et al., 1995; Kline, 1998). According to Table 7.3, no values have been found that have passed both the HTMT.85 and HTMT.90 tests, indicating that the discriminant validity has not been shown. Values of 0.95 and above are thus regarded as problematic. Therefore, all the DV in this study are acceptable.

Table 7.3: Discriminant Validity: Heterotrait-Monotrait Ratio Statistics

Items	CBP	FC	RW	SDEP	SDF	SDIP
CBP						
FC	0.549					
RW	0.763	0.759				
SDEP	0.804	0.588	0.586			
SDF	0.814	0.577	0.635	0.851		
SDIP	0.810	0.593	0.687	0.837	0.826	

7.5.3 Collinearity Statistics (VIF)

As detailed by Tabachnick & Fidell (2007), "multi-collinearity" denotes a scenario in which multiple exogenous latent variables display significant associations with each other. The presence of multi-collinearity among exogenous latent constructs can substantially influence the regression coefficient estimates and subsequent tests for their statistical significance (Hair et al., 2019). Within the context of multi-collinearity, the standard errors of coefficients often elevate, leading to a diminished statistical significance of these coefficients, as Tabachnick & Fidell, (2007) indicated. The Variance Inflation Factors (VIF) values were harnessed to assess the potential impact of collinearity. A VIF value within or below 5 is essential to mitigate collinearity issues (Joe F Hair Jr et al., 2019; Taofeeq et al., 2019). Within this study, Smart-PLS 4 was employed

to calculate VIFs for all latent variables in the model. The results of the multicollinearity test, illustrated in Table 7.4, span a range from 3.188 to 3.301, suggesting a level of collinearity that is not of significant concern.

Table 7.4: Inner VIF Values

Items	VIF
FC -> CBP	1.580
RW -> CBP	1.769
SDEP -> CBP	3.301
SDF -> CBP	3.195
SDIP -> CBP	3.188

7.5.4 Structural Model Assessment: Hypothesis Testing

After completing the assessment of the measurement model and ensuring the results adhere to all requirements, the research team employed bootstrapping in Smart-PLS to determine the hypothesis testing in the structural model (Joseph F Hair, Anderson, et al., 2010; Sarstedt et al., 2014). The bootstrapping was conducted with a sample size of 5,000 and a significance level of 0.05 (Hair et al., 2010). The researchers evaluated the standardized path coefficients (standard beta) to assess the strength of the relationships between the critical variables (Sarstedt et al., 2014). However, a positive outcome does not automatically indicate a significant relationship; the researchers also assessed the interaction effects (t-values) to validate the hypotheses (Ravand & Baghaei, 2016). As per the recommendations of Hair et al. (2013), hypotheses were accepted if the t-value exceeded 1.645 ($t\text{-value} > 1.645$) when the p-value was less than 0.05 in a one-tailed test. The results of the hypothesis testing are presented in Figure 7.3 and Table 7.5.

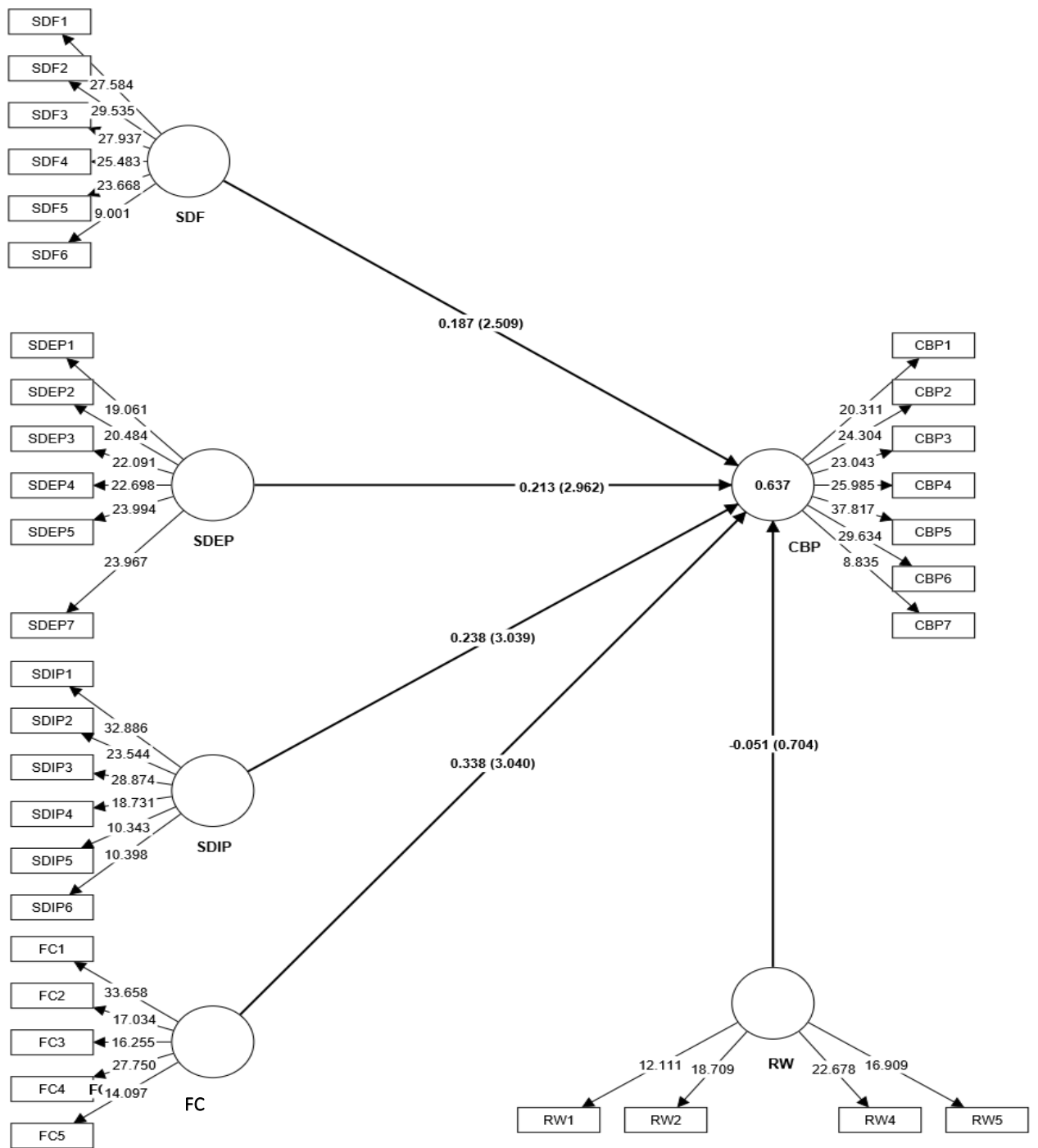


Figure 7.3: Evaluation of Structural Model through PLS Bootstrapping

Table 7.5: Summary of Hypotheses Testing

Hypotheses	Path	Std. Beta	std. Error	t-value	Bias	Confidence Interval		Decision
						5.00%	95.00%	
H1	SDF -> CBP	0.187	0.186	2.509	0.001	0.071	0.318	Supported
H2	SDIP -> CBP	0.238	0.248	3.039	0.010	0.104	0.359	Supported
H3	SDEP -> CBP	0.213	0.204	2.962	0.008	0.095	0.330	Supported
H4	FC -> CBP	-0.051	-0.039	0.704	0.012	-0.199	0.047	Not Supported
H5	RW -> CBP	0.338	0.333	3.040	0.005	0.156	0.519	Supported

Note: **Significant at 0.05 (p-value), **significant at 1.65 (t-value). Note: Strategic Decision Formulation (SDF), Strategic Decision Implementation Practices (SDIP), Strategic Decision Evaluation (SDE), Reliance on Financial Strength (FC), Reliance on Workforce (RW), Construction Business Performance (CBP).

Table 7.5 summarizes the tests of the five hypotheses developed for this study. Four of the five research hypotheses have significant connections that point in the hypothesized directions. In hypothesis 1, the study found a strong relationship between strategic decision formulation and construction business performance, with ($\beta = 0.187$, $t=2.509$). The study found that there is a positive connection between strategic decision implementation practices and construction business performance, with a value of ($\beta = 0.238$, $t = 3.039$). Additionally, the study found that strategic decision evaluation has a positive impact on construction business performance ($\beta = 0.213$, $t = 0.2.962$). Also, the link between reliance on workforce and the construction business performance is positive, with a value of ($\beta = 0.338$, $t = 3.040$). The only hypothesis not supported in the research is Hypothesis 4. The study found that the financial strength aspect has a discernible influence on construction business performance, with a path coefficient (β) of -0.051 and a t-value of 0.704.

7.5.5 Coefficient of Determination (R^2)

The R-square has been established in the literature as a measure of how much variation in the endogenous variable is analysed by its exogenous variable. The R-square displays the calibre of the variables included in the model (Hair et al., 2011). The degree of R-square may be calculated using several variables, and these variables can be used as guidelines. For instance, Chin et al. state that an R-square value of 0.67 or above is deemed significant, 0.33 is considered moderate, and 0.19 is considered weak Chin et al. (2003). Table 7.6 depicts the R-squared values of the endogenous latent variable (construction business performance).

Table 7.6: Variance Explained in the Endogenous Latent Variable

Item	R-square	R-square adjusted
CBP	0.637	0.631

7.5.6 Effect Size

According to (Hair et al., 2013), the predictive importance of impact size (f^2) and basic traits is widely reported. Cohen, (1988) criteria state that the impact size must be less than 0.02 (0.10 to 0.14 = moderate, 0.15 to 0.34 = medium, and 0.35 and above = strong). According to Cohen's criteria, the f^2 was assessed; values between 0.10 and 0.14 indicated a small effect, 0.15 and 0.34 indicated a medium effect, and 0.35 and above indicated a strong effect (Cohen, 1988). All eleven factors were examined for f^2 , summarizing the findings in Table 7.7.

Table 7.7: Effect Size

Construct	F-square	Criteria
FC -> CBP	0.013	Small Effect
RW -> CBP	0.212	Medium Effect
SDEP -> CBP	0.017	Small Effect
SDF -> CBP	0.009	Small Effect
SDIP -> CBP	0.019	Small Effect

7.5.7 Assessment of the PLS Predict

PLS predict is a novel feature that allows researchers to evaluate the prediction power of a model outside of the sample (Hair et al., 2021). The sample data are divided into k folds using PLS predict, each around the same size as the sample data. The method produces a training sample after combining the k-1 folds, which is used to calculate the model's parameters (Hair et al., 2021). Utilizing the data from this fold, the remaining fold is used as a holdout sample to assess the predictive potential of the model (Shmueli et al., 2019). In other words, the holdout sample includes the cases for which forecasts will be made using model parameters calculated from the training sample. This process is repeated until each k fold has served as a holdout sample for the fold before it.

However, depending on the sample size, the default number of folds (k) is often 10. However, this amount might be adjusted either higher or lower (Hair et al., 2017). According to Hair et al. (2021), the model has weak predictive power if all of the item differences (PLS-SEM value) were higher than LM, medium predictive power if most of the item differences (PLS-SEM value) were lower than LM, and no predictive power if all of the item differences (PLS-SEM value) were higher than LM. The PLS predict is shown in Table 7.8.

Table 7.8: Construct Cross Validity Redundancy

Items	Q ² predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
CBP1	0.248	1.277	0.870	1.339	0.924
CBP2	0.336	1.244	0.835	1.346	0.895
CBP3	0.337	1.205	0.795	1.310	0.883
CBP4	0.326	1.243	0.863	1.377	0.962
CBP5	0.440	1.071	0.772	1.115	0.800
CBP6	0.423	1.087	0.780	1.157	0.805
CBP7	0.196	1.187	0.925	1.176	0.879

7.6 Discussions of Findings

The study unveils significant findings pertaining to the relationships between various factors and the performance of construction businesses, as outlined in the developed hypotheses. Initially, the study establishes a robust connection between strategic decision formulation and construction business performance, indicating a significant value of ($\beta = 0.187$, $t = 2.509$). In the dynamic business landscape, strategic management extends beyond mere decision-making to encompass a series of deliberate actions aimed at formulating and executing plans to achieve organisational objectives. The strategic planning process is an evolving one, subject to constant adjustments to effectively accomplish the overarching mission. This process should be holistic, considering the diverse interests and expectations of various stakeholders, including stockholders, employees, management, creditors, consumers, and suppliers. Strategic Decision Formulation (SDF) is a critical aspect of strategic management, as it involves identifying the organisation's vision, mission, and objectives, as well as devising appropriate strategies to achieve these goals. Effective strategic formulation requires a comprehensive assessment of the internal and external environment, resource

management, and stakeholder considerations. Failure to consider these factors can lead to a withdrawal of stakeholder support and hinder the organisation's ability to achieve its objectives. This discovery aligns with the hypothesized direction, emphasizing the pivotal role of strategic decision formulation in influencing the overall performance of construction businesses, thereby supporting H1. This finding is consistent with previous research that highlights the importance of strategic decision formulation in the construction industry (Oyewobi et al., 2015; Pamulu, 2010; Shrivastava & Singla, 2018).

Similarly, strategic decision implementation practices exhibit a positive connection with construction business performance, with a noteworthy value of ($\beta = 0.238$, $t = 3.039$), supporting H2. This underscores the importance of effective implementation strategies in contributing to favourable outcomes in the construction industry. Strategic decision implementation practices are equally important as they represent the actionable phase of the strategic management process. Successful implementation requires clear responsibility for outcomes, typically vested in top management, but also involving all staff members to foster a sense of ownership and commitment. Effective implementation practices involve aligning organisational resources, structures, and motivational systems with the chosen strategies. This finding is in line with prior studies that emphasise the significance of strategic decision implementation practices in the construction sector (Chileshe & John Kikwasi, 2014; Oyewobi et al., 2017; L. R. Yang et al., 2011).

The study further indicates a positive impact of strategic decision evaluation on construction business performance, supported by a significant value of ($\beta = 0.213$, $t = 2.962$), endorsing H3. This highlights the role of ongoing evaluation processes in enhancing the overall performance of construction businesses. Strategic decision evaluation holds significant importance in validating the effectiveness of management's strategies and determining their ultimate success or failure. It serves as a critical juncture for organisations to reassess their trajectory and make necessary adjustments to the strategic plan if performance falls short of expectations. Regular strategy evaluation is crucial for sustaining competitiveness and deciding whether to persevere with the current vision, objectives, strategies, and execution approaches or to make modifications. This finding is supported by previous research that underscores the importance of strategic decision evaluation in the construction industry (Balatbat et al., 2010; Oyewobi et al., 2015; Shibani, Abdussalam, 2010).

In contrast, the hypothesis concerning the influence of financial strength on construction business performance (H4) is not supported. The study reveals a non-significant relationship with a value of ($\beta = -0.051$, $t = 0.704$), suggesting that financial strength may not be a discernible influencing factor in the construction business performance. Reliance on financial strength is a comprehensive gauge of a company's overall financial stability and relative standing within the industry. Examining financial statements and utilizing financial ratios as diagnostic tools provide insights into profitability, liquidity, efficiency, leverage, and overall financial health. Strong financial performance is essential for organisational success and strategic decision-making. This finding is contrary to some previous studies that have highlighted the importance of financial strength in the construction sector (Bilal et al., 2016; Bondinuba et al., 2022; Horta et al., 2013).

Conversely, the study establishes a positive connection between reliance on the workforce and construction business performance (H5), supported by a significant value of ($\beta = 0.338$, $t = 3.040$), supporting the hypothesis. This emphasises the importance of workforce considerations in driving positive outcomes for construction businesses. Reliance on workforce is particularly critical in the construction industry, where the presence of skilled labour is vital for project performance and long-term economic viability. A shortage of skilled labour can lead to productivity challenges, impact project schedules, and adversely affect overall performance. Effective workforce management and labour force forecasting are essential for ensuring the availability of skilled labour and mitigating productivity issues. This finding is consistent with prior research that highlights the significance of workforce reliance in the construction industry (Kazaz et al., 2008; Loosemore & Lim, 2017; Ye et al., 2015).

7.7 Research Implication

This study investigates the interplay between strategic decision-making and organisation performance in New Zealand's construction context, seeking to provide insights and recommendations for enhancing information management practices, decision-making frameworks, and project performance. The study offers valuable insights into the relationships between strategic decision formulation, implementation, evaluation, financial strength, reliance on the workforce, and construction business performance. Effective strategic decision formulation, implementation, and evaluation,

coupled with strong financial performance and a skilled workforce, are crucial for driving success and sustainable growth in the construction industry. Organisations must strike a balance between these factors and continuously assess and adapt their strategies to navigate the complexities of the business environment and achieve their overarching objectives. These results hold meaningful implications for industry practitioners and researchers seeking to enhance the understanding of factors influencing success in the construction sector. Consequently, the study concludes that adopting strategic management practices, coupled with integrating quality information, significantly influences performance within New Zealand's construction sector. This conclusion is substantiated by the positive relationship established between the adoption of strategic management practices and construction business performance, with the quality of information serving as a mediating variable. Therefore, it is evident that adopting strategic management practices, complemented by quality information, enhances performance within the construction sector.

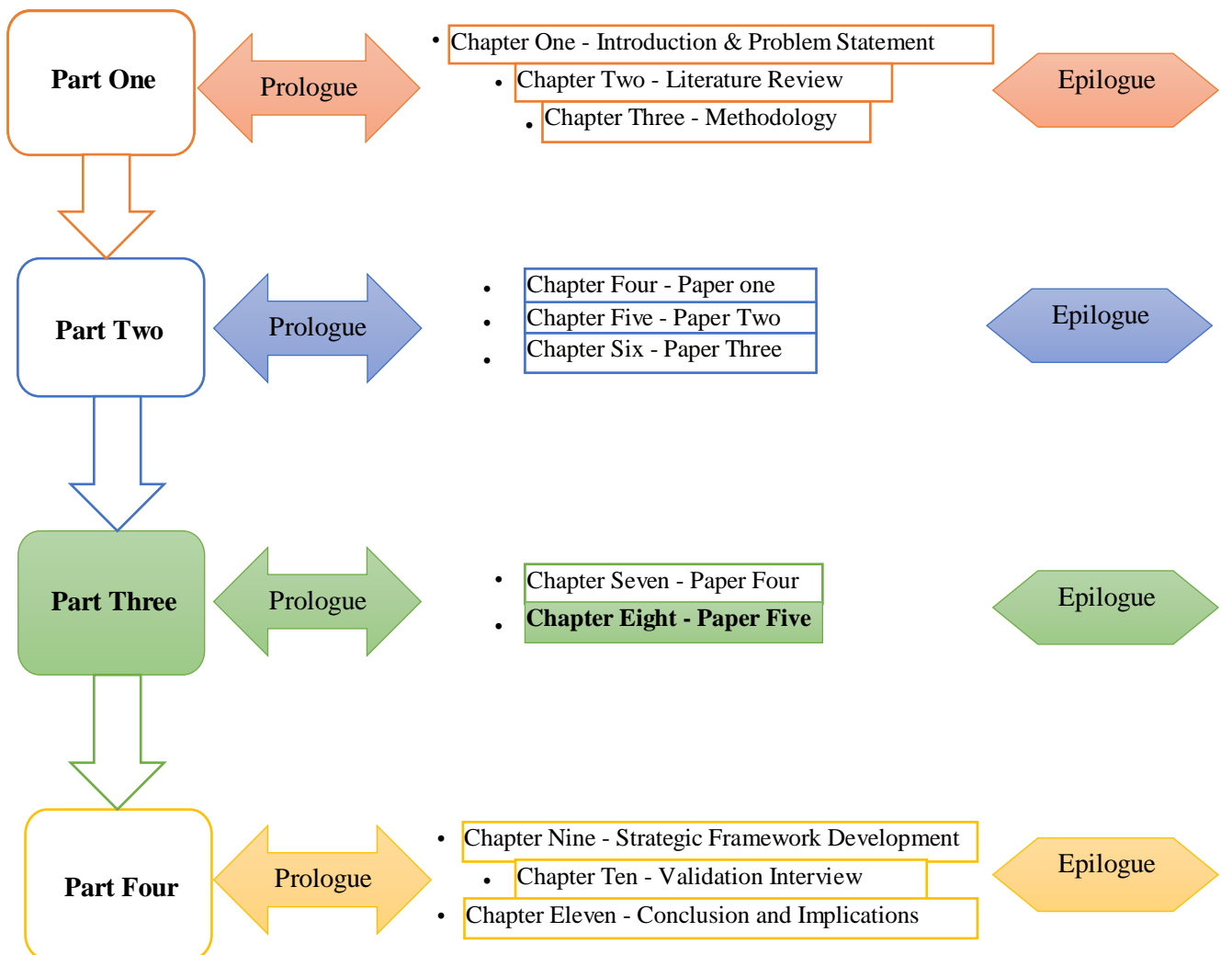
In light of these findings, construction businesses should employ more effective methods to navigate the challenging business climate. This may be achieved by conducting a comprehensive and precise situational analysis, involving consultants and all workers in the formulation of strategies, ensuring inclusive strategy execution, and regularly evaluating organisational techniques. It is crucial for construction organisations to formulate and articulate mission and vision statements concisely and unambiguously, conveying them to employees during the plan's implementation. Vision and mission statements are vital as they articulate the direction and future goals of the company.

Owners of construction organisations should ensure that the strategic management process is inclusive, involving personnel at all levels, fostering a sense of ownership and guaranteeing that employees feel included in the entire process since they are responsible for executing the plan. Consistent assessment of different methods and prompt implementation of corrective actions is essential. To mitigate the high likelihood of company failure, owners of construction organisations must demonstrate a keen interest in enhancing their management acumen through consistent training and ensuring access to high-quality information before making any project-related decisions.

Additionally, owners must formulate exceptional strategic objectives encompassing technology and innovation, business efficiency and development, and

excellent customer service. Construction organisations must prioritize acquiring the appropriate resources, as the effectiveness of any business strategy hinges primarily on the availability of resources (such as data/information, financial assets, and human capital), the discernment of value, the vigour and expertise of its managers, and strategic implementation within the framework of uncertain and ambiguous environments that are prone to unpredictability. The study has some limitations that should be acknowledged. First, the sample size for the survey was relatively small, and the findings may not be generalizable to the entire construction industry in New Zealand.

Future research could replicate the study with a larger and more representative sample to enhance the generalizability of the findings. Second, the study relied on self-reported data from construction professionals, which may be subject to response bias. Future research could triangulate the findings with objective performance data, such as financial reports and project documentation, to validate the perceptions of the respondents. Third, the study focused on a limited set of determinants of construction business performance. Future research could explore additional factors, such as organisational culture, leadership styles, and innovation practices, to provide a more comprehensive understanding of the drivers of success in the construction industry. Despite these limitations, the study provides valuable insights into the determinants of successful construction business performance in New Zealand. It highlights the importance of strategic decision-making, financial strength, skilled workforce, and high-quality information in driving construction business success, and offers practical recommendations for construction businesses to enhance their performance and competitiveness. The findings also lay the foundation for future research on the drivers of success in the construction industry, both in New Zealand and beyond.



CHAPTER 8

PAPER 5

8.0 ENHANCING CONSTRUCTION ORGANISATIONS' PERFORMANCE THROUGH STRATEGIC DECISION-MAKING: UNVEILING THE MEDIATING ROLE OF QUALITY OF INFORMATION

This chapter is based on the following published Journal paper:

Moshood, T. D., Rotimi, J. O. B., & Shahzad, W. (2024). Enhancing Construction Organisations' Performance Through Strategic Decision-Making: Unveiling the Mediating Role of Quality of Information. *International Journal of Organisational Analysis*.

Abstract: Formulating strategic decisions poses a significant challenge for construction organisations, profoundly impacting their overarching strategic management. The success of an organisation's strategy relies on how information is managed, and decisions are executed. However, the literature has a limited understanding of the connection between information quality and strategic decision-making, particularly in construction business performance. This study aims to bridge this gap by exploring how information quality mediates the relationship between strategic decision-making and the performance of construction businesses in New Zealand. This quantitative study aims to fill this gap by assessing how information quality shapes strategic decision-making practices, impacting construction organisations' performance. Analysing 102 viable responses through partial least squares structural equation modelling structural equation modelling offers partial support to the research framework. The study used statistical analysis to gauge the impact of adopting strategic management practices on construction business performance, considering the mediation of the quality of information within New Zealand's context. It affirmed a positive correlation between strategic decision-making management and construction business performance, underpinned by the mediation of

quality of information. This study underscores the critical role of information quality in evaluating strategic decisions for bolstering construction business performance.

8.1 Introduction

The New Zealand government actively fosters a sustainable construction sector, emphasizing high performance, productivity, innovation, and community well-being (MBIE, 2023). This commitment is evident in various projects, spanning residential and non-residential building developments to infrastructure initiatives. The construction industry is pivotal in bolstering the nation's economy, driving up GDP (gross domestic product) per capita, generating employment opportunities, and nurturing business expansion (MBIE, 2022). Notably, in 2019, the construction sector contributed 6.7% to New Zealand's GDP, while by the first quarter of 2021, it had employed over 170,000 individuals (Granwal, 2021). As the industry aligns its objectives with the government's vision for housing and infrastructure, prioritizing safety, affordability, health, and sustainability (Salesa, J., & Reidy, 2019), policymakers are committed to enhancing the sector's capacity (TEC, 2021). Noktehdan et al., (2015) argue that strengthening the construction industry's capabilities paves the way for investment opportunities, infrastructure upgrades, and stimulates sectoral activity. By enhancing the industry's capabilities, construction organisations can better position themselves to attract investments, undertake infrastructure projects, and contribute to the overall growth and development of the sector.

Despite proactive measures, construction projects in New Zealand, particularly those in the pipeline (future projects), consistently grapple with challenges that hamper their performance (MBIE, 2022). The Ministry of Business, Innovation and Employment (MBIE) identifies insufficient strategic decision-making among stakeholders as a key contributing factor, resulting in project delays. While de Jong et al., (2022) have delved into project delays and integrated project delivery methods for potential improvements, a notable research gap remains concerning the strategic decision-making and information quality linked to construction business performance. Salesa, J., & Reidy, (2019) argue that the construction industry grapples with the crucial challenge of envisioning future scenarios and accurately predicting operational outcomes. They emphasise that timely and precise budgeting, forecasting, and financial planning procedures empower organisations to navigate the rapidly evolving business landscape.

Decision-making is a continuous process in the construction industry, from the tendering phase to project closure (Abrahams, 2012). Decision-makers in construction face a myriad of choices, including project acceptance, technical solutions, risk management concerning cost and schedule, in-house construction versus subcontracting, procurement decisions, hiring considerations, and numerous other options, each with its own set of implications (de Jong et al., 2022). Making as many correct decisions as possible from the project's beginning phases and in every significant activity is crucial. When dealing with a change-averse industry like construction, where the cost of changes becomes very high later during the project (PMBOK, 2013), making as many decisions as possible is essential. The person in charge of making a choice ought to have access to all relevant information, including the facts, the repercussions, and the predictions relating to the decision (V. Shepherd, 2022). Nonetheless, this does not ensure that the outcome of the choice will be as anticipated; however, the quality of the information does raise the odds of attaining beneficial outcomes.

Organisations must give careful consideration to both the economic climate and the myriads of internal and external factors that have the potential to affect their operations. According to Botten (2009), companies should constantly monitor their surroundings, looking for new possibilities and risks. When it comes to strategic planning, Phornlaphatrachakorn, (2019) stated that companies must consider the opportunities and obstacles specific to their sector. When making strategic decisions in a context where fast and reliable information is extremely significant, the capability of an organisation to make rapid adjustments to or updates to the initial plan is of the utmost importance. Burgin, (2019) states that rolling projections or flexible budgets have made it possible for companies to swiftly adjust plans and projections in response to changes in the business environment. Collier & Agyei-Ampomah, (2007) argue that investigating deviations requires a far deeper foundation than a strict budget or projection, particularly when significant drivers, such as expected volumes, deviate from the original plan. Furthermore, the construction industry's performance has been abysmal due to the inadequate quality of information available to organisations. This lack of high-quality information hinders the ability of construction organisations to make informed strategic decisions, leading to suboptimal performance and project delays.

While these studies provide valuable insights, a notable research gap remains concerning the specific factors influencing the quality of information and how it impacts

strategic decision-making and construction business performance. Jayawardene et al., (2021) and Stretch (2009) emphasise the importance of timely and precise budgeting, forecasting, and financial planning in navigating the rapidly evolving business landscape. However, the construction industry in New Zealand appears to grapple with the challenge of accurately predicting operational outcomes and envisioning future scenarios (Salesa & Reidy, 2019). Furthermore, Abrahams (2012) and de Jong et al. (2022) highlight the critical role of information availability and utilization in the successful completion of building projects. Yet, the existing literature lacks a comprehensive understanding of the factors influencing the quality of information and how it shapes strategic decision-making processes in the New Zealand construction industry.

This research aims to address this gap by investigating the factors influencing the quality of information and their impact on strategic decision-making and construction business performance in the New Zealand context. By exploring this underexplored area, the study can provide valuable insights to construction organisations, policymakers, and stakeholders to enhance the industry's capabilities, competitiveness, and overall performance.

8.2 Literature Review

8.2.1 Overview of the New Zealand Construction Industry

The construction industry in New Zealand significantly contributes to the nation's economy, with a GDP contribution exceeding 18.6 billion New Zealand dollars in the year ended September 2022. Employment within this sector has notably increased, surpassing 182 thousand workers in the fourth quarter of 2022 (National Construction Pipeline Report, 2022a). Various residential, non-residential, and infrastructure sectors have consistently grown in building consent and employment. Granwal, (2021) highlights that infrastructure development, particularly in transportation, has shown steady progress in alignment with the country's evolving needs due to population growth. The Ministry of Business, Innovation and Employment (MBIE, 2022) reports that the Auckland region leads in construction value, particularly residential projects, responding to a high demand for homes. However, housing shortages have led to soaring property prices, with average residential property costs nearing one million New Zealand dollars in many Auckland areas. This situation underscores the importance of effective strategic decision-making

and high-quality information in the construction industry to address the growing housing demand and ensure the timely completion of residential projects.

Amidst this growth, the construction industry faces multiple challenges like reduced cash flow, workforce disruptions, supply chain issues, and uncertainties in future projects (Salesa, J., & Reidy, 2019). Job vacancies within the industry are increasing, particularly for tradespeople, technical workers, and supervisors. Material shortages and price hikes, especially in plasterboard and timber, have increased industry frustration (National Construction Pipeline Report, 2022a). In response, the New Zealand government, in collaboration with major construction companies, launched a three-year action plan, the Construction Sector Accord, aiming to address workforce shortages, rising costs, sustainability concerns, and technological advancements (MBIE, 2023). This initiative seeks to boost productivity and the sector's resilience. Recent trends indicate increased customer demand for green, energy-efficient buildings and those conducive to remote work (Taofeeq Durojaye Moshood, Rotimi, Shahzad, et al., 2024). Features like energy-efficient appliances, smart heating systems, and solar panels have gained popularity. The push for sustainable renovations, such as double-glazed windows and insulation, aims to control rising heating costs.

Improving the construction sector's information quality is pivotal for decision-making across projects, productivity, workforce, risk management, and cost-effectiveness. However, uncertainties in project pipelines, crucial for economic development and residential and non-residential construction, add instability to the sector (MBIE, 2023). Addressing these uncertainties is vital to reducing risks and promoting growth. This study explores the influence of information quality on strategic decision-making for successful construction business performance in New Zealand. It focuses on project pipelines requirements, challenges, mitigation strategies, and their impact on the construction sector's stability and growth. The study aims to provide insights into current trends and assist investors and the government in planning for future investments in the construction industry.

8.2.2 Strategic Decision Making

Mazzolini (1981) defines a strategic decision as the commitment to actions and resource allocations that delineate an organisation's sphere of activity, representing what

services or commodities it creates and the markets it serves. Strategic decision-making involves a company's critical leadership consensus, directing the organisation towards long-term profitability, sustainability, and resilience against external threats and internal inefficiencies (Moshood et al., 2023; Shaffakat, 2014). Fitzroy & Hulbert (2005) outline strategy as the overarching theme guiding strategic decisions, distinguishing between corporate decisions affecting the entire firm and business-level decisions impacting specific units. As per Nyariki (2016), the primary goal of company strategy is to maintain competitive advantages within each strategic business unit. Business and competitive strategies focus on how an organisation plans to compete in its sector, identifying critical success factors and operating to outperform competitors (Assaf & Assaad, 2023; Moshood et al., 2021).

Adendorff et al., (2011) explain that differentiation strategies aim to provide products or services with unique attributes valued by customers, reducing the impact of price competition. Louis & Dunston, (2018) state that customers perceive the product's value as outweighing its price compared to other options. The objective, as mentioned by Adendorff et al., (2011), is to diminish the product's sensitivity to price changes, prioritizing factors beyond cost when making a purchase.

Ma et al., (2023) define functional or operational strategies, which are synonymous terms used interchangeably, as decisions and actions across functional areas like marketing, operations, finance, and human resources directed at achieving short-term goals. These strategies play a crucial role in the construction industry, as they help organisations to effectively manage their resources and operations, ensuring the timely completion of projects while meeting customer expectations. Li et al., (2021) explain that functional or operational strategies align the company's functional areas with its broader business and corporate strategies. Eberhardt et al. (2022) Eberhardt et al., (2022) emphasise that ensuring day-to-day operations correspond with broader company objectives requires specific metrics and effective project management within each department.

Whether in research and development, marketing, financing, or manufacturing, implementing functional strategies requires tailored decisions aligned with the overarching corporate strategy. Effective communication is critical for available leaders in translating high-level strategies into actionable operational plans (BusinessBecause,

2022). Departmental leaders must skilfully align organisational strategy with functional strategies and offer insights for refining higher-level strategies. Li et al., (2021) describe strategic management as a process that involves envisioning a guiding vision, formulating a strategic mission, defining objectives, conducting situational analysis, crafting strategies, executing them, and evaluating their effectiveness. They emphasise that this iterative process is continuous and dynamic, necessitating agility to accommodate changes across the strategy.

Karami et al., (2020) explain that strategy formulation involves considering various factors, including economic, social, political, technological, ecological, and industry-specific elements. These industry factors encompass competitive dynamics, entry barriers, substitutes, and the bargaining power of buyers and suppliers. The authors emphasise that organisations must rigorously assess their strategic choices post-formulation to maintain competitiveness. Zhou et al., (2023) emphasise that adopting strategic management practices significantly impacts a firm's performance by offering a framework to navigate strategic positioning, manage uncertainties, and minimize risks. They highlight that within the construction industry, applying strategic management is pivotal for enhancing financial performance and overall business outcomes.

8.2.3 Quality of Information

Bawden & Robinson, (2013) note that various definitions and perspectives have been proposed to conceptualize information. The concept of information has been approached from different angles, leading to a diverse range of interpretations and understandings. It has been articulated as data processed into a meaningful form and an assembly of data capable of communication and application. It is also considered well-formed and meaningful data, emphasizing honesty (M. Chen et al., 2013). Bates (2018) suggests that information represents patterns of organisation in matter and energy. Maksimov & Lebedev (2020) propose two manifestations of information: as a representation of an item and as a force influencing the behaviour of other entities.

Davis (2000) defines data as representations of events, people, or conditions, while information results from processed data. Knowledge, on the other hand, is organized and processed information that conveys understanding and expertise. Davenport & Prusak (1998) characterize data as discrete, objective facts about events,

while information is a message influencing the receiver's perception. Floridi (2010) notes the challenge of encapsulating the diverse applications of information in a single definition. The quality of information has been a focal point in scholarly discussions, particularly within Management Information Systems and Information Management (Y. W. Lee et al., 2002). Total Quality Management (TQM) principles have been applied to information quality, considering information as a product (Shankaranarayan et al., 2003). TQM refers to efficiently meeting customer needs while achieving organisational objectives.

In considering information, Lillrank (2003) introduces two concepts: information emerging in evolving discussions and information as an established artefact. The former highlights that information is growing amidst changing requirements, which is common in sectors like tourism, where travellers organize their arrangements. The latter concept focuses on standardised information, such as in accounting reports, emphasizing effective communication aligned with the sender's intention (Hamzah et al., 2021). These diverse perspectives underscore the complexity of information, which varies across contexts and disciplines, making a singular definition challenging yet emphasizing its critical role in communication and decision-making processes.

8.2.4 Construction Organisation Performance

Organisational performance denotes the extent to which an organisation accomplishes its predefined objectives. It pertains to the organisation's ability to efficiently acquire and utilize scarce resources to achieve operational and strategic goals. Wentzel et al., (2022) point out that conventionally, organisational performance assessment heavily focused on financial elements owing to innovations rooted in financial and management accounting. However, the authors note that exclusive reliance on financial indicators has come under scrutiny due to the unreliability of financial ratios, which can be attributed to "creative accounting" practices.

Mafundu & Mafini, (2019) highlight that recent insights emphasise company's success transcends financial performance. They acknowledge the impact of diverse factors, including economic influences, organisational aspects, and environmental considerations, which are particularly evident in industries like construction. Malik et al., (2019) argue that while construction business performance is critical, it receives scant

attention in canonical construction management literature. The authors point out that the focus is often narrowly placed on tangible aspects like project specifics and profits, neglecting the broader realm of stakeholder-oriented decision-making.

Evaluating construction endeavours solely on meeting client objectives disregards crucial aspects like the business environment, organisational structure, and technological sophistication (Bajracharya et al., 2018; Ingle & Mahesh, 2022). In the fiercely competitive global economy, construction companies must comprehensively understand their present state and future requirements to sustain their competitiveness (Jang et al., 2019; Love & Holt, 2000). Yang et al., (2020) caution that ignoring the necessity of stakeholder-oriented decision-making risks the adoption of short-term strategies and overlooks evolving market dynamics. This can lead to a "survival of the fittest" scenario amidst industry mergers and acquisitions. However, Naji et al., (2022) point out that the prevailing reliance on traditional bottom-line performance indicators, which focus on plan effectiveness, productivity, and profitability, has faced criticism. The authors argue that this approach has a heavy dependence on financial aspects, is retrospective in nature, and fails to align with stakeholder interests. Evaluating organisational performance should transcend financial metrics and encompass broader considerations to comprehend success beyond conventional parameters. This is particularly important in dynamic and competitive industries like construction, where the interplay of various factors and stakeholders significantly influences a firm's performance.

8.3 Hypotheses Development and Theories

Establishing a rationale or theoretical framework is crucial in social and behavioural sciences research. This framework, often known as a theoretical foundation, is a conceptual model explaining the interactions among various elements essential to solving a specific problem (Chen et al., 2018). Our study's theoretical framework derives from theories emphasizing the significance of organisational performance in predicting information quality as a mediating variable between strategic decision-making and construction business performance in New Zealand. The integrated model analyses strategic decision-making and construction business performance, incorporating the quality of information as a mediating factor. Several theories underpin this study, like the Ansoff strategic success theory and the resource-based view theory. Ansoff initially introduced the strategic success formula for strategic management, later developed by

Harry Igor Ansoff & Donnel (1990). This formula suggests that exceptional company performance aligns with an organisation's strategy of adapting to environmental turbulence while its capabilities match the strategy's aggressiveness (Moussetis, 2011). To achieve optimal performance, it's crucial for an organisation that the aggressiveness of its strategy matches environmental turbulence, its capability's responsiveness aligns with strategic aggressiveness, and its components support each other (Kiple & Lewis, 2009). Essentially, this strategic diagnosis tool guides organisations in adjusting strategy and internal capabilities for future success (Njeru, 2015).

Similarly, the resource-based view theory, pioneered by Wernerfelt (1984) and extended by Barney (1991), asserts that a firm's strategy results from its resource assortment (Freeman et al., 2021). It suggests that an organisation's resources are more critical than industry structure in gaining and maintaining a competitive edge (Njeru, 2015). According to this view, an organisation's resources and capabilities define its efficiency and effectiveness. Organisational resources, including material, financial, informational, and human capital, drive competitive advantage and enhance company performance (Safari & Saleh, 2020). This theory implies that strategic decision-making in the construction sector depends on available resources, often influenced by factors like size, industry, and legal formation, impacting the industry's success. Therefore, the quality of information and stakeholders' strategic decisions play a pivotal role in strengthening construction organisations. The conceptual framework elucidates the relationships between variables, showcasing their interdependence as independent, dependent, and mediating variables. Figure 8.1 shows the conceptual framework for this study.

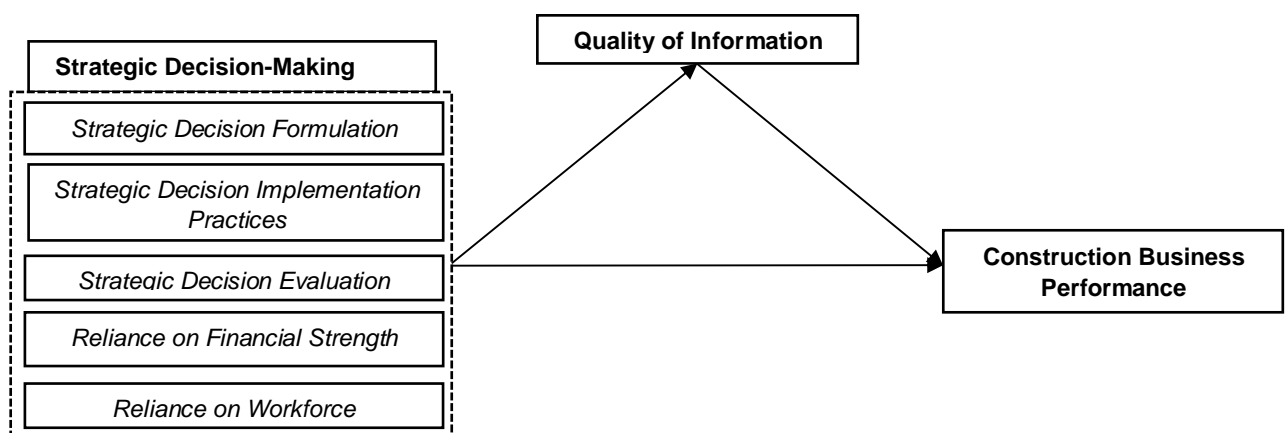


Figure 8.1: Conceptual Framework

This hypothesis was formulated based on robust research evidence, focusing on the pivotal role of strategic decision-making in influencing construction business performance. It specifically considers how the quality of information acts as a mediating factor in this relationship.

8.3.1 Strategic Decision Formulation

Lu, (2010) defines strategic decision formulation as an essential aspect of strategic planning that encompasses defining an organisation's mission, philosophy, objectives, policies, and methodologies for achieving these objectives. Ng'andu, (2022) emphasises that strategic decision formulation is crucial for bolstering an organisation's position and gaining a competitive edge, not just domestically but also on a global scale. The author notes that this process involves delineating the organisation's mission objectives and crafting a suitable strategy. Safaeian et al., (2022) highlight that numerous factors influence the process of strategic decision formulation. These factors include evaluating both internal and external environments, envisaging the future landscape, establishing organisational missions and goals, defining strategic policies, and assessing the capabilities of those involved in strategy development. The authors emphasise that these same factors also influence the formulation of strategic objectives. Strategic decision formulation is a multifaceted process that entails goal setting and devising action plans to achieve these goals. Strategy formulation enables organisations to plan for success and adapt workplace strategies as needed, playing a pivotal role in goal attainment and assessment (Han et al., 2023). Subsequent to crafting strategies, organisations often educate their workforce about their purpose and objectives. In reality, strategic decision formulation and implementation form an intricate, interactive process shaped by policies, values, organisational culture, and management styles, culminating in outcomes. The amalgamation of strategy, structure, and systems influences these results (Mintzberg & Rose, 2003).

Yildiz & Ahi, (2022) describe strategic decision formulation as a process that involves setting organisational objectives, devising alternative courses of action, and selecting the best course, considering an organisation's core competencies and the external environment. The authors note that this process relies on aggregated, incomplete, and uncertain information about various strategic options. Ng'andu, (2022) highlights that modern executives are tasked with managing internal activities and navigating the

challenges presented by their organisation's immediate and broader environment. Strategic management encompasses decisions and actions geared toward formulating and executing plans designed to achieve company objectives, focusing on forward-thinking, large-scale plans for engaging with the environment to accomplish these objectives.

***HI:** There is a positive effect of strategic decision formulation on the construction business performance.*

8.3.2 Strategic Decision Implementation Practices

Ng'andu, (2022) explains that strategic decision implementation practices involve delegating tasks and responsibilities to individuals or groups within the organisation. The author emphasises that this process, facilitated through organisational structure, is the second pivotal step in strategic management. Wuni, (2022) further elaborates that strategic decision implementation encompasses a range of managerial decisions, including determining the organisational structure, information systems, leadership alignment, and suitable control mechanisms. Bakar et al., (2011) highlight that implementation is the most challenging phase of strategic management, as it necessitates mobilizing both employees and managers. The authors note that the aim of implementation is to rally the entire organisation behind the strategy, requiring involvement from all units, with top management initiating and leading the process for successful execution.

Chen, (2015) emphasises that an effective strategic plan must translate into actionable steps, prioritizing its execution tailored to the unique aspects of producing goods. The author notes that while plans need to be specific and well-articulated, they also function as instruments steering an organisation towards success, providing the flexibility to seize new opportunities and adapt to market changes. Babalola et al., (2019) highlight that the planning process is evolutionary and constantly adjusted to accomplish the mission. Doz, (2020) explains that stakeholders, encompassing stockholders, employees, management, creditors, consumers, and suppliers, anticipate the organisation to meet their respective demands, be it adequate returns on investment, fair wages, timely payments, value for purchases, or more. The author cautions that ignoring stakeholder interests in formulating strategies can lead to their withdrawal of support.

Once long-term objectives are set and suitable strategies are chosen, the strategic management process progresses into the implementation phase. As Ehlers & Lazenby (2004) described, strategy implementation marks this process's active phase, encompassing administrative tasks to mobilise organisational resources cohesively to accomplish its strategy (Ng'andu, 2022). Successful execution of this phase is integral to an organisation reaching its potential and is symbolic of effective management. As per Nnaji & Karakhan (2020), sound strategy coupled with effective implementation is a testament to good governance, as it tests a manager's abilities to direct change, motivate people, enhance organisational competencies, and nurture strategies. For an implemented strategy to be effective, it must be deeply ingrained in the organisation's daily operations, permeating its day-to-day functioning.

H2: There is a positive effect of strategic decision implementation practices on the construction business performance.

8.3.3 Strategic Decision Evaluation

Ng'andu, (2022) explains that strategic decision evaluation entails establishing evaluation systems to ensure the effective execution of strategic planning towards organisational objectives. The author notes that this process involves comparing anticipated outcomes with actual results and encompasses appraising the entire corporation while considering the environmental dynamics add that strategic decision evaluation centres on long-term opportunities and issues related to achieving corporate objectives, forming a continuous cycle of visioning, planning, implementing, and evaluating within the strategic management process.

Ng'andu, (2022) emphasises that evaluating strategic decisions is pivotal in validating management's strategies and determining their success or failure. The author notes that it is a pivot point for organisations to reevaluate their course and adjust the strategic plan if performance falls short of expectations. Barbhuiya & Das, (2023) emphasises that evaluating strategic decisions is pivotal in validating management's strategies and determining their success or failure. The author notes that it is a pivot point for organisations to reevaluate their course and adjust the strategic plan if performance falls short of expectations.

When a company's direction aligns well with industry conditions and performance targets are met, management can focus on refining the strategy and enhancing execution (Y. Pan & Zhang, 2021). Mintzberg et al. (2002) explain that strategy evaluation helps ascertain the appropriateness of objectives, policies, and plans, confirming or challenging underlying assumptions. Ng'andu, (2022) Mintzberg et al. (2002) explain that strategy evaluation helps ascertain the appropriateness of objectives, policies, and plans, confirming or challenging underlying assumptions. Chen et al., (2021) emphasise that it's crucial to recognize that evaluation should be continual rather than intermittent, necessitating ongoing performance assessment and proactive adjustments in the company's long-term direction, objectives, and strategy.

H3: There is a positive effect of strategic decision evaluation on the construction business performance.

8.3.4 Reliance on Financial Strength

The historical intertwining of the construction and finance strength has been foundational, driven by long-term political aims to ensure accessible housing (Daier et al., 2022). Despite this enduring connection, scholarly attention within construction management often overlooks these intricate links. The construction industry, encompassing primary contractors, subcontractors, and vital suppliers, significantly relies on substantial financial investments to execute projects (Chen, 2009). Project financing stands as a critical facet within this industry. Financial ratios wield immense influence in determining project feasibility and guiding financing decisions. Understanding these ratios equips construction organisations to secure funding effectively and execute projects successfully.

Singla & Prakash, (2021) highlight the importance of financial ratios in illuminating the financial robustness, stability, and performance of construction companies. Stakeholders such as lenders, investors, and project experts heavily rely on these metrics to gauge creditworthiness and associated risks linked to project financing. Taofeeq et al., (2020) emphasise that by scrutinizing these key financial indicators, stakeholders can make informed judgments about a project's viability and potential returns. This is crucial in the decision-making process for various stakeholders. Styhre, (2019) underscores the immense significance of assessing a company's financial

performance, particularly for managers, shareholders, creditors, investors, and even tax authorities, amidst the rapidly evolving global landscape. This assessment is critical for informed decision-making and strategic planning. Naumenkova et al., (2020) note that international corporations often secure contracts in foreign nations, competing directly with local businesses. Consequently, both multinational and local contracting organisations must prioritize performance enhancements to uphold their global reputations and maintain a competitive edge in the international market.

Financial performance serves as a reflection of a company's overall financial stability and relative position in comparison to its counterparts. Evaluating financial statements to discern profitability and stability is pivotal in assessing a firm's financial performance (Mishlanova, 2019). Financial ratios serve as diagnostic tools, illuminating strengths and weaknesses regarding liquidity, efficiency, leverage, and profitability.

***H4:** There is a positive effect of reliance on financial strength on the construction business performance.*

8.3.5 Reliance on Workforce

Improving project performance through enhanced labour skills has been a persistent demand in the construction sector. Agenbag & Amoah, (2021) acknowledge the significant impact of labour efficiency on project progress, particularly in construction projects where physical labour is integral to the work. Hussain et al., (2020) highlight that project management in the construction industry involves a team comprising a project manager, assistant manager, engineers, architects, contractors, and subcontractors, with physical labour being crucial in executing tasks at the construction site. As a labour-intensive industry (Hussain et al., 2018), the construction sector heavily relies on labour skills for successful project execution. Muthuveloo et al., (2017) emphasise that in any industry, performance is critical for ensuring sustainability and competitiveness. Cserhádi & Szabó, (2014) further note that performance serves as a pivotal indicator, determining the industry's survival, project success, and adherence to the triple constraint (time, cost, quality).

The role of skilled and unskilled labour profoundly influences project performance in construction. Understanding this impact is vital to ensure seamless project completion without delays. Labour skills and efficiency are pivotal factors that

significantly impact project performance (Aghimien et al., 2023). The availability of an experienced and skilled labour force is crucial for initiating and successfully executing construction projects. Shortages or deficiencies in skilled labour can negatively impact project performance, leading to delays and quality compromises (Calvetti et al., 2020). The productivity of labour significantly influences project outcomes in construction. Labour productivity is a multifaceted aspect that affects project performance positively or negatively. Challenges related to unskilled labour productivity are a significant concern within the construction industry due to various social, cost-related, and physical issues (Hussain et al., 2020). Unskilled labour, in particular, poses a significant productivity challenge within the construction sector, impacting project performance adversely.

The scarcity of skilled labour presents a significant challenge for construction projects' long-term economic viability and success. Projects facing a shortage of skilled labour often grapple with tight schedules to meet project targets (Hussain et al., 2018). Poor labour productivity remains a critical factor influencing project performance within the construction industry (Shehata & El-Gohary, 2011). Effectively managing resources is essential to mitigate adverse impacts on construction projects' time, cost, quality, and safety. Construction managers and contractors must know strategies and methodologies to assess workers' productivity across different skill levels (Hussain et al., 2020).

***H5:** There is a positive effect of reliance on the workforce on the construction business performance.*

8.3.6 Quality of Information as a Mediating Variable Between Strategic Decision-Making and Construction Business Performance

Information plays a pivotal role in the construction sector, yet the quality of information research in this industry is confined by the influence of Information and Communication Technology (ICT) and related systems (Akanbi & Zhang, 2021; Gibbs et al., 2013). Gorkavyy et al., (2018) highlight the extensive use of information and communication technology (ICT) across the building design and development process, which has notably superseded traditional manual sketching techniques. However, despite the criticality of human information behaviour in construction project failures (Dzokoto, 2016), research on this aspect remains scarce in the field. Prior studies on information

aspects in construction have focused on information flow, supply chain, and communication and knowledge management facets by researchers (Demian & Balatsoukas, 2012; Emmitt & Gorse, 2009; Jalaei et al., 2021). Yet, these studies have insufficiently underscored the importance of information quality, information behaviour exhibited by stakeholders, and the value of information management in construction (Young et al., 2015).

Young et al., (2015) provide a nuanced understanding of information, highlighting that it embodies both implicit aspects (the information itself) and explicit attributes (the context in which information is stored). They emphasise that information quality is inherent in both of these dimensions. Factors influencing the value and quality of information encompass various explicit characteristics, including quality, usability, currency, context, accuracy, availability, relevance, and accessibility (Vignali et al., 2021; Zhao et al., 2008). Gerstberger & Allen, (1968) emphasise the importance of addressing engineers' information needs demands improvements in information library quality and delivering information tailored to their preferences.

The escalating volume and diversity of data generated throughout construction projects pose challenges to effective data management (Naderi et al., 2021). Harnessing databases and online information technologies emerges as a viable strategy to overcome this hurdle (Moshood & Sorooshian, 2021; Parsamehr et al., 2023). Critical decisions in the pre-construction phase significantly influence project success, underscoring the importance of accurate and timely information inputs for effective risk mitigation and decision-making (Al Shobaki & Naser, 2016).

Historically, construction relied on managers' intuition, especially when digital data acquisition involved significant investments or limited data (Moshood, et al., 2023). However, the limitations of intuitive decision-making have become evident (Kliuchnikova & Pobegaylov, 2016). Transitioning to fact-based decision-making is vital for improving decision quality and pace, enhancing overall short- and long-term performance (Cheng & Lok, 2015). Accessible and comprehensible data empower construction leaders to discern crucial patterns, which is pivotal for consistent project development (Murphy & Seriki, 2021).

Leveraging big data analytics facilitates better decision-making by transforming raw data into actionable insights, knowledge, and wisdom (Basar, 2018). Accurate and

updated information is indispensable for informed, reality-based decisions. Shifting from intuitive to systematic data-gathering methods through digital platforms allows comprehensive data integration, facilitating informed decision-making (Cheng & Lok, 2015).

Timely decision-making backed by appropriate data delivery is imperative for businesses to thrive amid market competition. Yet, ensuring data quality for strategic decision-making remains a key organisational concern (E. Paulus et al., 2023). Discerning between systematic biases and random errors in data measurements is crucial for enhancing data quality. Rectifying biases is critical, as they can misrepresent social groupings or geographic regions, impacting operational and strategic choices (Wollmann & Steiner, 2017).

***H6:** There is a significant positive effect between the quality of information and construction business performance.*

***H7:** Quality of information significantly mediates the relationship between strategic decision formulation and construction business performance.*

***H8:** Quality of information significantly mediates the relationship between strategic decision implementation practices and construction business performance.*

***H9:** Quality of information significantly mediates the relationship between strategic decision evaluation and construction business performance.*

***H10:** Quality of information significantly mediates the relationship between reliance on financial strength and construction business performance.*

***H11:** Quality of information significantly mediates the relationship between reliance on the workforce and construction business performance.*

8.4 Methodology

In order to gather empirical data, a quantitative survey was conducted with a substantial sample size. This research approach was used to give descriptive data on the profiles of the strategic decision-making factors and construction business performance. In line with that, the researcher believes that the quality of information can influence strategic decision-making and play a mediating role in strategic decision-making and construction business performance by improving their relationship.

The online questionnaire survey began in August 2023 and continued until December 2023. This research uses closed-ended questions. The survey technique tracks and identifies people's thoughts, feelings, and views. The survey is the most adequately utilized tool regarding the time and quantity necessary to gather sufficient data. Data for all variables were collected through a self-administered online-based survey approach to ensure impartiality, prevent researcher bias and ensure a diverse Expert pool.

Recruitment primarily targeted members of New Zealand Certificate Building, Building Contractors, New Zealand Institute of Building, Infrastructure New Zealand, The National Association for Civil Construction in New Zealand, and professionals associated with various construction organisations through platforms like LinkedIn. School of Built Environment Engagement contact list was also sought from contacts within the industry. Initiating contact with potential experts began through email communication. The online survey used the Qualtrics system to gather the needed information for this research. This initial contact contained an official invitation letter outlining the study's purpose and importance. An expert consent form and a direct link to the survey questionnaire were provided alongside the letter. Any Expert who expresses interest in participating can proceed with the survey. The reasons for choosing this online survey method are that it is easy, fast, and inexpensive. Using this technique, the researchers can cut costs, including documentation, transportation, and printing. The respondents also can feel more comfortable and convenient because they can answer the questionnaire anytime and anywhere. Following the delivery of the questionnaires, it was intended that the sample individual would return them with their answers within two weeks. Individuals who had not responded were contacted through email and telephone to increase the response rate during the third week.

8.5 Findings

8.5.1 Demographic Distribution of the Respondents

It is necessary to consider similarities and differences within the unit when constructing the demographic profile of respondents. Such similarities and differences include position, gender, age, qualification, and geographic location (Hair et al., 2013; Sekaran & Bougie, 2016). On a five-point, seven-point and nine-point Likert scale, a sample of construction organisations was asked to respond to the questionnaire. It also

included a demographic and descriptive question about their perceptions of the influence of strategic decision-making on construction organisations with mediation variable of quality of information. A total of 102 surveys were completed and utilized to analyse the questionnaire sent to experts. The demographic information the respondents provided is presented in Table 8.1.

Table 8.1: Profile of Respondents

Profiles Items	Frequency	Percentage%
1. Position in Organisation		
Project Manager	14	13.73
Project Engineer	15	14.71
Executive Director	30	29.5
Contract Manager	09	8.8
Site Manager/Engineer	05	4.9
Quantity Surveyor/Estimator	02	1.96
Marketing Manager	04	3.9
General Manager	18	17.6
Others	05	4.9
2. Company Project Specialization		
Non-Residential Buildings	17	16.7
Residential Buildings	38	37.3
Commercial Buildings	18	17.6
Infrastructure	24	23.5
Other	05	4.9
3. Company Main Location		
Northland	01	0.98
Auckland	63	61.8
Manawatu	02	1.96
Canterbury	01	0.98
Waikato	01	0.98
Wellington	18	17.6
Southland	01	0.98
Others	15	14.71
4. Period of Company Establishment		
Less than 5 years	02	1.96
5-10	25	24.51
10-20	35	34.31
Above 20 years	40	39.22
5. Number of Direct Workers		
0-25	07	6.9
26-50	21	20.6
51-100	41	40.19
Above 100	33	32.3
Total	102	100

8.6 Assessment of Measurement Model

This section presents the assessment of the measurement model's validity. Within this study, the measurement model's validity underwent scrutiny through convergent validity and discriminant validity tests guided by established methodologies (Hair et al., 2010; Javed Memon et al., 2013; Rigdon et al., 2014). The utilization of PLS-SEM within this research was motivated by several considerations. Primarily, the study pursued an exploratory path, aiming to unravel the structural implications of strategic decision-making on construction business performance with the mediating effect of information quality. PLS-SEM was chosen due to its adeptness in handling intricate frameworks, aligning with the complex nature of the study's objectives (Hair et al., 2016). The analytical process of PLS-SEM is bifurcated into two stages: measurement evaluation and structural model construction, in accordance with established guidelines (Hair et al., 2010; Hair et al., 2014; Henseler et al., 2009).

In this vein, the study influenced the establishment of measurement standards, adhering to the criteria set by researchers (Hair et al., 2010; Javed Memon et al., 2013; Rigdon et al., 2014). To assess the measurement model's robustness, composite reliability, outer loadings, Cronbach's alpha, average variance extracted (AVE for convergent validity), and discriminant validity were all meticulously evaluated. These evaluations encompassed cross-loading assessments, the Fornell–Larcker criterion, and the Heterotrait-Monotrait ratio of correlations, culminating in a comprehensive scrutiny of the measurement models. Figure 8.2 shows the PLS Path model.

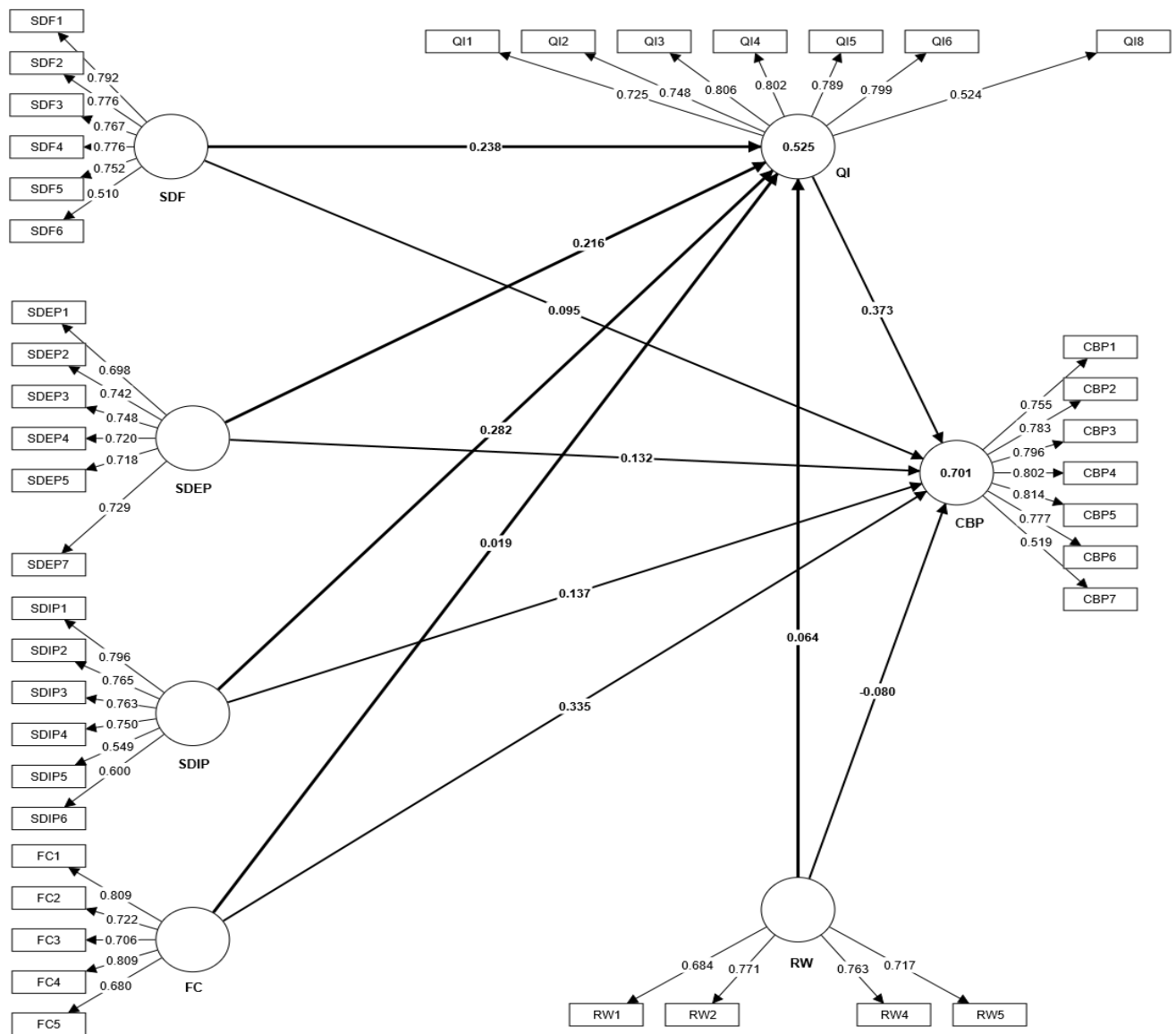


Figure 8.2: PLS Path model

8.6.1 Convergent Validity

This study's initial phase of establishing convergent validity encompassed rigorous data analysis. Carlson and Herdman (2012) noted that convergent validity centres on the interconnectedness of measurements, indicators, and items. After establishing this foundation, a crucial step involves ensuring that all construct measures effectively assess the same underlying concept and move cohesively in the same conceptual direction (Carlson & Herdman, 2012). An evaluation of factor loadings and average variance extracted (AVE) was conducted to scrutinise the convergent validity of

constructs. Notably, most outer loadings for the constructs exceed the minimal threshold of 0.500. However, as Neupane et al., (2014) and Wong (2013) advocate, exploratory research may accept loading scores of at least 0.50 or higher. This perspective underscores that the obtained loading scores comfortably exceed this lower benchmark. Composite reliability (CR) scores were employed to gauge the reliability of internal consistency (Hair et al., 2011). Simultaneously, Fornell and Larcker's recommendation of an AVE score reaching 0.5 or beyond was followed (Fornell & Larcker, 1981).

This guideline ensures the establishment of adequate discriminant validity, necessitating the square root of AVE to surpass inter-latent construct correlations (Hair et al., 2011). Notably, the AVE values spanning 0.504 to 0.571 comfortably exceed the acceptable threshold of 0.50, indicative of their capability to elucidate over 50 percent of construct variances. Cronbach alpha values below 0.60 denote average reliability, while coefficients reaching or exceeding 0.70 signify a high-reliability threshold (Joseph F Hair et al., 2010; Hassan et al., 2019; Javed Memon et al., 2013; Rigdon et al., 2014). Complementing this perspective, Hair et al. (2014) and Sekaran et al. (2010) propose that the composite reliability coefficient should attain a level of at least 0.70. As this coefficient approaches unity, the instrument's reliability and internal consistency grow, lending greater credibility to the measurements. Table 8.2 summarises construct reliability and validity.

Table 8.2: Convergent Validity

Construct	Range of Outer Loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	(AVE)
CBP	0.519 - 0.814	0.871	0.881	0.902	0.571
FC	0.680 - 0.809	0.716	0.721	0.824	0.539
QI	0.524 - 0.806	0.864	0.871	0.897	0.559
RW	0.684 - 0.771	0.800	0.806	0.863	0.558
SDEP	0.698 - 0.748	0.821	0.821	0.870	0.527
SDF	0.510 - 0.792	0.825	0.837	0.874	0.541
SDIP	0.600 - 0.796	0.804	0.828	0.857	0.504

Note: Strategic Decision Formulation (SDF), Strategic Decision Implementation Practices (SDIP), Strategic Decision Evaluation (SDE), Reliance on Financial Strength (FC), Reliance on Workforce (RW), Construction Business Performance (CBP), and Quality of Information (QI).

8.6.2 Discriminant Validity

In assessing whether a concept remains empirically distinguishable from other constructs within the same model, discriminant validity is paramount in evaluating measurement models. It necessitates establishment before comprehensive model assessment (Farrell, 2010). In this context, Henseler et al. (2015) introduce the heterotrait-monotrait (HTMT) ratio of correlations as an alternative avenue for evaluating discriminant validity. The resilience of this methodology is underscored by a succession of subsequent studies (Franke & Sarstedt, 2019; Sarstedt et al., 2020; Voorhees et al., 2016). Calculated for each latent variable pair, the HTMT ratio presents the division between the mean item correlation amid constructs (heterotrait correlations) and the (geometric) mean of the average correlations across items that measure individual constructs (monotrait correlations) (Henseler et al. 2015). Consequently, an elevated HTMT value signifies potential concerns regarding discriminant validity between the two concepts. Discriminant validity results based on the heterotrait-monotrait ratio of correlations is presented in Table 8.3.

Table 8.3: Discriminant validity results based on the heterotrait-monotrait ratio of correlations (HTMT).

Construct	CBP	FC	QI	RW	SDEP	SDF	SDIP
CBP							
FC	0.549						
QI	0.839	0.513					
RW	0.763	0.759	0.526				
SDEP	0.804	0.588	0.788	0.586			
SDF	0.814	0.577	0.782	0.635	0.849		
SDIP	0.810	0.593	0.775	0.687	0.837	0.826	

Source: Created by the authors

Henseler et al. (2015) introduce a benchmark value of 0.85, serving as a criterion for assessing discriminant validity between two constructs. However, when dealing with constructs that share a conceptual resemblance, a less conservative threshold value of 0.90 may be more suitable, reflecting a more lenient criterion. In order to address this, researchers should integrate a statistical examination to ascertain if an HTMT value significantly diverges from a predetermined threshold (e.g., 0.85).

8.6.3 Collinearity Statistics (VIF)

As detailed by Tabachnick & Fidell (2007), "multi-collinearity" denotes a scenario in which multiple exogenous latent variables display significant associations with each other. The presence of multi-collinearity among exogenous latent constructs can substantially influence the regression coefficient estimates and subsequent tests for their statistical significance (Hair et al., 2019). Within the context of multi-collinearity, the standard errors of coefficients often elevate, leading to a diminished statistical significance of these coefficients, as Tabachnick & Fidell (2007) indicated. The Variance Inflation Factors (VIF) values were harnessed to assess the potential impact of collinearity. A VIF value within or below 5 is essential to mitigate collinearity issues (Joe F Hair Jr et al., 2019; Taofeeq et al., 2019). Within this study, Smart-PLS 4 was employed to calculate VIFs for all latent variables in the model. The results of the multicollinearity test, illustrated in Table 8.4, span a range from 1.604 to 3.411, suggesting a level of collinearity that is not of significant concern.

Table 8.4: Inner VIF values

Construct	VIF values
FC -> CBP	1.604
FC -> QI	1.596
QI -> CBP	2.104
RW -> CBP	1.771
RW -> QI	1.770
SDEP -> CBP	3.411
SDEP -> QI	3.313
SDF -> CBP	3.317
SDF -> QI	3.198
SDIP -> CBP	3.356
SDIP -> QI	3.189

8.7 Assessment of Structural Model

The study used structural path analysis as a foundational framework for hypothesis testing. This methodology, focusing on the structural model analysis, facilitates the examination of multiple pathways within the research model, thereby aiding in identifying potential issues (Wong, 2013). Each established structural path in

the research model corresponds to a hypothesized relationship. The study operationalised hypothesis testing within the structural model by implementing Bootstrapping within Smart-PLS 4. In line with recommended practice, bootstrapping was executed with a sample size of 5,000 (Hair et al., 2011), while the significance alpha was set at 0.05. The analysis delved into the coefficient of determination (R^2 values) and path coefficients (beta values, β) to gauge the resilience of the hypothesized associations under rigorous scrutiny (Hair et al., 2012). The outcomes of this comprehensive procedure are visually conveyed through Figure 8.3, while the detailed results are presented in Table 8.5, effectively capturing the results obtained via PLS bootstrapping.

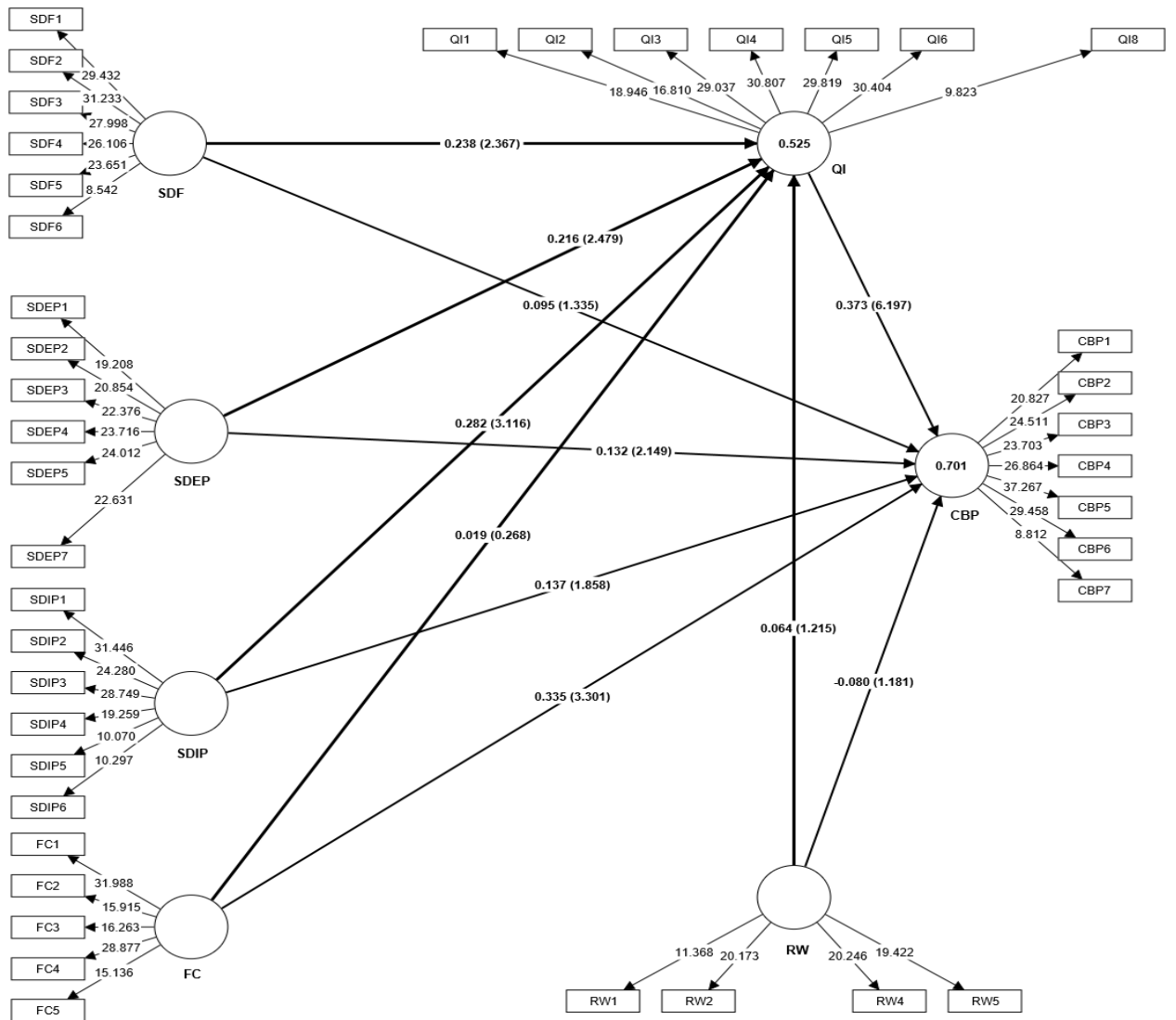


Figure 8.3: Evaluation of Structural Model through PLS Bootstrapping

Table 8.5: Summary of Hypotheses Testing

Hypotheses	Path	Std. Beta	std. Error	t-value	Bias	Confidence Interval		Decision
						5.00%	95.00%	
H1	SDF -> CBP	0.095	0.071	1.335	0.000	-0.015	0.218	Not Supported
H2	SDIP -> CBP	0.137	0.074	1.858	0.010	0.013	0.253	Supported
H3	SDEP -> CBP	0.132	0.061	2.149	-0.006	0.032	0.234	Supported
H4	FC -> CBP	-0.080	0.068	1.181	0.010	-0.212	0.016	Not Supported
H5	RW -> CBP	0.335	0.101	3.301	-0.007	0.167	0.500	Supported
H6	QI -> CBP	0.373	0.060	6.197	-0.004	0.280	0.476	Supported
H7	SDF -> QI -> CBP	0.089	0.040	2.230	-0.002	0.033	0.167	Supported
H8	SDIP -> QI -> CBP	0.105	0.040	2.640	0.000	0.051	0.183	Supported
H9	SDF -> QI -> CBP	0.089	0.040	2.230	-0.002	0.031	0.147	Supported
H10	FC -> QI -> CBP	0.024	0.019	1.239	0.001	-0.008	0.056	Not Supported
H11	RW -> QI -> CBP	0.007	0.026	0.272	0.002	-0.040	0.046	Not Supported

Note: **Significant at p-value 0.05 (1-Tailed). **Note:** Strategic Decision Formulation (SDF), Strategic Decision Implementation Practices (SDIP), Strategic Decision Evaluation (SDE), Reliance on Financial Strength (FC), Reliance on Workforce (RW), Construction Business Performance (CBP), and Quality of Information (QI).

Subsequently, Structural Equation Modelling (SEM) was employed to deduce the hypothesized model's estimations based on the given dataset. The significance threshold of a P-value at 0.05 and a t-value of 1.65 was embraced, acknowledging the statistical significance of the associations between the endogenous, exogenous and mediating variables. The testing process regressed factors onto each endogenous, exogenous and mediating variable to scrutinize the hypotheses. Table 8.5 comprehensively showcases the results, revealing that eleven of the 11 research hypotheses posited garnered substantiated support, displaying a notable impact on the quality of information on the relationship between strategic decision-making and construction business performance.

8.7.1 Coefficient of Determination (R²)

An additional pivotal criterion employed for evaluating the structural model within PLS-SEM encompasses the utilization of R-squared values, also referred to as the coefficient of determination or correlation coefficient (Hair et al., 2011; Hair et al., 2012; Henseler et al., 2009). Extensive literature underscores that the R-squared value serves as an indicator elucidating the proportion of variation dissected in the endogenous variable by its corresponding exogenous variable. Furthermore, the R-squared value signifies the model's constituent variables' effectiveness (Hair et al., 2011). Nevertheless, the quantification of the R-squared degree can be guided by various considerations. Chin

et al. (2003) delineate that R-squared values around 0.67, 0.33, and 0.19 correspond to substantial, moderate, and weak explanatory power, respectively. Table 8.6 presents the R-squared values pertaining to the endogenous latent variables (Construction Business Performance and Quality of Information), unveiling their respective explanatory strengths.

Table 8.6: Variance Explained in the Endogenous Latent Variable

Construct	R-square	Criteria
CBP	0.701	Substantial
QI	0.525	Moderate

8.7.2 Effect Size

In order to determine the model's strength, the f^2 value of the endogenous latent construct is evaluated. This process is appropriate for assessing how significant the effect of exogenous constructs is on the endogenous construct (Hair et al., 2013). The f^2 was evaluated according to Cohen (1988) standards, with 0.02 – 0.14 indicating a small effect, 0.15 – 0.34 indicating a medium effect, and 0.35 and above indicating a large effect (Cohen, 1988). All eleven factors were examined for f^2 , and the findings are summarized in Table 8.7.

Table 8.7: Effect Size

Construct	F-square	Criteria
FC -> CBP	0.013	Small Effect
FC -> QI	0.005	Small Effect
QI -> CBP	0.221	Medium Effect
RW -> CBP	0.212	Medium Effect
RW -> QI	0.000	No Effect
SDEP -> CBP	0.017	Small Effect
SDEP -> QI	0.030	Small Effect
SDF -> CBP	0.009	Small Effect
SDF -> QI	0.037	Small Effect
SDIP -> CBP	0.019	Small Effect
SDIP -> QI	0.053	Small Effect

8.7.3 PLS-Predict

The novel PLS-predict feature emerges as a valuable tool for assessing a model's predictive capabilities beyond the confines of the initial sample (Hair et al., 2021). This unique approach entails segmenting the sample data into distinct subgroups, known as folds, with each fold being of comparable size to the overall sample (Hair et al., 2021). In a sequential manner, the technique consolidates k-1 folds to formulate a training dataset, facilitating parameter estimation for the model (Hair et al., 2021). Simultaneously, the remaining fold serves as a holdout sample, permitting an evaluation of predictive efficacy using this subset (Shmueli et al., 2019).

Fundamentally, the holdout sample encompasses instances to be forecasted using the model parameters derived from the training sample's estimation process. This cyclic procedure iterates until every k fold is a holdout sample for its preceding fold. Ordinarily, the default value of folds (k) is set at ten, contingent on the sample size. However, this count can be adjusted upwards or downwards to suit the circumstances (Hair et al., 2017). A valuable heuristic, articulated by Hair et al., (2021), suggests that if all the item differences (PLS-SEM values) remain below a certain limit (LM), the predictive power is robust; if most item differences (PLS-SEM values) fall below LM, the predictive power is moderate; and if all item differences (PLS-SEM values) surpass LM, the model's predictive power is inadequate. The PLS-predict outcomes are graphically illustrated in Table 8.8.

Table 8.8: PLS-Predict

Construct	Q ² predict	PLS-		PLS-	
		SEM_RMSE	SEM_MAE	LM_RMSE	LM_MAE
CBP1	0.248	1.277	0.869	1.339	0.924
CBP2	0.337	1.243	0.835	1.346	0.895
CBP3	0.338	1.204	0.794	1.310	0.883
CBP4	0.327	1.242	0.863	1.377	0.962
CBP5	0.441	1.071	0.772	1.115	0.800
CBP6	0.423	1.087	0.780	1.157	0.805
CBP7	0.195	1.138	0.905	1.176	0.879
QI1	0.229	1.298	0.882	1.358	0.915
QI2	0.270	1.305	0.905	1.380	0.949
QI3	0.327	1.141	0.820	1.166	0.844
QI4	0.284	1.217	0.865	1.277	0.903

QI5	0.321	1.286	0.884	1.383	0.940
QI6	0.249	1.234	0.865	1.295	0.930
QI8	0.199	0.947	0.735	1.004	0.743

8.8 Discussions of Findings

This study underscores the critical role of information quality in evaluating strategic decisions for bolstering construction business performance. These findings substantiate the hypothesis formulated based on our research objectives and inquiries. They are thoroughly expounded upon, drawing comparisons with pertinent earlier research, thus enriching the context and understanding of the outcomes.

The study's findings diverge from Hypothesis 1, indicating no observed relationship between strategic decision formulation and the performance of construction businesses in New Zealand's construction industry and analysing the data presented in Table 7.5 highlights that strategic decision formulation exhibits a negative influence on construction business performance ($\beta=0.095$, $t=1.335$). This outcome challenges Hypothesis 1, which initially posited a positive correlation between strategic decision formulation and organisational success, indicating a critical discrepancy.

Strategic decision formulation is crucial for fortifying organisational standing and competitiveness, both domestically and globally. It encompasses elucidating the organisation's mission objectives and devising appropriate strategies. However, various factors influence this process, including challenges such as inadequate information quality, limited assessment of internal and external environments, failure to envision future landscapes, lack of establishment of organisational missions and goals, failure to define strategic policies, and incapacity to evaluate the capabilities of individuals involved in strategy development. Scholarly perspectives from Aldhaena (2020) and Gavalas (2022) underscore the crucial role of strategic formulation and decision-making in addressing such challenges. As asserted by these scholars, strategic management formulation becomes imperative for a firm's performance by creating effective systems to mitigate unpredictable events, ensuring operational sustainability, and minimizing inherent risks.

Research contends that strategic planning begins with identifying vision, mission, and objectives (Aldhaen, 2017; Aldhaena, 2020; H. Hassan, 2010). It also emphasises

the need for organisations to manage their resources and orchestrate strategies to achieve their objectives (Aldhaen, 2017; Gavalas, 2022). Furthermore, it accentuates the criticality of considering the internal and external environment within the strategic planning process (Bagheri, 2016). However, it is evident from Darabos (2013) that many organisations undervalue strategic formulation, overlooking its significance in motivating employees and setting a coherent vision, mission, and direction. Choudhary & Gangotia (2017) advocates for organisations to support and review their strategies, vision, and mission by collecting data during the evaluation and control stage, emphasizing data-driven decisions rather than relying on intuition or experience.

The study emphasises that a critical imperative for organisations to succeed in strategic decision formulation is periodic collection and analysis of internal and external market data factors that impact their operations. It calls for identifying key strengths, weaknesses, opportunities, and threats through a comprehensive analysis of the internal and external environment. This process ensures alignment with good strategic management practices, particularly situational analysis. Regular situational analyses reflect an organisation's commitment to robust strategic management practices.

Moreover, it asserts that construction organisations must establish a clear direction through articulated vision, mission statements, and core values. This includes proactively gathering and analysing information concerning the internal and external environment to comprehend their implications. Top management is responsible for defining the company's strategy and envisioning its future. However, involving all employees in defining its mission and vision remains pivotal to fostering a sense of ownership and commitment.

Furthermore, the study highlights the importance of creating a planning department or committee to formulate policy, ensuring that strategic behaviour aligns with environmental developments. A comprehensive assessment of all resources - information/data, physical, financial, and human resources- must be undertaken during strategy formulation. It emphasises the potential benefit of employing consultants to aid strategy formulation. As identified in this study, failure to adhere to these practices may lead to strategic formulation failure within construction organisations. Hypothesis 1 was not supported, indicating that strategic management practices do not directly influence

organizational success, thereby emphasizing the critical mediating role of information quality in the construction industry context.

Hypothesis 2 posited a positive relationship between strategic decision implementation practices and construction business performance. The data analysis in Table 8.5 reveals a significant correlation between strategic decision implementation practices and construction business performance, reflected in the coefficients ($\beta=0.137$, $t=1.858$), signifying a robust association. These findings unequivocally affirm that strategic decision implementation practices wield a direct and beneficial impact on construction business performance. The positive linkage between strategic decision implementation practices and organisational performance is hardly surprising, considering the pivotal role these practices play in organisational efficacy. Strategic decision implementation practices are intricately interwoven with an organisation's capabilities and capacities, substantially influencing its overall performance.

Tawse & Tabesh (2021) emphasise that strategy implementation represents the actionable phase of the strategic management process. Once long-term objectives are established and suitable strategies chosen, the strategic management process transitions into strategy implementation. Successful execution of this phase necessitates clear responsibility for implementation outcomes, typically vested in top management. However, involving all staff members in strategy implementation fosters a sense of ownership, contributing significantly to success. According to Ehlers & Lazenby (2004), strategy implementation embodies the active phase involving administrative tasks that align organisational resources cohesively to achieve its strategic objectives. The adept execution of this phase signifies an organisation's ability to realize its potential and signifies practical management skills.

Čater & Pučko (2010) accentuate that successful strategy coupled with effective implementation is a testament to adept management, as it tests a manager's proficiency in navigating change, motivating personnel, enhancing organisational competencies, and fostering strategies. The study underscores crucial aspects for construction organisations to ensure effective strategy implementation: alignment of strategies with set objectives and anticipated performance, allocation of adequate resources, congruence between organisational strategy and structure, implementation of motivational systems, comprehensive communication of company strategy to all staff members, and the pursuit

of strategy implementation methods that yield optimal performance. The study establishes that implementing motivational systems is critical to the success of strategy implementation. This emphasises the importance of fostering an environment incentivised by encouraging employees to engage with and contribute actively to the implementation process.

Hypothesis 3 posited a substantial impact of strategic decision evaluation on the construction business performance within construction organisations. As indicated in Table 8.5, a positive association exists between strategic decision evaluation and construction business performance, reflected in the coefficients ($\beta = 0.132$, $t = 2.149$), signalling a notable connection with the construction business performance. Numerous empirical studies corroborate the significant influence of strategic decision evaluation on organisational performance and environmentally responsible decision-making and behaviour in the assessment of organisational performance (Oyewobi et al., 2015; Seaden et al., 2003; Sulieman & Alfaraidy, 2019). Establishing strategic decision evaluation seems to have instigated substantial momentum for developing the organisation's capabilities and capacities, effectively channelling the impact of its precursors (activators). A crucial factor in guiding strategic decision-making is the process of strategic decision evaluation. Within construction business performance, strategic decision evaluation emerges as a pivotal concept following strategic formulation (Isik et al., 2010). Following the successful implementation of a well-devised strategy, organisations must systematically evaluate or review their strategic choices to ensure sustained competitiveness over the long term.

The findings in Table 8.5 underscore the importance of monitoring, evaluating, and controlling the strategy's implementation in construction organisations to gauge their performance. This involves regular review of strategic management decisions, scrutinizing the strategy formulation and implementation process within construction organisations, and ensuring clear communication channels exist within the organisation to facilitate strategy performance evaluation. Additionally, it is imperative to conduct regular assessments of strategy success and promptly take corrective actions for optimal performance. Comparisons among different implemented strategies and the final evaluation of a strategy upon completion should inform any necessary corrective measures.

The findings derived from this study do not validate Hypothesis 4, which posited a correlation between reliance on financial strength and construction business performance within construction organisations. The analysis indicates that dependence on financial strength does not significantly influence construction business performance ($\beta = -0.080$, $t=1.181$). Isik et al., (2010) stated that organisational performance typically revolves around attaining objectives or effectively implementing an appropriate strategy within an organisation. While studies on organisational performance have acknowledged the substantial role played by financial strength (Kurdi & Alshurideh, 2020; Singh & Misra, 2021; Surroca et al., 2010), performance measurement in the construction industry has traditionally focused predominantly on project-level performance (Anwar & Abdullah, 2021; Dai & Wells, 2004; Parker & Skitmore, 2005). However, this trend is gradually shifting towards an enhanced emphasis on the organisational level. Also, the impact of financial position on overall performance has long been recognized (Altman, 1968; Beaver, 1966).

Financial strength is a barometer of a company's overall financial stability and comparative position within its industry. Assessing financial statements to ascertain profitability and stability is pivotal in evaluating a firm's performance. Financial ratios serve as diagnostic instruments, shedding light on strengths and weaknesses related to liquidity, efficiency, leverage, and profitability. Extensive studies have underscored the effectiveness of financial ratios in appraising organisational performance (Fahami et al., 2019; Siaila & Rumerung, 2022).

Utilizing financial ratios allows stakeholders in construction projects to make more informed decisions regarding funding. Gaining insights into a company's financial health, profitability, and liquidity through these ratios is critical for risk management and maximizing returns. Whether acting as an investor, lender, or construction professional, leveraging financial ratios undoubtedly enriches decision-making processes and significantly contributes to the success of construction projects. Hypothesis H4 of this study was not supported by the analysis, suggesting that reliance on financial strength might not exert a statistically significant influence on construction business performance within construction organisations, particularly when effective strategic decisions aren't in place to drive the organisation toward its objectives.

Hypothesis 5 posited that reliance on the workforce significantly impacts the construction business performance within construction organisations. The statistical analysis presented in Table 8.5 validates this hypothesis, demonstrating a positive association between reliance on the workforce and construction business performance ($\beta = 0.335$, $t = 3.301$), underscoring a robust correlation between this reliance and organisational performance. According to Slattery & Sumner (2011), in the construction industry, the success of projects heavily relies on various skills, encompassing conceptual, technical, and physical prowess. It becomes crucial for contractors and service providers to discern and select highly skilled labourers who meet the essential standards, as their competence significantly enhances project efficiency and performance.

Arshad & Ab Malik (2015) underscore the significance of productivity augmentation achieved through construction labourers possessing appropriate skills, knowledge, and robust mental and physical capabilities, ultimately contributing to operational efficiency. Elevated skills among labourers not only elevate productivity but also augment project performance. Labourers with extensive skills and expertise demonstrate heightened productivity and robust physical and psychological health, allowing them to efficiently and effectively execute tasks. The strategic managerial practice of labour force forecasting within the construction industry, as highlighted by Olsen et al., (2012), elucidates the integral role of Human Resource Management (HRM) in enhancing construction performance. The consensus among researchers, such as Elbashbishy & El-adaway (2024), accentuates that skilled labour forces represent a pivotal human resource asset, significantly influencing construction performance. Therefore, the efficient execution of projects is notably contingent upon the proficiency and performance of skilled workforces. The superior performance exhibited by skilled labourers directly correlates with heightened efficiency and success in construction projects.

Hypothesis 6 postulated that the quality of information significantly impacts construction business performance. The statistical analysis in Table 8.5 confirms this hypothesis, revealing a notable influence of information quality on construction business performance ($\beta = 0.373$, $t = 6.197$). Several pivotal considerations in the construction industry substantiate this relationship between information quality and performance. According to Nisar et al., (2021), decisions made by project leaders, especially during the

pre-construction phase, have substantial influence over a project's success. Al Shobaki et al., (2016) emphasise the importance of managers ensuring the accuracy and relevance of available information, as this significantly contributes to informed decision-making, thereby mitigating potential risks and challenges.

Businesses often rely on highly experienced managers to make critical operational decisions, particularly when digital data acquisition poses challenges, as noted by Cheng & Lok (2015). However, research by Kliuchnikova & Pobegaylov (2016) highlights the inadequacy of solely intuitive decision-making methods, underscoring the necessity of transitioning to evidence-based decision-making for enhancing decision quality and swiftness, thus yielding enhanced overall performance in the medium to long term. Aligning with this perspective, Safa & Hill (2019) emphasise the significance of easily accessible, understandable data, enabling construction leaders to discern patterns and relationships crucial for consistent project development. The importance of accurate and updated information cannot be overstated in fostering informed decision-making grounded in reality.

According to Henseler-unger & Ziele (2016), evaluating the direct and indirect connections between exogenous and endogenous latent variables is critical to structural model assessment. This can be achieved through mediating or moderating analyses. In this study, the focus was solely on assessing the significance of mediating relationships. The Hypothesis 7, 8, 9, 10 and 11 suggested that the quality of information acts as a mediating factor influencing both strategic decision-making and construction business performance.

The results of the t-tests within the structural model revealed statistically significant PLS path mediating effects of quality of information on strategic decision formulation ($\beta = 0.089$, $t = 2.230$) H7, strategic decision implementation practices ($\beta = 0.105$, $t = 2.640$) H8, and strategic decision evaluation ($\beta = 0.089$, $t = 2.230$) H9. However, the indirect (mediation) effect of quality of information on reliance on financial strength ($\beta = 0.024$, $p = 1.239$) H10 and reliance on the workforce ($\beta = 0.007$, $p = 0.272$) H11, concerning construction business performance did not receive substantial support. These findings emphasise the pivotal role of information quality as a vital link between strategic decision-making and construction business performance. It acts as a channel guiding decision-making processes, aligning strategies with relevant data, facilitating

effective execution, enabling comprehensive evaluation, and optimizing resource allocation.

8.9 Conclusion

The study's results have significant implications for industry practitioners and researchers aiming to better understand the factors that influence success in the construction sector. The findings confirmed a positive relationship between strategic decision-making management and construction business performance, mediated by the quality of information. The research emphasises the importance of strategic decision implementation, evaluation, reliance on a skilled workforce, and high-quality information for improving construction business performance in New Zealand. It also highlights the need for comprehensive strategic management practices and the use of accurate, relevant data to support evidence-based decision-making in the construction industry.

These findings are consistent with previous studies conducted by Waweru & Omwenga (2015), Ng'andu (2022), Lekan & Sabo (2019), Bamidele-Sadiq et al., (2022), Otieno & Theuri (2016), Otieno et al., (2018), Nyarik (2016), Njeru (2015), and Adendorff et al., (2011), all of which demonstrated the positive impact of strategic management practices on organisational performance and competitive advantage in the construction industry. However, the conclusion also notes that the performance of construction sector should be developed and measured by actively seeking new opportunities, promoting products and services, and undertaking responsibilities such as technical reviews and advice to customers across all aspects of the business, from procurement to final delivery. These efforts include practices like business process re-engineering, total quality management, continuous improvement, and business process management.

8.10 Research Implications

This study concludes that adopting strategic management practices and integrating quality information significantly influences New Zealand's construction sector performance. Hence, it's evident that adopting strategic management practices, complemented by quality information, enhances performance within the construction sector. The observed positive correlation between adopting strategic management practices and enhanced construction business performance underscores the critical need

for seamless integration of strategic management into the daily operations of construction businesses. Practitioners must emphasise the infusion of strategic decision-making at every organisational level. Recognizing the pivotal role of quality information as a mediating factor, construction enterprises should prioritize refining information quality management. Deploying robust systems to ensure information accuracy, reliability, and accessibility becomes imperative, optimizing the positive impact of strategic management practices on overall business performance. In navigating the challenging business climate, construction businesses can employ more effective methods by conducting comprehensive situational analyses. This process should involve consultants and engage all team members in formulating strategies, ensuring an inclusive execution approach. It is essential to evaluate organisational techniques and foster adaptability regularly. Developing clear and concise mission and vision statements is crucial, serving as guiding principles for the company's direction and future goals. These statements should be effectively communicated to all staff during the plan's implementation, instilling a sense of purpose.

Owners of construction organisations play a pivotal role in ensuring the inclusivity of the strategic management process. Involving personnel at all levels, from lower-level staff to top management, fosters a shared sense of ownership and responsibility for plan execution. Continuous assessment of different methods and swift corrective actions are vital to mitigate the risk of company failure. Owners must actively pursue enhanced management acumen through consistent training, ensuring access to high-quality information before making project-related decisions. Moreover, owner should articulate exceptional strategic objectives encompassing technology and innovation, business efficiency and development, and a commitment to excellent customer service. Prioritizing the acquisition of appropriate resources, including data/information, financial assets, and human capital, becomes paramount. The success of any business strategy primarily hinges on resource availability, discernment of value, the vigour and expertise of managers, and strategic implementation within volatile and ambiguous environments. This proactive approach positions construction organisations for resilience and sustained success.

The present study has several limitations that should be acknowledged. First, the sample size for the survey was relatively small, with 102 respondents. While this sample size is sufficient for the analyses conducted, it may limit the generalizability of the

findings to the broader construction industry in New Zealand. Future research could replicate the study with a larger and more representative sample to enhance the external validity of the results.

Second, the study relied on self-reported data from construction professionals, which may be subject to response bias. To address this limitation, future research could triangulate the findings by incorporating objective performance data, such as financial reports, project documentation, and industry benchmarks, to corroborate the perceptions of the respondents.

Third, the study focused on a selected set of determinants of construction business performance, including strategic decision-making, financial strength, skilled workforce, and information quality. While these factors were found to be significant, the construction industry is influenced by a multitude of additional variables, such as organisational culture, leadership styles, technological adoption, and innovation practices. Expanding the scope of investigation to include these additional factors could provide a more comprehensive understanding of the drivers of success in the construction industry.

Despite these limitations, the present study offers valuable insights into the determinants of successful construction business performance in New Zealand. The findings highlight the crucial role of strategic decision-making, financial robustness, skilled labour, and high-quality information in driving construction business success. The study's recommendations provide practical guidance for construction businesses to enhance their performance and competitiveness. Additionally, the research lays the foundation for future studies to further explore the complex and multifaceted factors influencing the success of the construction industry, not only in New Zealand but also in other contexts.

EPILOGUE: PART THREE

The statistical analysis conducted throughout this research has provided robust empirical evidence for the complex relationships between strategic decision-making, information quality, and construction business performance in New Zealand's construction sector. Through rigorous application of partial least squares structural equation modelling (SmartPLS4), this study has validated multiple hypotheses that illuminate the intricate dynamics shaping organisational success in the construction industry.

The findings from Chapter 7 have demonstrated conclusively that strategic decision-making processes are fundamental drivers of organisational performance. Through the testing of five key hypotheses, we have established that both internal organisational factors and external market conditions significantly influence the effectiveness of strategic decisions. This understanding provides construction industry stakeholders with evidence-based insights for optimizing their decision-making processes and improving organisational outcomes.

Perhaps most significantly, the research presented in Chapter 8 has established the critical mediating role of information quality in the relationship between strategic decision-making and construction business performance. The validation of eleven hypotheses through SmartPLS4 analysis has revealed that while strategic decision-making directly influences business performance, the quality of information available to decision-makers substantially affects the strength and effectiveness of this relationship. This finding has profound implications for how construction organisations should approach both their information management and strategic planning processes.

These empirical findings suggest several promising directions for both practical application and future research. Construction organisations would benefit from developing more sophisticated information quality management systems, given the demonstrated importance of high-quality information in strategic decision-making. Additionally, the validated conceptual frameworks provide a foundation for developing more nuanced approaches to strategic management in the construction sector. As New Zealand's construction industry continues to evolve, the empirical evidence presented in this research offers valuable guidance for industry practitioners and researchers alike.

The statistical validation of the relationships between strategic decision-making, information quality, and business performance provides a solid foundation for developing more effective management practices. This research not only contributes to the theoretical understanding of construction management but also offers practical insights that can be immediately applied to improve organisational performance in the sector.

PART 4

STRATEGIC FRAMEWORK DEVELOPMENT, VALIDATION INTERVIEW

AND

CONCLUSION AND IMPLICATIONS

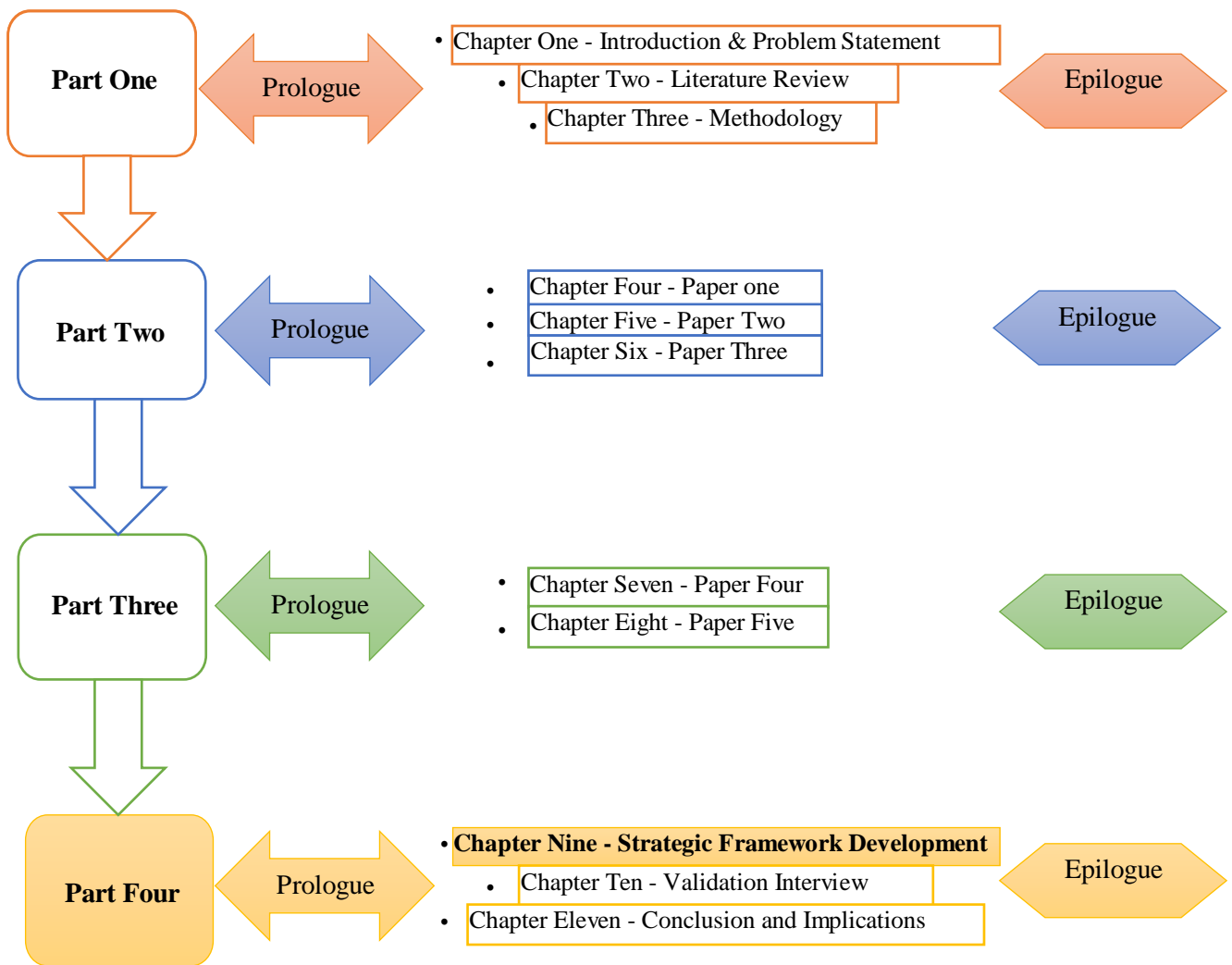
PROLOGUE: PART FOUR

In an era of unprecedented complexity and rapid change, the construction industry stands at a critical juncture. New Zealand's construction sector, like many around the world, faces mounting challenges in project delivery, resource optimization, and strategic planning. The increasing sophistication of construction projects, coupled with evolving regulatory requirements and market dynamics, has created an environment where effective strategic decision-making can mean the difference between organisational success and failure.

Yet, amidst these challenges lies a fundamental question that has remained largely unexplored: How does the quality of information influence strategic decision-making in construction organisations, and what role does it play in determining business performance? This research emerges from the recognition that while information serves as the lifeblood of strategic decision-making, its quality and impact on construction business performance have not been systematically studied within the New Zealand context.

The journey that unfolds in these pages represents a comprehensive investigation into the intricate relationships between strategic decision-making, information quality, and construction business performance. Through rigorous analysis and empirical research, this study seeks to bridge the gap between theoretical frameworks and practical application, offering insights that could transform how construction organisations approach strategic planning and information management.

As we delve into this exploration, we stand on the threshold of uncovering crucial insights that could reshape our understanding of strategic management in the construction industry. The findings and frameworks presented here are not merely academic exercises but practical tools that could guide construction organisations through the complexities of modern project delivery and business management.



CHAPTER 9

STRATEGIC FRAMEWORK DEVELOPMENT

9.1 Introduction

The third primary objective is to create a comprehensive strategic framework that would assist construction organisations in making better decisions and improving their capacity and capabilities to perform projects based on the findings of the first and second objectives. The proposed framework has significant potential to enhance industry performance, fostering sustainable growth and development in the construction sector of New Zealand.

The strategic framework presented in Figure 9.1 is a strategic decision-making process framework that illustrates the various components and their interactions in making effective strategic decisions within an organisation. This framework is divided into three main sections: the first part highlights the factors that influence this process, while the second part focuses on the strategic decision-making process and realised benefits and the third part focus on benefit realization of the framework. By clearly delineating these three aspects, the framework provides a holistic view of the elements that contribute to successful strategic decision-making.

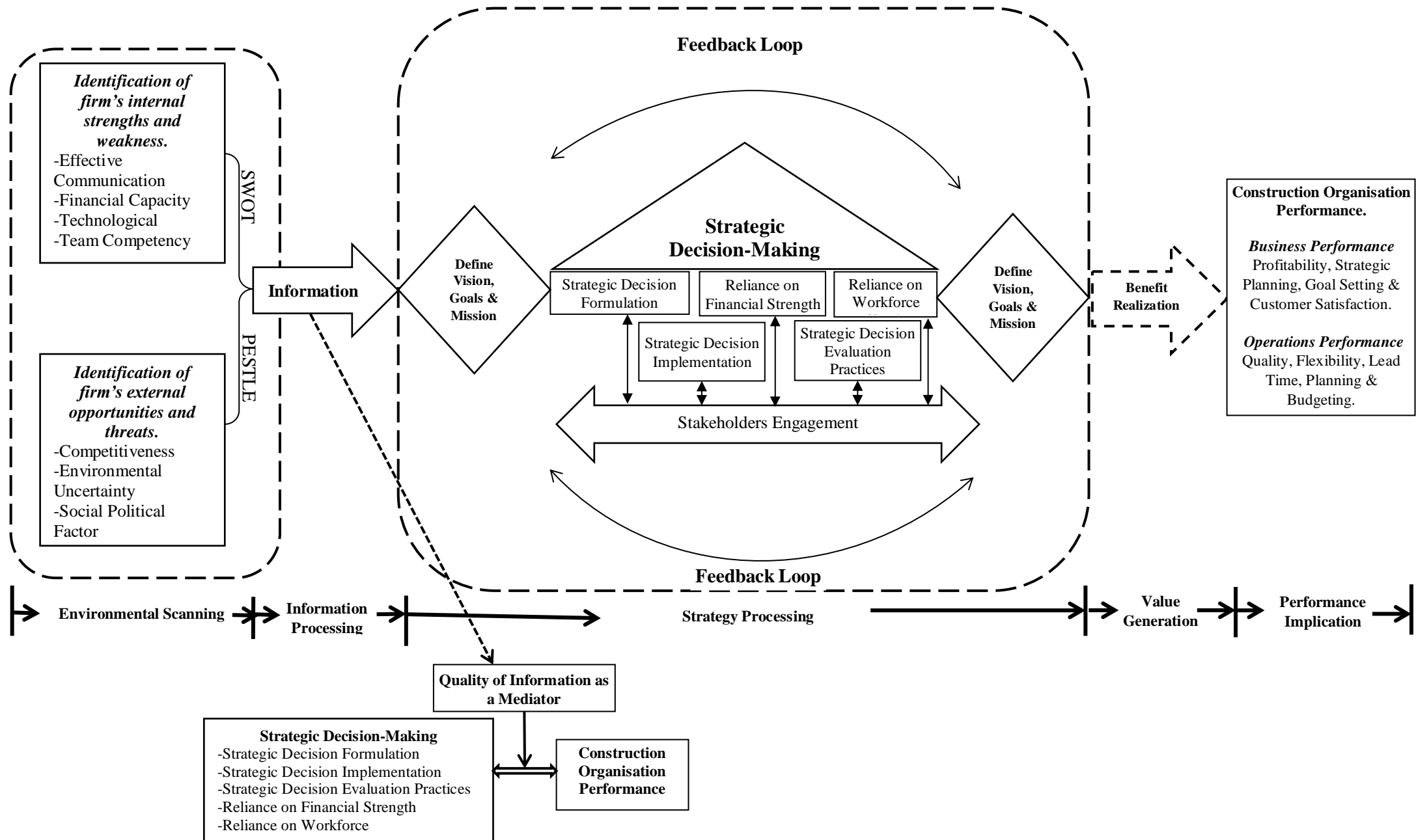


Figure 9.1: Quality of information as a strategic resource (Proposed Strategic Framework)

The factors influencing the strategic decision-making process are divided into two categories: (i) people and (ii) information. The people component is critical to this framework, emphasising the human element in decision-making. It includes the identification of the firm's internal strengths and weaknesses through a SWOT analysis. This analysis covers effective organisational communication, financial capacity to undertake projects, technological competency to leverage modern tools and techniques, and team competency to execute tasks efficiently. Additionally, the people component involves the identification of external opportunities and threats through a PESTLE analysis. This includes factors such as competitiveness in the market, environmental uncertainty that might affect project timelines or costs, and social-political factors that could influence regulations or public perception of construction projects. The information component is equally crucial in this framework. It considers various aspects related to the quality of information and its availability. In the modern data-driven world, having access to accurate, timely, and relevant information can significantly impact the quality of decisions made. This component emphasises the need for organisations to invest in robust information systems, data analytics, and knowledge management practices to ensure that decision-makers have access to high-quality information when needed.

At the framework's core is the strategic decision-making process, which consists of five key stages: strategic decision formulation, strategic decision implementation, strategic decision evaluation practices, reliance on financial strength, and reliance on the workforce. The strategic decision formulation stage is the foundation of the entire decision-making process. It involves defining the organisation's vision, which provides a long-term direction for the company. This vision is then translated into specific, measurable goals the organisation aims to achieve. Finally, the mission statement articulates the organisation's purpose and how it intends to achieve its goals. Together, these elements set the stage for all subsequent strategic decisions. Once the strategies are formulated, the framework moves to the Strategic Decision Implementation stage. This stage is critical because even the best-laid plans can fail if not executed properly. It focuses on translating these strategies into actionable plans that can be understood and implemented by various teams within the organisation. This stage also involves resource allocation, timeline setting, and assigning responsibilities to ensure effective strategies are executed. The success of this stage heavily depends on clear communication, effective project management, and the workforce's commitment.

Another stage in the process is the Strategic Decision Evaluation Practices. This stage assesses the effectiveness of the implemented strategies, determining whether they are achieving the desired outcomes. It involves setting up key performance indicators (KPIs), collecting data on these indicators, and analysing the results. This evaluation helps identify areas where the strategies are working well and areas that need improvement. It also provides insights into unforeseen challenges or opportunities that may require adjustments to the original strategy. One of the key insights from this framework is the importance of relying on the workforce to execute and support strategic decisions successfully. The framework emphasises that engaging and empowering employees is crucial for effective implementation. This means going beyond mere task assignments to fostering a sense of ownership and commitment among employees. It involves clear communication of the strategies, providing necessary training and resources, recognizing contributions, and creating a culture that values feedback and continuous improvement. Interestingly, the framework suggests that reliance on financial strength alone may not significantly influence the success of strategic decision-making. While financial resources are undoubtedly necessary, they must be complemented by a competent, motivated workforce to drive organisational success.

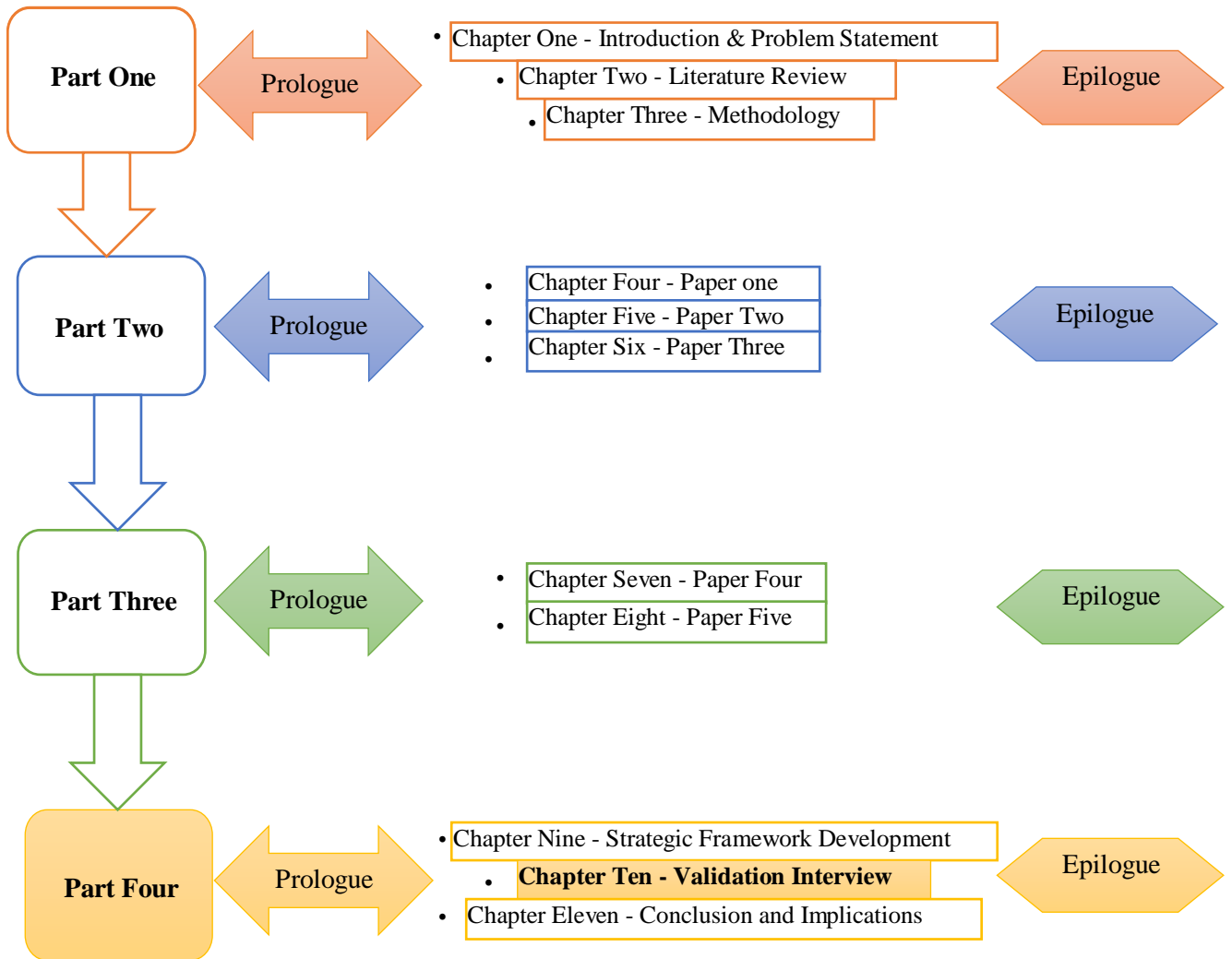
The framework incorporates two feedback loops that provide continuous insights and enable adjustments to the decision-making process. The first feedback loop connects the strategic decision evaluation practices to the strategic decision formulation stage. This loop is vital because it allows for the refinement and adaptation of strategies based on the evaluation results. If certain strategies do not yield the expected results, this feedback loop prompts a review and potential revision of the goals or organisational vision. It ensures that the organisation remains agile and responsive to changing conditions.

The second feedback loop links the organisation's performance and realised benefit back to the People and Information components. This loop ensures that internal strengths, weaknesses, and information quality are continuously assessed and improved based on the achieved outcomes. For example, if the evaluation reveals that specific projects are consistently delayed due to communication breakdowns, this feedback can trigger improvements in communication processes or tools. Similarly, if outdated or inaccurate data hamper decisions, this feedback can lead to investments in better information systems.

An interesting aspect of this framework is that it positions the quality of information as a mediator between the strategic decision-making process and organisational performance. This suggests that the quality of information plays a vital role in bridging the gap between the available resources (both human and informational) and the effectiveness of decision-making. High-quality information can enhance the impact of strong internal capabilities, while poor information can negate even the most talented teams. This underscores the importance of collecting data and ensuring its accuracy, relevance, and accessibility.

The process flow within the framework follows a logical, sequential order. It starts with environmental scanning, where the organisation assesses its internal landscape (strengths and weaknesses) and the external environment (opportunities and threats). Information processing follows this, where the scanned data is analysed and transformed into actionable insights. Another phase is the strategy processing stage, where these insights inform strategy formulation, implementation, and evaluation. Thereafter, the value generation stage follows, where the executed strategies create value for the organisation, its clients, and other stakeholders. Finally, the process culminates in performance implication, where the generated value translates into tangible improvements in organisational performance, such as increased profitability, higher client satisfaction, or a stronger market position.

Therefore, this strategic decision-making process framework provides a comprehensive overview of the key elements and their interactions in making effective strategic decisions in the construction industry of New Zealand. It highlights the importance of defining clear goals, implementing strategies effectively, evaluating their effectiveness rigorously, and profoundly engaging the workforce. The framework also underscores the influence of internal strengths, weaknesses, and information quality on the decision-making process. Incorporating feedback loops ensures continuous improvement and adaptation based on performance outcomes. By adopting this framework, construction organisations can enhance their strategic decision-making capabilities, leading to improved project performance, sustainable growth, and a more resilient construction sector in New Zealand.



CHAPTER 10

VALIDATION INTERVIEW

10.1 Introduction

The study's fourth objective was to validate the proposed strategic decision-making process framework, evaluating its sufficiency, clarity, coherence, relevance, and applicability within New Zealand construction organizations. The validation process involved in-depth interviews with six industry experts representing different construction organizations across New Zealand.

The interview process followed a systematic approach. Initial contact was made via email, followed by discussions conducted through Microsoft Teams. Each interview began with a concise overview of the research objectives and framework. The semi-structured format allowed for clarifying questions throughout the session, with particular attention paid to current industry challenges and internal organizational issues. Interviews typically lasted 90 minutes, providing sufficient time for comprehensively exploring each topic.

The expert selection followed a rigorous purposive sampling strategy, with experts chosen based on two primary criteria: extensive industry experience and demonstrated expertise in construction management. The final panel comprised six senior professionals, each holding strategic positions within different New Zealand construction organizations.

The data collection process adhered to the principle of theoretical saturation. Interviews were conducted until no new thematic insights emerged from additional experts, indicating that the data collection had reached its saturation point. This approach aligns with established qualitative research methodologies, ensuring comprehensive coverage of the research topics while maintaining research efficiency.

Interview scheduling prioritized expert convenience to ensure thoughtful, unhurried responses. Each session was conducted at a time chosen by the expert, allowing them to engage fully with the research questions without operational pressures. To maintain ethical research standards and protect expert confidentiality, all experts were assigned pseudonyms, with their identifying information securely stored separately from the research data. Detailed expert profiles, including their roles and experience levels, are presented in Table 10.1, using these pseudonyms to enable transparent reporting while preserving anonymity.

Table 10.1: Profile of Informants

No.	Pseudonym	Position/Level	Organization Size	Nature of the Organization	Year of Experience
1	Expert 1	Senior Consultant	Medium Size	Consultant	12 years
2	Expert 2	Managing Director	Medium Size	Construction	10 years
3	Expert 3	Director	Medium Size	Construction	30 years
4	Expert 4	Project Manager	Medium Size	Construction	10 years
5	Expert 5	Chief Executive Officer	Medium Size	Construction	11 years
6	Expert 6	Managing Director	Medium Size	Construction	19 years

The findings revealed a spectrum of approaches, ranging from highly structured systems to more informal decision-making processes, reflecting the diverse operational contexts of New Zealand construction firms (Chang & Hsieh, 2020). Data analysis followed a rigorous qualitative methodology using ATLAS.ti 9 software. The analysis process involved:

1. Verbatim transcription of interviews
2. Implementation of a systematic translation protocol to ensure accuracy
3. Both within-case and cross-case analysis to identify patterns
4. Data triangulation to enhance validity and reliability

The coding process in ATLAS.ti 9 followed established qualitative analysis protocols. Initial open coding identified keywords, phrases, and concepts relevant to strategic decision-making. This was followed by axial coding to establish relationships between concepts and develop categorical hierarchies (Friese et al., 2018). The software's functionality enabled the researchers to manage complex data relationships while maintaining analytical rigour.

The analysis revealed that strategic information-gathering and decision-making processes vary significantly across construction organizations, reflecting their unique market positions and operational approaches. These variations provided valuable insights into how the proposed framework could be adapted to different organizational contexts while maintaining its core functionality.

This methodological approach allowed for systematic validation of the framework while gathering rich insights into its practical application within New Zealand's construction industry context. Through this process, the researchers could assess both the theoretical soundness and practical applicability of the proposed framework.

10.2 Experts Response to Questions One

-What are the current sources of information used for strategic decision-making within your organisation?

10.2.1 Expert 1

Expert 1 exemplifies a collaborative approach to strategic information gathering centred on a structured monthly shareholder meeting system with four managing partners. These meetings serve as critical decision-making forums where partners discuss and categorize opportunities into two strategic levels: project-level expansions of existing services and new business directions for fresh revenue streams. Each partner contributes monthly activity reports and new leads, creating a comprehensive overview of the company's status and prospects. The organisation has strategically positioned itself as an information hub within the industry, monitoring policy changes like the PC79 planning

rule and assessing their impacts on developers. This positioning serves a dual purpose: informing their own strategic decisions while adding value to client services, and rather than relying on third-party market intelligence services, United Portfolio leverages its industry position and professional associations like NZIQS to gather insights. Their approach to information gathering is particularly effective through client interactions, where clients frequently approach them with queries about industry developments and policy changes. This client-centric information-gathering strategy reinforces their market position and ensures access to current industry trends and challenges. The company regularly produces informative articles about construction industry developments, sharing its expertise with clients and the broader market. This knowledge-sharing approach maintains its position as a leading industry and strengthens client relationships and market understanding. Their focus on niche markets in development, construction, and residential and commercial sectors is supported by continuous monitoring of market trends and regulatory changes. The company's strategic decision-making process combines formal monthly reviews with ongoing market intelligence gathering through its professional network, creating a balanced approach that serves both immediate operational needs and long-term strategic planning.

10.2.2 Expert 2

Expert 2 is a private business owner's organisation demonstrating an effectively streamlined approach to strategic information gathering, focusing primarily on internal sources across their diverse project portfolio of house construction, apartment buildings, and land subdivisions. Their information system is built around a clear hierarchical structure where information flows rapidly through specialized teams. The construction team, led by a construction manager overseeing four site managers, provides detailed daily reports on project progress and site-specific challenges. The Quantity Surveying team, comprising a QS manager and three quantity surveyors, delivers crucial cost-related information and financial updates, ensuring comprehensive project financial oversight. A dedicated project administration team manages essential documentation, including water connection applications, City Council permits, Code Compliance Certificates, and property titles. At the same time, in-house design coordination ensures regular updates on design-related matters. The company's lean structure enables direct reporting to top management, with daily updates from construction and QS managers about site progress

and critical issues requiring immediate attention. This direct communication channel ensures comprehensive project oversight, from financial to on-site progress. The organisation has found external information sources, particularly from the Auckland Council, less useful for their decision-making processes, leading to a stronger reliance on internal expertise and resources. While acknowledging that an additional project management layer would be ideal, the current industry slowdown has necessitated a more streamlined structure. This adaptation has improved decision-making efficiency and project management effectiveness. Synthesizing information from various internal sources, the organisation maintains strong control over project delivery and strategic planning. This demonstrates how effective internal information systems can drive successful outcomes in the construction industry.

10.2.3 Expert 3

Expert 3 employs a sophisticated three-tier approach to strategic information gathering, effectively combining internal operations, industry networks, and governmental resources. The organisation utilizes structured management meetings at the operational level to create a solid foundation for data-driven decision-making, demonstrating its commitment to incorporating ground-level insights into strategic planning. The expert's involvement in multiple industry boards provides a significant competitive advantage, offering early access to industrial trends and market movements before they become widely known. This insider position enables proactive rather than reactive strategic decisions. The company has developed strong external information networks through strategic relationships with subcontractors and clients, creating an effective early warning system for market conditions and workflow optimization opportunities. Their project acquisition and planning process employs a sophisticated triple-source approach, primarily relying on the Government Electronic Tender System (GETS), complemented by Pacifecon monitoring and the Workforce Development Council's report regarding projects in the pipeline. This comprehensive coverage of potential opportunities ensures no significant projects are missed. The strategic decision to focus on central government infrastructure projects rather than local council work indicates a deliberate market positioning strategy, suggesting a preference for larger, more stable contracts. Their multi-layered approach to information gathering enables them to maintain a comprehensive market view while focusing on their chosen sector.

Integrating these three information tiers - internal operations, industry networks, and governmental resources - creates a robust system for strategic decision-making. This approach allows the organisation to maintain a strong market position while efficiently identifying and pursuing appropriate opportunities within its target market sector.

10.2.4 Expert 4

Expert 4 demonstrates a highly focused approach to strategic information gathering, particularly aligned with their strong presence in the government construction sector. With government contracts comprising approximately 80% of their work, their information-sourcing strategy reflects a well-developed business model targeting this specific market segment. The cornerstone of their approach is a robust government relationship management system featuring regular monthly meetings at both regional and national levels. These strong personal relationships with key government departments facilitate transparent discussions about upcoming project pipelines and provide valuable insights into future opportunities. The frequency and depth of these interactions indicate a deliberate strategy to maintain strong communication channels with their primary client base, enabling early access to critical project information. While acknowledging the availability of external market research and professional networking platforms like LinkedIn, they have found that such generic market information often lacks relevance to their specific operational approach. This recognition has led them to emphasise internal analysis and processing of information, carefully filtering external data through the lens of their unique business model, procurement methods, and tendering processes. Their internal focus enables a more accurate interpretation of market signals within their specific operational context. The organisation maintains a balanced approach to gathering information, combining strong government relationships with broader market awareness while ensuring all external information is appropriately contextualized for their business needs. This focused strategy has proven particularly effective given their concentration on government sector work, enabling well-informed strategic decisions aligned with their business objectives and market positioning.

10.2.5 Expert 5

Expert 5 exemplifies a highly structured approach to strategic information gathering and processing, demonstrating a comprehensive understanding of diverse data

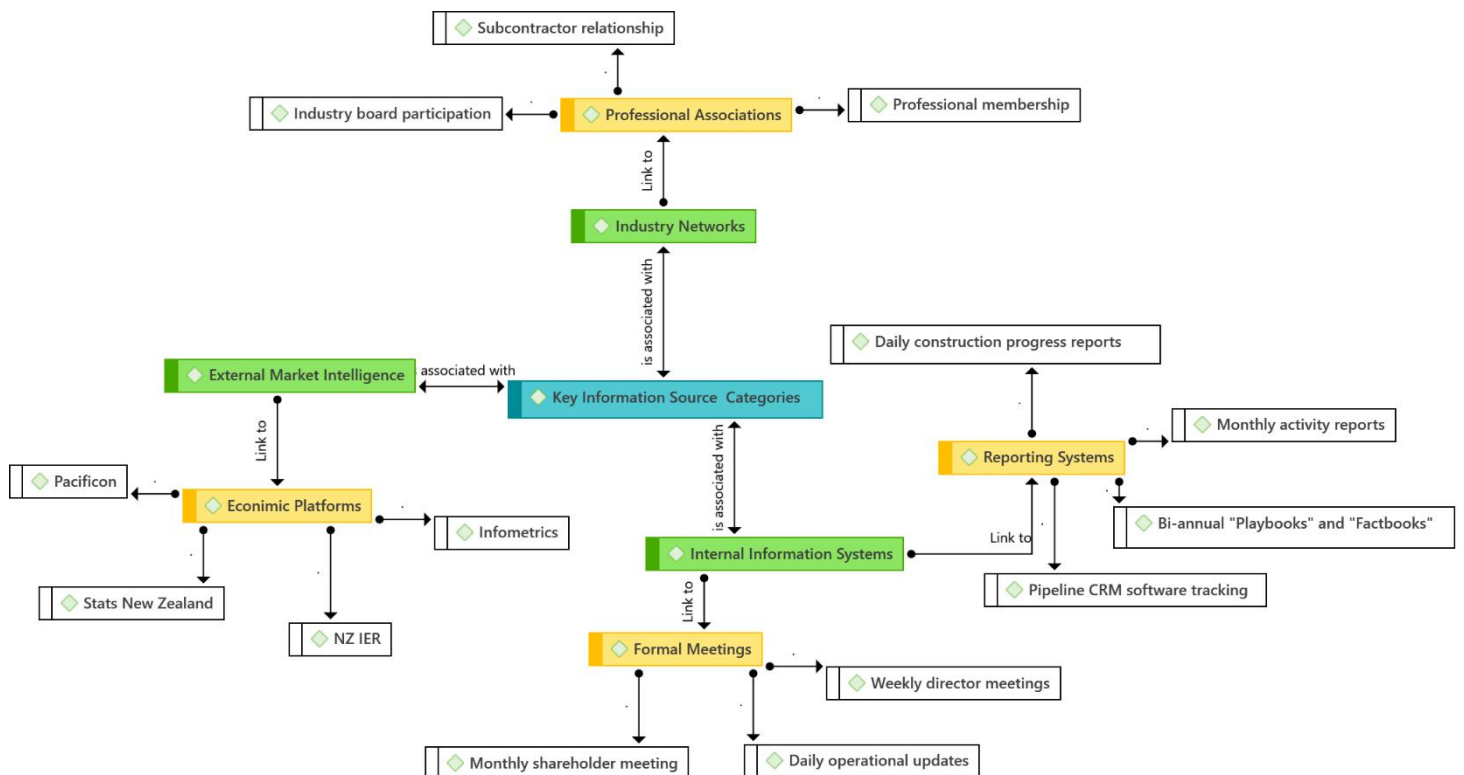
sources and systematic analysis in decision-making. They leverage multiple economic intelligence platforms, including NZ IER (NZ Institute of Economic Research), Infometrics, Stats New Zealand, and Pacifecon, to build a comprehensive view of market conditions and opportunities. This multi-source approach enables cross-referencing and validation of information, creating a reliable foundation for strategic planning. Their robust information processing system operates across multiple time horizons, with pipeline information being updated monthly for current market awareness and broader market intelligence synthesized and distributed company-wide through bi-annual "Playbooks" and "Factbooks." This tiered approach ensures both immediate tactical responsiveness and long-term strategic alignment. Their four-year strategic framework serves as an overarching guide, incorporating traditional analysis tools like SWOT and PESTLE while implementing a balanced scorecard approach across four strategic pillars: people enhancement, financial performance improvement, process adaptation, and project experience evolution. While acknowledging limitations in their information sources, particularly regarding government infrastructure plans and private sector activities, they demonstrate a mature understanding of the need for continuous data gathering and validation improvement. Their use of a matrix model with a balanced scorecard approach shows a sophisticated translation of market intelligence into operational strategy, ensuring effective information flow from gathering through implementation. This comprehensive approach reflects a deep understanding of construction industry dynamics and the need for robust decision-making frameworks.

10.2.6 Expert 6

Expert 6 employs a pragmatic approach to strategic information gathering, primarily relying on internal channels and their customer relationship management (CRM) system for decision-making. The process begins with initial project filtering based on their established expertise in specific construction types. This is intended to avoid high-rise buildings and residential projects in favour of warehouses, food stores, and distribution centres. Their information tracking revolves around their Pipeline CRM software, which manages projects through various stages, from leads to negotiations. The company has found published industry reports less useful due to timing issues instead of relying on direct client and architect relationships for early project notifications. Their strategic decision-making process includes weekly directors' meetings where potential

projects undergo a thorough evaluation, with any director having veto power over projects that raise concerns. This consensus-based approach ensures careful risk management and strategic alignment. The organisation applies a probability-based assessment to potential projects, assigning different success rates based on tender circumstances - 33% for competitive tenders and up to 80% for negotiated work. Resource allocation is managed flexibly based on current workload rather than fixed budgets, maintaining a full-time estimating team regardless of project flow. This practical approach to information gathering and decision-making allows them to maintain focus on their core competencies while remaining adaptable to market conditions. Though their system is less formal than some competitors, it effectively combines preliminary screening, director-level oversight, and resource management to support their strategic objectives and market position. Figure 10.1 illustrates the diverse information sources currently utilized by organisations for strategic decision-making.

Figure 10.1: Current sources of information used for strategic decision-making



10.3 Experts Response to Questions Two

-What type of information/data is needed for strategic decision-making in your company?

10.3.1 Expert 1

Expert 1 stated that they employ a meticulously structured approach to information gathering, centred on comprehensive financial data analysis and project performance metrics. Their strategic decision-making process is anchored in regular shareholder meetings where two primary data streams undergo thorough analysis. The first stream focuses on detailed financial analysis, comparing month-to-month and year-on-year sales revenue, thus providing crucial performance indicators that help track business growth and identify trends. This comparative analysis serves as a fundamental tool for understanding business trajectory and market position. The second key information source is their work breakdown structure (WBS) report, which offers a comprehensive view of all ongoing projects and serves as the backbone of their operational oversight. This report captures essential data points, including monthly project invoicing, revenue retention figures, and team member earnings distribution, providing a granular view of project health and resource allocation. Compiling this financial and operational data creates a robust foundation for strategic planning and decision-making, enabling the organisation to make informed choices about future directions and resource allocation. By systematically reviewing these metrics, the organisation can effectively assess their current performance and identify new opportunities while clearly understanding its operational capabilities. The WBS report is a crucial tool for understanding project health and resource allocation, while the financial comparisons provide clear indicators of business trajectory. This dual approach to data analysis enables them to make informed decisions about future opportunities and strategic directions, ensuring all strategic decisions are grounded in concrete data rather than speculation. The regular review cycle through shareholder meetings provides a consistent framework for evaluating performance and adjusting strategies as needed, creating a dynamic yet structured approach to strategic decision-making. This methodical approach to information gathering and analysis demonstrates a clear understanding of the link between comprehensive data analysis and effective strategic planning.

10.3.2 Expert 2

Expert 2, a property developer, said that his organisation's strategic decision-making relies on various information categories spanning multiple development domains. Their approach centres on gathering detailed data across three primary areas: market intelligence, financial metrics, and operational capabilities. Local demographic data, economic indicators, and real estate market trends form the foundation of their market understanding, enabling them to make informed decisions about project locations and target markets. Before initiating any development, they conduct extensive feasibility studies incorporating crucial financial information from their Quantity Surveyors, including specific data on land prices, subdivision costs, and building expenses. This financial data proves particularly critical when evaluating potential developments, such as determining the viability of a 50-house development on a 10,000-square-meter plot. Project timeline information from their construction and site management teams provides essential data about project durations, from initial excavation to completion dates, enabling accurate resource allocation and financial planning. Resource allocation data helps determine staffing requirements, such as calculating the optimal number of site managers for specific project sizes and types. Market demand analysis forms another crucial information category, requiring detailed research data and trend analysis to inform acquisition decisions and project timing. Team capability and availability of information round out their data requirements, ensuring they can properly staff each project with necessary professionals across all stages of development. This multi-faceted approach to information gathering enables them to make well-informed decisions throughout the project lifecycle, from initial land acquisition to project completion. Their systematic approach to data collection and analysis ensures that all strategic decisions are based on comprehensive, reliable information, reducing project risks and enhancing success rates.

10.3.3 Expert 3

Expert 3 stated that the approach to required information centres on the early engagement of contractors to transform their required data for strategic decision-making. Their shift from traditional post-design information gathering to active participation in project development stages has revolutionized how they collect and utilize project data. Early involvement creates opportunities to influence project documentation and

specifications, requiring different types of information than traditional bidding processes. They prioritize gathering collaborative design input, cost assessment data, and project parameter information from the earliest stages to ensure more accurate project planning and execution. This approach necessitates detailed information about design intentions, construction methodologies, and potential challenges before project commencement. The organisation requires comprehensive data about material availability, supply chain constraints, and construction methods to inform their input during the design phase. Their desired information extends to understanding client objectives, design team capabilities, and potential project risks that could impact successful delivery. Participating in the early stages requires detailed costs for modelling data, constructability assessments, and value engineering opportunities for more accurate project forecasting and risk management. This proactive approach to information gathering has significantly reduced their reliance on initial estimates and thus enhanced their ability to influence project outcomes positively. Their strategic decision-making process now requires more detailed upstream information about project viability, team capabilities, and potential challenges to ensure better project outcomes. The shift represents a more sophisticated approach to gathering information, focused on creating reliable data streams supporting effective project planning and execution. This comprehensive approach to information gathering enables them to make well-informed decisions that balance risk and opportunity while maintaining strong client relationships and project success rates.

10.3.4 Expert 4

Expert 4 stated that the required information for strategic decision-making is focused on specifically designed projects to have insight into the project's ecosystem data needs. They prioritize gathering comprehensive information about complete project ecosystems, extending beyond basic project specifications to include detailed stakeholder mapping and relationship networks. Key required information includes identifying crucial relationships with engineers-to-contractors and other project influencers for better project coordination and risk management. Their approach emphasises understanding current workload capacity compared to potential opportunities, thus requiring detailed resource allocation data and project pipeline information. They emphasise gathering information about client reliability and project timeline accuracy, which are crucial in managing project uncertainties in the current market environment. Monthly

communication with clients provides essential data about project progression and potential delays, enabling proactive problem-solving and resource management. The organisation has developed sophisticated tracking systems for different government departments' performance meeting projected start dates, enabling better project selection and resource allocation strategies. Their five-year business plan is a framework for evaluating opportunities, requiring regular updates on market conditions, industry trends, and competitive positioning. This comprehensive approach to information gathering includes detailed data about team capabilities, resource availability, and project pipeline management, ensuring balanced workload distribution and optimal resource utilization. Their strategic decision-making process integrates both quantitative project data and qualitative relationship information to ensure a comprehensive approach to opportunity assessment and risk management. This sophisticated information-gathering system enables them to maintain a stable project in the pipeline while remaining adaptable to market changes and emerging opportunities.

10.3.5 Expert 5

Expert 5 demonstrated a sophisticated understanding of diverse information essentially required for strategic decision-making in the construction industry. Their approach encompasses both political and economic intelligence gathering, focusing heavily on government infrastructure priorities and broader economic indicators that could impact project viability. They require detailed data about market conditions, cost structures, and labour market trends to inform strategic planning and decisions on resource allocation. Environmental and social considerations form a crucial part of their required information, which includes comprehensive data about sustainability trends, Green Star certification requirements, and evolving social outcome expectations in the construction sector. They actively gather information about government policies, particularly focusing on Better Broader Outcomes policy and business case evaluation methods to ensure alignment with public sector requirements and expectations. This comprehensive approach requires monitoring various political, economic, social, and environmental data sources to create a holistic view of the market landscape.

They prioritize gathering data about both immediate operational requirements and long-term industry evolution to ensure balanced decision-making that addresses current needs while preparing for future challenges. Their multi-layered approach to

information gathering enables more informed strategic decision-making so that their organisation remains responsive to market changes while maintaining sustainable growth. Their methodology reflects a sophisticated understanding that success in the construction industry requires comprehensive data across multiple domains, from technical specifications to broader market context and future trends.

10.3.6 Expert 6

Expert 6 stated that the required information is strategically shaped based on four distinct divisions: QS maintenance, QS interiors, QS construction, and QS construction printing. Each division requires specific types of market intelligence tailored to their unique operational requirements. They gather detailed information about educational sector developments and government maintenance programmes for QS maintenance to enable effective service delivery in this specialized sector. The interiors division requires comprehensive market data about commercial property upgrades and retail sector trends, focusing on projects up to \$2 million. Their construction division, specializing in warehouses, food stores, and distribution centres, needs detailed information about retail expansion plans and industrial property developments. Their information gathering focuses intensively on project efficiency metrics and resource allocation data, particularly in understanding staffing requirements for different project types and sizes. They require detailed information about project risks and resource requirements, such as knowing that a \$12 million warehouse can be efficiently managed with specific staffing ratios. Market segment data helps them avoid high-risk projects outside their expertise, such as high-rise buildings, to optimise resources and manage risk. They gather crucial information about regulatory changes and industry reform initiatives, particularly regarding contractor qualification requirements and tender processes. Their approach emphasises understanding core competencies and market positioning, requiring data about project opportunities aligning with their strengths and operational capabilities. Resource allocation information plays a pivotal role in their decision-making to help them maintain operational efficiency across different project types while ensuring profitable operations.

Figure 10.2 presents a systematic categorization of the critical information and data types required for effective strategic decision-making.

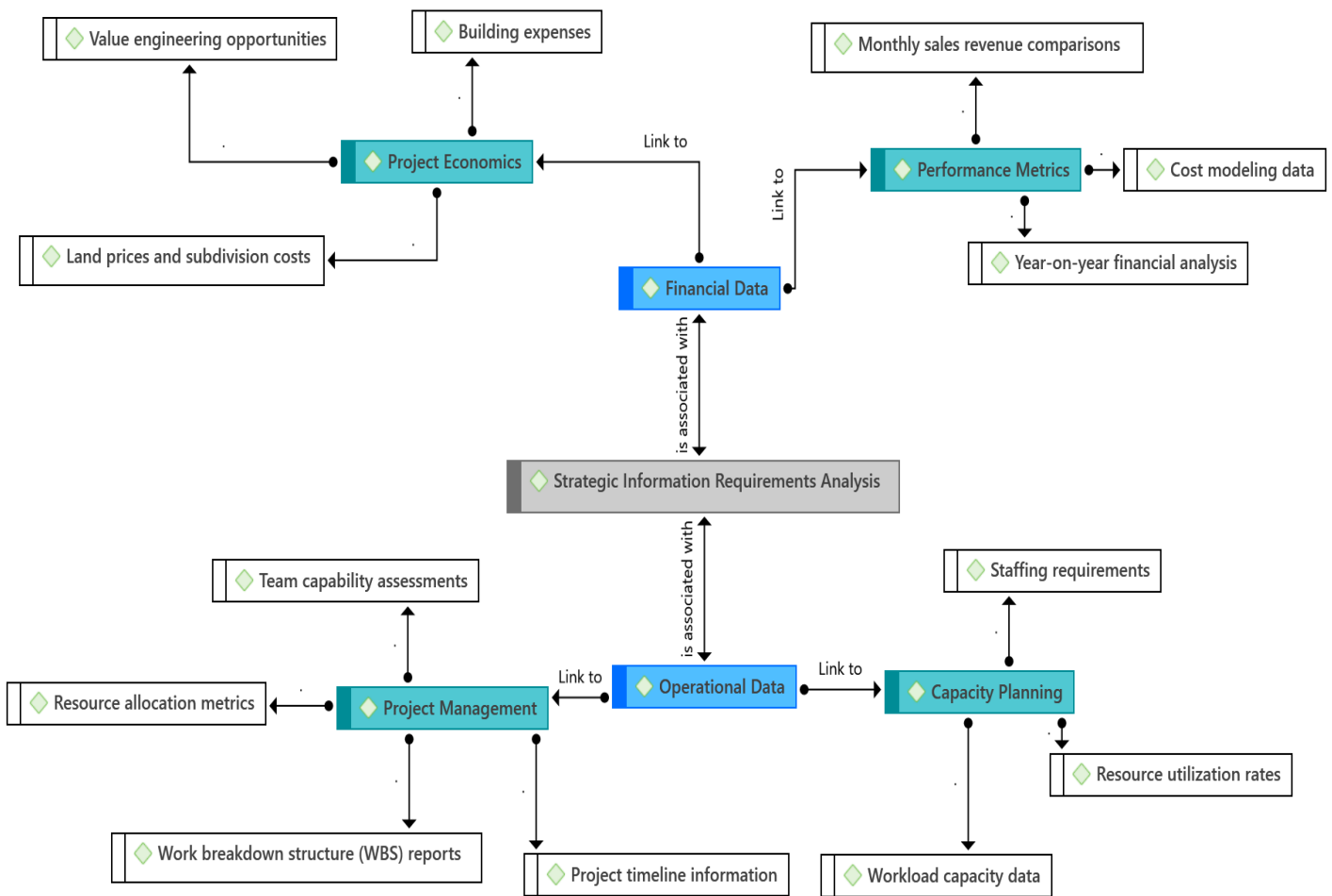


Figure 10.2: Type of information/data needed for strategic decision-making.

10.4 Experts Response to Questions Three

-What role do you see the quality of information playing in strategic decision-making?

10.4.1 Expert 1

Expert 1 provided insightful comments about the role of information quality in their firm's strategic decision-making process. The quality of information emphasized the importance of specific, internal, and proprietary information sources over general or

generic statistics. *Expert 1* highlighted that quality of information gives the organisation the exclusive opportunity to provide advice to the developer and sometimes to the contractor to position themselves as their house contractor. Furthermore, *Expert 1* asserted that the quality of the information is better than the generic information, which can be obtained from the market because it is more specific. Thereafter, *Expert 1* explicitly mentioned ethical considerations or confidentiality constraints. *Expert 1* comments underscored the importance of high-quality information in their firm's strategic decision-making process, highlighting how their unique market position allows them to access and utilize information that goes beyond what's publicly available.

10.4.2 Expert 2

Expert 2 emphasized the crucial role that the quality of information plays in their strategic decision-making process. He stated that accurate and reliable data are fundamental to the success of their property development projects. Because quality information is critical in their business, *Expert 2* explained that every decision is based on a thorough analysis of various data points - from cost estimates and market trends to demographic information and regulatory requirements.

He further stated that because the flow of information is significant within their organisation, the company has been structured to ensure a seamless flow of high-quality information from various departments. This includes real-time updates from the construction sites, detailed financial projections from Quantity Surveyors, and market insights from the sales team. It is also highlighted that having the right team to gather and interpret information is very significant. He said, "It's not just about having data; it's about having the right people to provide the most accurate and relevant information. We invest heavily in building a team of experts who can collect data and analyse it effectively, providing me with the insights I need to make informed strategic decisions." He concluded by noting the direct link between information quality and risk management. He said thus that margins can be tight in property development, and risks are always present. High-quality information allows us to anticipate challenges, identify opportunities, and make calculated decisions that minimize risks and maximize returns. It's the foundation of our strategic planning and operational efficiency.

10.4.3 Expert 3

Expert 3 response revealed a sophisticated understanding of how information quality fundamentally shapes strategic decision-making in the construction industry. It is stated that the insights they usually have in quality information helped draw attention to the complex interplay between information reliability and project success, directly influencing both strategic planning and operational outcomes. The Expert expressed that he observed over the years that the construction industry had faced challenges concerning obtaining high-quality information through conventional channels and the reliability of information in the traditional documentation processes. This observation points to a systemic challenge that requires innovative solutions. The response mainly illuminates the critical relationship between information quality and risk assessment. He further stated that there was a situation in which information uncertainty necessitated higher risk factors in pricing structures and thus created a financial ripple effect throughout the project lifecycle.

10.4.4 Expert 4

Expert 4 response reveals critical insights into the deteriorating quality of strategic information within the construction sector, particularly highlighting how recent political transitions and economic uncertainties have created unprecedented challenges. Their experience indicates that information reliability has declined, with project certainties becoming increasingly unstable even after the recent government transition. This deterioration in information quality has created significant challenges for strategic planning and resource allocation.

The *experts'* 4 insights particularly emphasise the complex relationship between government budget decisions and project viability. Major fiscal events, such as budget reviews and spending adjustments, can dramatically impact previously confirmed projects. This volatility in project certainty has forced construction companies to develop more sophisticated approaches to resource management and strategic planning. Their organisation has responded by implementing flexible workforce strategies, including maintaining relationships with former employees who now work as contractors. This approach allows them to scale their workforce up or down as needed, providing crucial

operational flexibility in an environment where project certainties are increasingly unreliable.

Despite these challenges, the Expert maintains a pragmatic long-term perspective, acknowledging the fundamental importance of construction to New Zealand's economy ("New Zealand relies too heavily on construction not to be building"). However, they emphasise that the key strategic challenge lies in maintaining optimal operational capacity during periods of uncertainty. This balancing act - maintaining enough capacity to capture opportunities while avoiding excess overhead - has become increasingly complex as information quality deteriorates. Their response suggests that success in the current environment requires managing information quality issues and developing robust organisational strategies that can function effectively despite these information limitations. This includes maintaining a core workforce while utilizing flexible contractor relationships to manage workload fluctuations, enabling the organisation to remain resilient in uncertain project timelines and changing market conditions.

10.4.5 Expert 5

Expert 5 provides critical insights into the complex relationship between information quality and strategic decision-making in the construction industry. It highlights a fundamental paradox: while information is abundant, its utility for strategic decision-making is often limited. Their response reveals that the construction industry faces a significant challenge where quantitative data is plentiful but lacks the qualitative depth necessary for meaningful strategic analysis. This necessitates a sophisticated approach to data interpretation, requiring organisations to examine information from multiple angles to derive meaningful insights.

The Expert specifically highlights systemic data classification and categorization issues that create significant strategic planning challenges. For example, the misalignment between statistical reporting categories and industry operational needs is evident in Statistics New Zealand's use of gross capital formation metrics rather than the industry-preferred "put in place" measurements. Further complications arise from inconsistent project categorization across residential, commercial, and infrastructure sectors, where projects may be miscategorized, leading to confused market signals. These

categorization issues require extensive time investment in filtering and reviewing data to ensure accurate interpretation.

Perhaps most critically, the Expert reveals fundamental reliability issues with core project information, particularly regarding project valuations and start dates. Their organisation has responded to these challenges by developing sophisticated probability-based analytical approaches, using weighted averages and likelihood assessments to manage uncertainty. This statistical approach to information quality challenges demonstrates how construction organisations must develop advanced data interpretation methodologies to compensate for inherent information quality limitations. The need to apply such sophisticated analysis techniques underscores the gap between available information and actionable intelligence in the construction sector. This suggests a crucial area for industry-wide improvement in data quality and standardization. Their response indicates that successful strategic decision-making in construction requires access to information and the ability to effectively filter, analyse, and interpret data through multiple lenses to derive meaningful strategic insights.

10.4.6 Expert 6

Expert 6 adopted a primarily internal information-driven approach to strategic decision-making, having found external information sources unreliable for their specific needs. They have deliberately moved away from industry-standard reporting systems like "What's On" reports due to concerns about accuracy and relevance. This is particularly evident in their experience with government-related projects, where published information often proves unreliable due to frequent policy changes and shifting priorities, especially in their maintenance division. Instead, they have developed a three-pronged internal information management system that forms the cornerstone of their strategic decision-making process. This system integrates their CRM for project tracking, a specialized spreadsheet for financial planning, and Microsoft Project for resource allocation management. Integrating these three tools allows them to make more informed decisions about project pursuit and resource management. Their approach focuses on staff allocation, using the combined data to identify potential resource gaps or oversupply periods, enabling proactive planning for future projects and staffing needs. For example, they can identify when specific site managers will become available and align this with upcoming project opportunities. This internal system has proven more reliable and

relevant to their decision-making needs than external information sources, allowing them to maintain better control over their strategic planning process and resource optimization. The organisation's focus on internal data quality and integration demonstrates their understanding that accurate, relevant, and timely information is crucial for effective strategic decision-making, even if that means relying more heavily on internally generated data rather than industry-standard sources. Figure 10.3 illustrates the pivotal role that information quality plays in the strategic decision-making process.

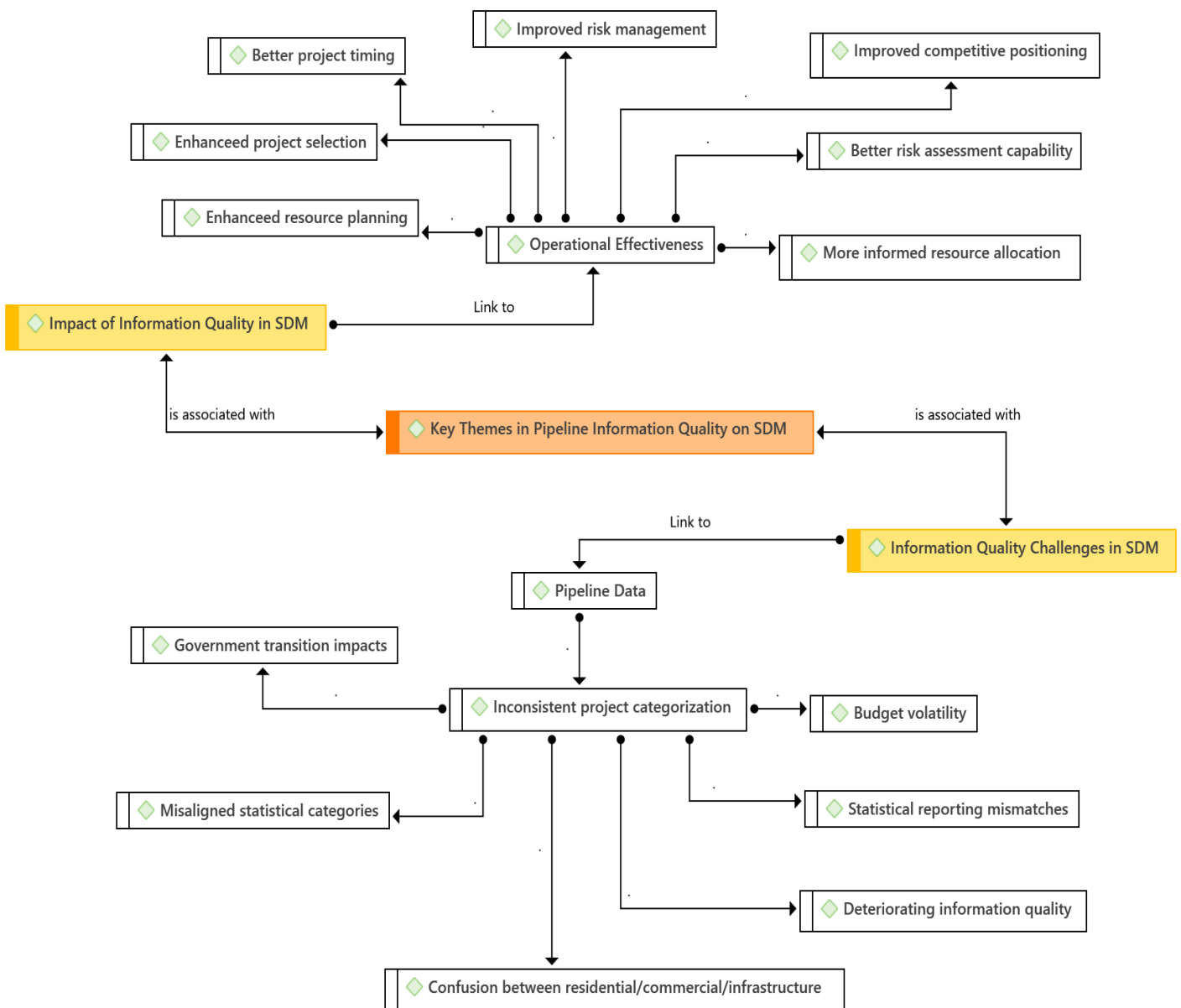


Figure 10.3: Role of quality of information playing in strategic decision-making

10.5 Experts Response to Questions Four

- Is the strategic framework proposed (refer Figure 9.1) relevant to the construction industry?

10.5.1 Expert 1

Expert 1 provided valuable insights on the relevance of the proposed strategic framework to the construction industry, particularly from the perspective of a consultancy firm. *Expert 1* stated that the framework will improve the conceptualisation process while making decisions. He noted that while they may not formally apply all aspects of the framework, many elements of the framework are inherent in their decision-making processes.

Regarding the SWOT analysis, *Expert 1* confirmed that it is being used to conduct stability analysis in his company every six months, not monthly. *Expert 1* emphasized the importance of information quality in their industry. However, it was highlighted that their focus tends to be more specific, prioritizing financial data and project timelines. As consultants primarily serving developers and contractors, *Expert 1* explained that their information focus is often on broader factors, which may involve general policy, like the Council's planning policy regarding the overall pipeline in the future whenever there is a change in law regulation. *Expert 1* also highlighted the need for practical applications of the framework. He suggested that a sensible use of information should relate more to the decision-maker or target audience. His organisation proposed developing tools such as a website or questionnaires to make the framework more applicable to the professionals in the industry. The Expert suggested several adaptations to enhance the relevance and utility of this framework for the construction industry. Firstly, tailoring the questions to different roles within the industry, such as developers, contractors, and consultants, would increase its applicability. Secondly, incorporating industry-specific metrics and data sources would make it more relevant to construction professionals. Thirdly, practical tools or questionnaires should be developed so that decision-makers can apply the framework effectively and enhance its usability. Lastly, considering how the framework could be adapted to account for the long-term nature of many construction projects would make it more suited to the industry's unique characteristics.

10.5.2 Expert 2

Expert 2 emphasized the need for the real-world application of any strategic framework in the construction industry. It is stressed if theoretical frameworks could be helpful, they must be grounded in the day-to-day realities of construction projects. Everything needs to be practical because a building cannot be erected on paper. The required information for decision-making must be correct and applicable to the project at hand. He said that his industry requires a blend of experience, practical knowledge, and the ability to make quick, informed decisions based on real-time information. He further elaborated on the importance of on-site expertise daily. Whenever problems arise, it becomes very pertinent to process information quickly and make decisions on the spot to resolve them immediately. This happens every hour and every day on a construction site. Any strategic framework for the construction industry needs to account for active responses.

Expert 2 suggested that to make the proposed framework more relevant, and it should incorporate elements that reflect the chaotic nature of construction management. The framework should include components addressing the operational situation and circumstances influencing decision-making. It should consider how unexpected events or rapidly changing conditions on-site can influence strategic choices.

It is proposed that the framework could be enhanced by:

1. Incorporating a component focused on operational situations and their impact on decision-making,
2. Emphasizing the need for flexibility and rapid response in strategic planning,
3. Highlighting the importance of practical, on-site experience in informing strategic decisions and
4. Addressing how to communicate crucial information in a fast-paced, dynamic environment effectively.

Expert 2 concluded by suggesting that, to understand and refine such a framework truly, one would need substantial on-site experience. This will give insight into what information is truly crucial, how it should be communicated effectively, and how to anticipate and solve problems in real-time.

10.5.3 Expert 3

Expert 3 response offered crucial insights into how traditional strategic frameworks should be adapted for the construction industry by emphasizing the critical role of comprehensive financial considerations. While acknowledging the foundational importance of SWOT and PESTLE analyses, it was highlighted that these tools alone are insufficient in today's depressed and uncertain market conditions. The response underscores a fundamental need to expand strategic frameworks to encompass both immediate financial capacity and long-term financial viability assessments.

The expert's perspective revealed a significant gap in conventional strategic thinking, particularly regarding the complex financial dynamics unique to construction projects. It was emphasized that strategic decision-making must go beyond surface-level financial assessments to consider detailed cash flow implications, such as the ability to bankroll projects for extended periods (typically 60 days) and manage substantial retention requirements (often 10%). This nuanced understanding of financial capabilities becomes especially crucial in an industry where taking on work without adequate financial backing can lead to serious operational challenges.

The insight revealed that an effective strategic framework for the construction industry must integrate traditional analytical tools with sophisticated financial modelling. This enhanced framework should consider not only balance sheet strength, but also operational liquidity needs, working capital requirements, and risk absorption capabilities. The expert's emphasis on cash flow management and project-specific financial dynamics indicates that strategic decision-making in construction requires a more detailed and industry-specific approach than generic strategic frameworks. This comprehensive understanding of financial viability, incorporating both immediate capacity and sustained financial health throughout project lifecycles, is essential for making sound strategic decisions in the construction sector.

10.5.4 Expert 4

Expert 4 provided crucial insights into the practical implementation challenges of strategic frameworks within the construction industry, particularly highlighting the complex relationship between operational activity and strategic reflection. His response

revealed a fundamental industry challenge where the effectiveness of feedback loops - a critical component of strategic frameworks - is often compromised by the industry's cyclical nature. During busy periods, when valuable insights could be gathered, teams racing from project to project typically lack the time or capacity for meaningful strategic reflection. Conversely, when market slowdowns create time for reflection, the insights from busy periods may have lost their relevance or immediacy. This timing paradox is identified as a significant industry-wide issue, where strategic learning opportunities are frequently missed during peak operational periods, potentially leaving companies vulnerable during market downturns. The expert's experience with COVID-19 serves as a compelling example of how external disruption can force strategic reassessment, particularly in balancing government and non-government work portfolios. The insights suggest that while strategic frameworks are relevant to the construction industry, their effective implementation requires a more systematic approach to continuous feedback and reflection rather than relying on market downturns to trigger strategic reviews. This observation points to a broader need within the construction industry to develop more robust mechanisms for capturing and implementing strategic insights during all market conditions, not just during periods of reduced activity.

10.5.5 Expert 5

Expert 5 provided a sophisticated evaluation of the proposed strategic framework, acknowledging its general alignment with current industry practices while identifying crucial areas for enhancement. The response revealed deep insights into the complexities of strategic planning in construction, particularly focusing on information flow and risk management.

The expert identified three key areas where the framework could be strengthened:

First, the need for a double-loop learning system rather than the current single-loop process was emphasized. This suggestion highlights the importance of feeding performance outcomes and value-generation insights into the environmental scanning phase, creating a more iterative and learning-focused approach. This continuous feedback loop would enable organisations to refine their strategic decision-making based on actual performance outcomes rather than operating linearly.

Second, the response strongly emphasized the critical role of risk and uncertainty management in strategic planning. These highlight the danger of cognitive biases - specifically overconfidence, optimism, and confirmation bias - in strategic decision-making. The insight suggests that effective strategic frameworks must include mechanisms to challenge existing assumptions and actively seek contrary evidence, preventing the formation of "group think" within strategic planning teams.

Third, the importance of organisational resilience and flexibility in strategic implementation was stressed. The expert suggested incorporating decision trees and similar tools to enhance the framework's ability to adapt to changing circumstances. This emphasis on adaptability reflects the construction industry's dynamic nature and the need for strategic frameworks to accommodate changes in rapid market conditions.

The comprehensive critique suggests that while the proposed framework provides a solid foundation, its effectiveness could be significantly enhanced by incorporating these additional elements to create a more robust and adaptive strategic planning process.

10.5.6 Expert 6

Expert 6 demonstrated that while they may not follow a formally documented strategic framework in their organisation, they have implemented a practical and effective decision-making structure that aligns with their business needs in the construction industry. Their approach centres on a multi-layered filtering system for project selection, starting with an informal preliminary screening at the initial contact point. For instance, when approached about projects outside their core competencies, such as apartment buildings, they immediately redirect these opportunities to more suitable competitors, demonstrating a clear understanding of their strategic positioning in the market. The organisation then employs a more formal evaluation process through their weekly directors' meetings, where projects that have passed initial screening undergo thorough discussion and assessment. This regular meeting structure ensures that all directors have input into strategic decisions, creating a consensus-based approach to project selection. The effectiveness of their framework is evident in their "veto" system, where any project that raises concerns among the directors can be rejected, even if it has progressed through earlier stages of consideration. This approach, while perhaps less structured than traditional strategic frameworks, provides the flexibility and rapid decision-making

capabilities necessary in the dynamic construction industry while maintaining proper risk management and strategic alignment. The relevance of their framework is particularly demonstrated in their ability to quickly filter out unsuitable projects while focusing resources on opportunities that align with their organisational capabilities and strategic objectives. Figure 10.4 delineates the recommended enhancements to the proposed strategic decision-making framework.

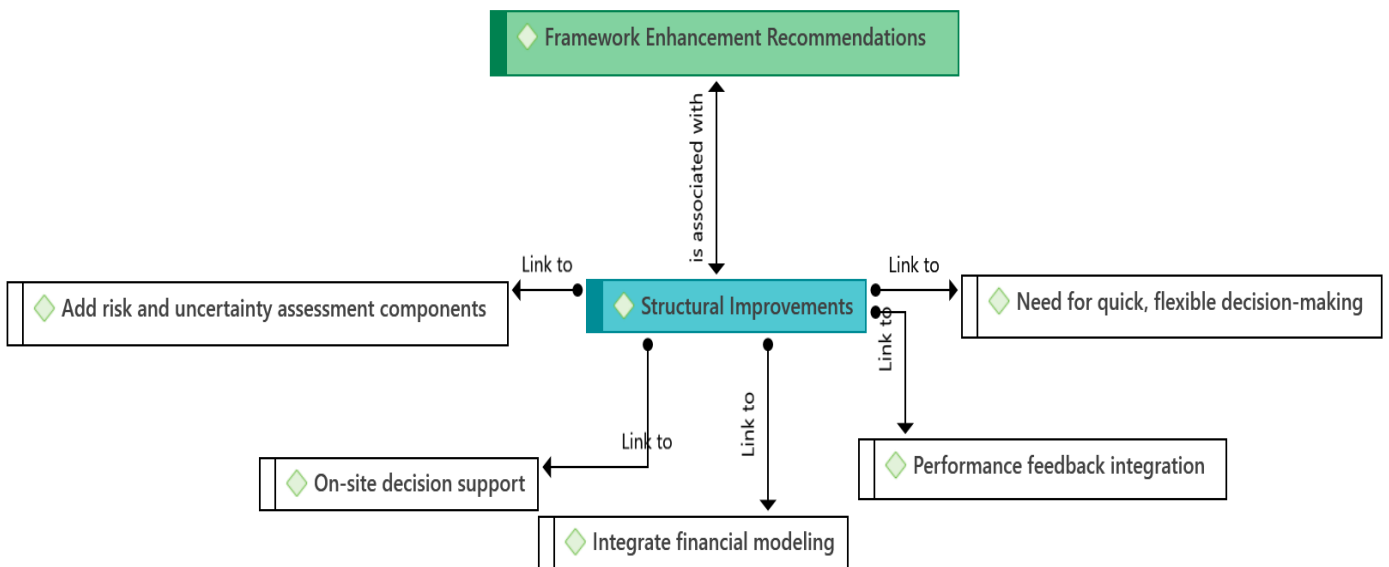


Figure 10.4: Recommendation for strategic framework improvement

10.6 Quality of Information as a Strategic Resource

Based on the expert feedback and recommendations, the strategic decision-making framework initially presented in Chapter 9 (Figure 9.1) has been refined and enhanced. The revised framework, shown in Figure 10.5, incorporates several key modifications to reflect industry needs and expert insights better.

Significant changes include restructuring feedback loops to create a more dynamic and responsive system. A comprehensive risk assessment component has been integrated into the framework to address the critical need for proactive risk management in construction projects. Financial modelling components have been added to strengthen the framework's economic analysis and financial decision-making capability.

The Information Quality-Mediated Strategic Decision-Making Framework developed in this study demonstrates that Quality of Information (QI) serves as the critical mediating variable in the relationship between strategic decision-making and organizational performance within New Zealand's construction industry. This framework is specifically designed to examine information quality as the primary mediating mechanism and deliberately excludes other potential factors that may influence decision-making processes, such as organizational culture, leadership styles, resource constraints, or external market conditions. The study's scope is intentionally bounded to focus exclusively on how information quality characteristics including accuracy, completeness, timeliness, relevance, and reliability mediate the strategic decision-making to performance relationship.

The framework's structure has been systematically optimized through expert validation to enhance both theoretical rigor and practical applicability. A significant structural refinement involves repositioning stakeholder engagement closer to the strategic decision-making cluster, reflecting expert recommendations that emphasized the critical importance of early and continuous stakeholder involvement throughout strategic decision-making processes. This repositioning acknowledges that effective stakeholder engagement cannot be treated as an isolated activity but must be integrated directly into the decision-making framework to ensure meaningful collaboration and communication during critical decision points.

This structural adjustment recognizes that information quality's mediating effect is enhanced when stakeholders are actively engaged in information gathering, validation, and interpretation processes. By positioning stakeholder engagement as an integral component of strategic decision-making rather than a separate construct, the framework better reflects the reality of construction project environments where multiple stakeholders contribute to and depend upon high-quality information for effective decision outcomes.

While acknowledging that multiple factors influence organizational decision-making and performance outcomes, this research framework deliberately isolates information quality as the focal mediating variable to provide targeted insights into its specific role and impact within construction organizations' strategic processes. This focused approach enables practitioners to understand precisely how information quality

improvements can enhance strategic decision-making effectiveness without the confounding effects of other organizational variables.

The refined framework creates a more comprehensive and practically applicable tool for construction organizations seeking to improve strategic decision-making outcomes through enhanced information quality management. These structural optimizations maintain the framework's theoretical foundation while increasing its utility for industry practitioners who must navigate complex stakeholder environments and information-intensive decision-making scenarios within New Zealand's construction sector.

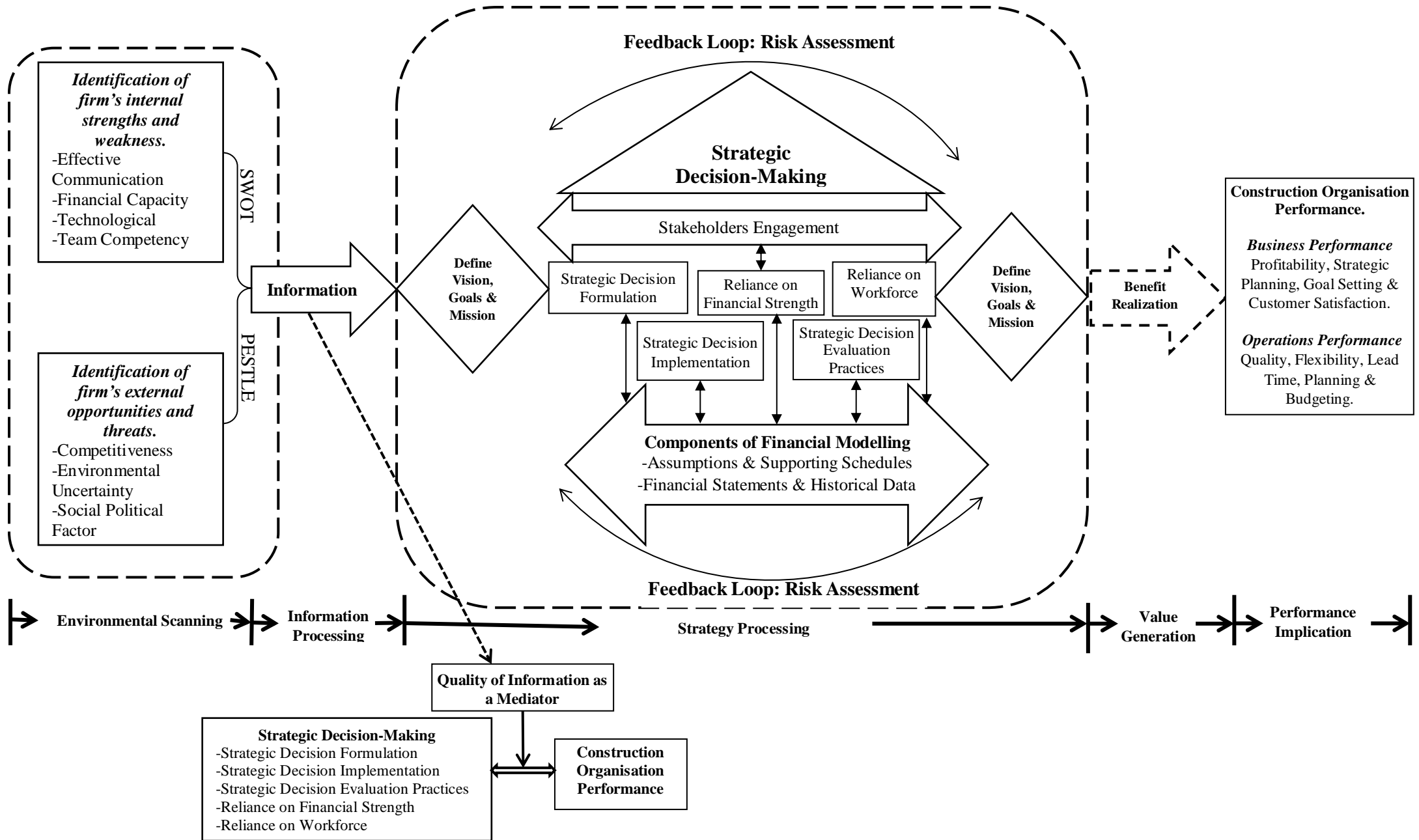


Figure 10.5: Revised Framework on Quality of Information as a Strategic Resource

Based on comprehensive expert feedback obtained through structured validation sessions with six industry professionals, the strategic decision-making framework initially presented in Chapter 9 (Figure 9.1) has been systematically refined and enhanced. The expert panel comprised senior construction managers, project directors, and industry consultants with an average of 10 years of experience in strategic decision-making roles across New Zealand's construction sector.

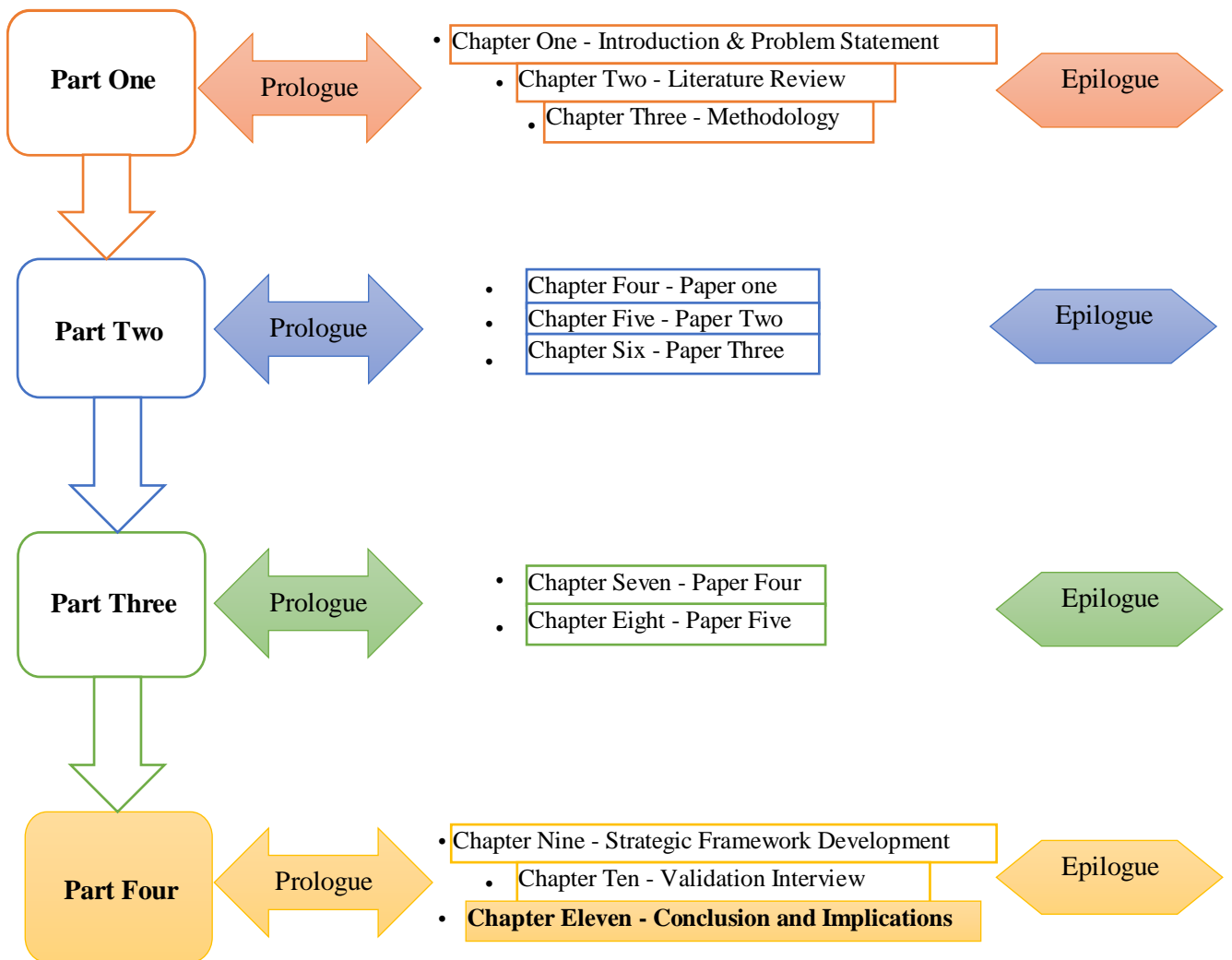
The validation process revealed several key strengths that experts recognized in the original framework. Participants consistently praised the framework's clear visualization of information quality as a mediating variable, with one senior project director noting that it "finally provides a structured approach to understanding how information impacts our decision outcomes." Experts particularly valued the framework's practical applicability, emphasizing its potential to bridge the gap between theoretical decision-making models and real-world construction environments. The logical flow from information inputs through decision processes to performance outcomes was identified as intuitive and aligned with industry practices. Additionally, experts appreciated the framework's focus on measurable information quality characteristics, which they viewed as essential for implementation and performance monitoring.

Despite recognizing the framework's strengths, experts identified several significant barriers to implementation that required framework modifications. Resource constraints emerged as the primary concern, with experts noting that smaller construction organizations might lack the infrastructure to implement comprehensive information quality management systems. Cultural resistance to change was highlighted as another substantial barrier, particularly in traditional construction organizations where informal decision-making processes are deeply entrenched. Experts also identified the complexity of stakeholder coordination as a significant implementation challenge, emphasizing that the original framework underestimated the difficulties of achieving consistent stakeholder engagement across project phases.

The revised framework, shown in Figure 10.5, incorporates several key modifications directly addressing expert concerns and leveraging their recommendations. Most significantly, stakeholder engagement has been repositioned closer to the strategic decision-making cluster to reflect expert emphasis on early and continuous stakeholder involvement. Experts recommended simplifying implementation pathways for smaller

organizations, leading to the inclusion of scalable implementation options within the framework structure. Additionally, change management considerations have been embedded throughout the framework to address cultural resistance concerns. The refined framework also includes enhanced feedback mechanisms based on expert recommendations for continuous improvement and adaptation capabilities.

Following these modifications, experts provided positive feedback on the framework's enhanced practical utility and implementation feasibility. The repositioning of stakeholder engagement received particular endorsement, with experts confirming that this change better reflects construction industry realities. The incorporation of scalable implementation options was praised as addressing a critical gap in the original framework. Overall, experts concluded that the refined framework represents a significant improvement in both theoretical rigor and practical applicability for New Zealand's construction industry.



CHAPTER 11

CONCLUSION AND IMPLICATIONS

11.1 Introduction

This is the concluding chapter of the research project. Based on the preceding chapters, a conclusion is formed. Furthermore, this chapter is the essential portion of this thesis since it places the current study findings in the perspective of previous research findings. This thesis chapter will discuss the current investigation findings, considering the existing literature and interviews to validate the findings. Furthermore, the reader will understand the distinctive characteristics of the current investigation through direct and indirect theoretical rationale. As a result, all the study's hypotheses will be discussed in the order specified in the model. The following discussion highlights the significance of research, its limits, the consequences of practices, and the need for more research.

11.2 Recapitulation of Findings

This research aims to develop a comprehensive strategic framework that enhances the performance of construction businesses in New Zealand by optimizing the quality of information used by stakeholders in their decision-making processes, particularly in the context of executing pipeline construction projects. Despite the critical importance of information quality in gaining a competitive advantage and improving construction business performance, there is a notable scarcity of research on this topic within the construction industry. In light of the problem identified in Chapter 1 and the extensive evaluation of the methodology used in Chapter 2, this research sets out to accomplish the following primary objectives:

RO1. To explore and identify the determinants for successful construction business performance in New Zealand.

- RO2.** To investigate and predict the impact of key determinants of strategic decision-making on the successful performance of construction businesses in New Zealand.
- 2.a** To investigate the direct effects of strategic decision-making on construction business performance in the New Zealand construction industry.
- 2.b** To investigate the mediating role of quality of information on strategic decision-making and construction business performance in New Zealand.
- RO3.** To develop a conceptual framework for successful construction business performance in New Zealand.
- RO4.** To validate the proposed strategic decision-making process framework for its sufficiency, clarity, relevance, and applicability in New Zealand construction organisations and to identify areas for further improvements.

The objectives of this study were established through a thorough literature evaluation, as discussed in Chapter 2. Considerable efforts have been made to organize information resources to support decision-makers in digitized construction project environments (Dzokoto, 2016). However, determining available information at a specific time and to the required actor not only aids an understanding of the actors' roles in the project environment but also enhances the information use behaviour of the actors (Eastman et al., 2011).

Therefore, identifying the quality of information preferences of the various players involved in construction projects will provide insights that can be used to develop innovative strategies to improve pipeline construction project settings. This research aims to present a framework for strategic decision-making on the quality of information to enhance the performance of construction businesses concerning the execution of pipeline construction projects in New Zealand. This is particularly important given the scarcity of research on how the construction industry can gain a competitive advantage in improving their construction business performance through the quality of information.

By addressing this research gap, the study seeks to contribute to developing effective strategies and practices that can optimize information quality, facilitate better

decision-making, and ultimately improve the performance of construction businesses in New Zealand's pipeline construction projects. The findings of this study will provide valuable insights and recommendations for construction industry stakeholders, policymakers, and researchers, facilitating the development of strategies and practices that optimize information quality and decision-making processes in pipeline construction projects.

The theoretical framework underpinning this investigation was built based on Ansoff's strategic success theory and the resource-based view theory, as explained in Chapter 2. Establishing a rationale or theoretical framework is crucial in social and behavioural sciences research. This framework, often known as a theoretical foundation, is a conceptual model explaining the interactions among various elements essential to solving a specific problem (Chen et al., 2018).

Our study's theoretical framework derives from theories emphasizing the significance of organisational performance in predicting information quality as a mediating variable between strategic decision-making and construction business performance in New Zealand. The integrated model analyses strategic decision-making and construction business performance, incorporating the quality of information as a mediating factor.

Ansoff initially introduced the strategic success formula for strategic management, which was later developed by Harry Igor Ansoff & Donnel (1990). This formula suggests that exceptional company performance aligns with an organisation's strategy of adapting to environmental turbulence while its capabilities match the strategy's aggressiveness (Moussetis, 2011). To achieve optimal performance, it's crucial for an organisation that the aggressiveness of its strategy matches environmental turbulence, its capability's responsiveness aligns with strategic aggressiveness, and its components support each other (Kiple & Lewis, 2009). Essentially, this strategic diagnosis tool guides organisations in adjusting strategy and internal capabilities for future success (Njeru, 2015).

Similarly, the resource-based view theory, pioneered by Wernerfelt (1984) and extended by Barney (1991), asserts that a firm's strategy results from its resource assortment (Freeman et al., 2021). It suggests that an organisation's resources are more

critical than industry structure in gaining and maintaining a competitive edge (Njeru, 2015). According to this view, an organisation's resources and capabilities define its efficiency and effectiveness. Organisational resources, including material, financial, informational, and human capital, drive competitive advantage and enhance company performance (Safari & Saleh, 2020).

This theory implies that strategic decision-making in the construction sector depends on available resources, often influenced by factors like size, industry, and legal formation, impacting the industry's success. Therefore, the quality of information and stakeholders' strategic decisions play a pivotal role in strengthening construction organisations. The conceptual framework elucidates the relationships between variables, highlighting their interdependence as independent, dependent, and mediating variables.

In light of the objectives of this study, which are discussed in Chapters 1 and 5, employed variables are determined, and the framework for this study is developed. The quantitative methodological approach outlined in Chapter 2 has been used to evaluate and assess the constructed theoretical framework. The hypotheses for this study have been generated according to the problem description, research questions, research objectives, and literature evaluation, and they are suitable for empirical testing in the field.

To gather data that reflected the components of the study, a survey questionnaire was developed in accordance with the investigation's research methodology and research design. All the questions in the questionnaire were either altered from or adopted from prior and diverse resources to ensure that the questionnaire had content validity. In addition, all the items were evaluated using a Likert scale.

After conducting a thorough systematic literature analysis, the previously adopted scale items from earlier research were changed to fit the needs of this present study. Initial pilot research was conducted, in which 60 copies of the questionnaire were disseminated based on a 5-7-9-point Likert scale verified by numerous statistical measures (item's reliability and validity), followed by a more extensive study. Furthermore, information was gathered from the top management in the New Zealand construction industry and was reviewed before use. The significance of the content validity factor loading and the convergent and discriminant validities under the PLS-SEM outer model requirement was determined with the assistance of the Smart-PLS 4 software.

As a result, this study's measurement model independent variable is strategic decision-making factors (strategic decision formulation, strategic decision implementation practices, strategic decision evaluation, reliance on financial strength, and reliance on workforce). The dependent variable is the construction business performance. In line with that, the quality of information mediates strategic decision-making and construction business performance by improving their relationship.

As soon as these statistical measures were found to be adequate, the inner model specification (structural model), which was utilized to test the hypothesized routes, was assessed. As suggested by Falk & Miller (1992) and Chin (1998), R^2 values of 0.67, 0.33, and 0.19 are deemed "substantial," "moderate," and "poor" for project risk management implementation in this study (see Table 4.8). The assumptions that were selected were comprised of both direct and mediating pathways. They were estimated using PLS-SEM statistical analyses to determine the significance of their conclusions. Specifically, the bootstrap approach was used to examine the mediating effects of quality of information on the correlations between strategic decision-making and construction business performance. The discussion in this part is therefore based on applied theory, findings of this study, and past research.

11.3 Research Implication

This novel study has made significant strides in illuminating the critical role of information quality in strategic decision-making processes, particularly within the context of construction business performance in New Zealand. The research delves deep into the intricate relationships between independent variables (IV), dependent variables (DV), and the mediating variable of information quality, shedding light on the complex dynamics that shape the success of construction projects.

One of the most notable contributions of this study lies in its exploration of the mediating effect of information quality on the relationship between strategic decision-making and construction business performance. By introducing this mediating variable, the research uncovers a new dimension in the interplay between these key factors, highlighting the pivotal role that information quality plays in determining the outcomes of strategic decisions and, ultimately, the performance of construction businesses.

The study's findings have far-reaching implications for the construction industry in New Zealand, particularly for construction projects in the pipeline. By providing a nuanced understanding of how information quality influences the effectiveness of strategic decision-making, this research equips industry professionals with valuable insights that can guide their decision-making processes. The recognition of information quality as a critical mediating factor underscores the importance of ensuring that decision-makers have access to accurate, reliable, and timely information, as this can significantly impact the success of construction projects.

Moreover, the study's contributions extend beyond academic research, offering practical applications for construction businesses seeking to optimize their performance. By emphasizing the importance of information quality in strategic decision-making, this research provides a roadmap for organisations to enhance their decision-making processes, ultimately leading to improved project outcomes and increased competitiveness in the market.

The study's findings also have implications for the wider construction industry, highlighting the need for a greater focus on information quality management. By investing in robust information systems, data governance frameworks, and data quality assurance processes, construction businesses can ensure they have access to high-quality information that can inform their strategic decisions. This, in turn, can lead to more effective resource allocation, risk management, and project planning, all of which are critical factors in determining the success of construction projects.

Furthermore, the study's contributions extend to policy-making, as it provides evidence-based insights that can inform the development of industry standards and best practices. By highlighting the importance of information quality in strategic decision-making, this research can guide the development of policies and regulations that promote adopting information quality management practices across the construction industry.

This study contributes to understanding the complex relationships between strategic decision-making, information quality, and construction business performance. By illuminating the mediating role of information quality and providing valuable insights into the factors that influence the success of pipeline construction projects in New Zealand, the application of these research findings has the potential to facilitate transformation in

the way construction businesses approach strategic decision-making and information management. As such, it represents a valuable resource for industry professionals, policy-makers, and researchers alike, offering a foundation for future research and practical applications that can drive the success of the construction industry in New Zealand and beyond.

11.3.1 Practical Implications

This study's findings underscore the profound impact of integrating strategic management practices and high-quality information on the performance of New Zealand's construction sector. This research highlights the paramount importance of seamlessly weaving strategic management into the fabric of daily operations within construction businesses. The observed positive correlation between adopting strategic management practices and enhancing construction business performance serves as a clarion call for practitioners to prioritize the infusion of strategic decision-making at every organisational echelon.

The study unveils the pivotal role of quality information as a mediating factor, emphasizing the need for construction enterprises to prioritize refining information quality management. By deploying robust systems that ensure information accuracy, reliability, and accessibility, construction organisations can optimize the positive impact of strategic management practices on their overall business performance. This proactive approach to information quality management enables construction organisations to make well-informed decisions, mitigate risks, and seize opportunities in an increasingly competitive and dynamic market landscape.

To navigate the challenging business climate, construction businesses must employ more effective methods, such as conducting comprehensive situational analyses. By involving consultants and engaging all team members in formulating strategies, construction organisations can foster an inclusive execution approach that leverages diverse perspectives and expertise. This collaborative approach to strategic decision-making ensures that various stakeholders' unique insights and experiences are considered, leading to more robust and adaptable strategies.

Moreover, the study emphasises the importance of regular evaluation and adaptability in construction organisations' techniques. By continuously assessing their methods and making swift corrective actions, when necessary, construction organisations can stay agile and responsive to the ever-changing market conditions. This proactive approach to strategic management enables construction businesses to identify and address potential challenges before they escalate, thereby mitigating the risk of company failure.

In addition to regular evaluation, developing clear and concise mission and vision statements is crucial for construction organisations. These statements serve as guiding principles, providing a roadmap for the company's direction and future goals. By effectively communicating these statements to all staff during the implementation of strategic plans, construction businesses can instil a sense of purpose and alignment in the organisation. This shared understanding of the company's mission and vision fosters a culture of collaboration, innovation, and continuous improvement, ultimately driving the organisation towards success.

The study also highlights the pivotal role of owners in ensuring the inclusivity of the strategic management process. By involving personnel at all levels, from lower-level staff to top management, owners can foster a shared sense of ownership and responsibility for plan execution. This inclusive approach to strategic management promotes employee engagement and motivation and ensures that the unique perspectives and insights of various stakeholders are considered in the decision-making process. By creating a culture of collaboration and open communication, owners can harness the collective intelligence of their organisation, thereby leading to more effective and innovative solutions.

Furthermore, the study emphasises the importance of continuous assessment and swift corrective actions in mitigating the risk of company failure. Owners must actively pursue enhanced management acumen through consistent training and ensure access to high-quality information before making project-related decisions. By investing in developing their leadership skills and knowledge base, owners can make more informed and strategic decisions that drive their organisation towards success.

The study also underscores the need for stakeholders to articulate exceptional strategic objectives that encompass technology and innovation, business efficiency and development, and a commitment to excellent customer service. By prioritizing the

acquisition of appropriate resources, including data/information, financial assets, and human capital, construction organisations can position themselves for long-term success. This proactive approach to resource allocation enables construction organisations to stay at the forefront of industrial trends, adopt cutting-edge technologies and deliver superior value to their customers.

Ultimately, the success of any business strategy hinges on the availability of resources, the discernment of value, the vigour and expertise of managers, and the strategic implementation within volatile and ambiguous environments. The study emphasises the need for a proactive approach that positions construction organisations for resilience and sustained success. By embracing strategic management practices, leveraging high-quality information, and fostering a culture of collaboration and continuous improvement, construction businesses can navigate the industry's challenges and emerge as leaders in their field.

The research implementation plan outlined in this study provides a clear and comprehensive approach to investigating the impact of strategic decision-making and the mediating role of quality information on construction organisations' performance in New Zealand. By following this plan, researchers can effectively execute the study and contribute to developing strategies for enhancing strategic decision-making practices and information quality management in the construction industry.

The findings of this study have far-reaching implications for the construction industry in New Zealand and beyond. By adopting the research's recommendations and insights, construction organisations can unlock their full potential, drive innovation, and achieve sustainable growth. The study is a valuable resource for practitioners, policymakers, and researchers alike, providing a roadmap for successfully integrating strategic management practices and high-quality information in the construction sector.

As the construction industry continues to evolve and face new challenges, the importance of strategic management and information quality management will only continue to grow. By embracing the findings of this study and implementing the recommended strategies, construction organisations can position themselves at the forefront of the industry, deliver superior value to their customers, and contribute to the overall growth and development of the construction sector in New Zealand and beyond.

Therefore, this study provides a comprehensive and actionable framework for enhancing the performance of construction organisations through strategic management practices and high-quality information. By adopting the recommendations and insights this research provides, construction businesses can navigate the industry's challenges, drive innovation, and achieve sustainable success. The findings of this study have the potential to transform the construction sector in New Zealand and beyond, paving the way for a more resilient, competitive, and innovative industry that delivers value to all stakeholders.

11.3.2 Theoretical Contribution

This research makes significant theoretical contributions to understanding strategic decision-making and information quality in construction management. Primarily, the study extends Ansoff's strategic success theory by demonstrating how information quality mediates the relationship between strategic decision-making and organisational performance. It empirically validates the theoretical link between strategic aggressiveness, environmental turbulence, and organisational capabilities in the construction context while expanding the understanding of how strategic decision formulation, implementation, and evaluation processes interact in construction organisations.

The study advances the Resource-Based View (RBV) theory by identifying information quality as a crucial strategic resource influencing competitive advantage. It demonstrates how the quality of information resources impacts an organisation's ability to make effective strategic decisions while showing how different organisational resources (financial, workforce, information) interact to influence performance outcomes. This enhancement of RBV theory provides a more nuanced understanding of how organisations can leverage information quality for competitive advantage.

A significant theoretical contribution lies in developing an information quality framework specifically for construction management. The study creates a theoretical framework for understanding how information quality mediates strategic decision-making in construction, establishing theoretical linkages between information characteristics (accuracy, timeliness, completeness) and strategic decision outcomes.

This framework provides a theoretical basis for understanding how information quality influences different aspects of strategic decision-making.

The research uniquely integrates multiple theoretical perspectives, combining strategic management theory, RBV theory, and information quality concepts into a comprehensive theoretical framework. It demonstrates how these different theoretical perspectives can be integrated to better understand construction organisation performance, providing a theoretical foundation for understanding the complex relationships between strategy, information, and performance. This integration advances construction management theory by identifying specific mechanisms through which information quality influences project success.

The study makes substantial contributions to theoretical model validation through empirical testing. It provides statistical validation of theoretical relationships between strategic decision-making, information quality, and performance through PLS-SEM analysis, confirming the theoretical importance of information quality as a mediating variable. This validation strengthens the theoretical foundations of construction management research while demonstrating the practical applicability of theoretical concepts.

Contextual theory development is another key contribution, as the study advances theoretical understanding of how construction industry context influences strategic decision-making processes. It demonstrates how New Zealand's specific construction industry characteristics shape theoretical relationships, showing how theoretical models must be adapted to account for industry-specific factors. This contextual understanding enhances the applicability of theoretical frameworks to real-world construction management situations.

The research also advances process theory related to strategic decision-making in construction organisations, developing a theoretical understanding of how strategic decisions are formulated and implemented. It establishes theoretical frameworks for understanding how information flows influence strategic decision-making, contributing to performance theory by establishing theoretical links between strategic decisions, information quality, and performance outcomes.

Finally, the study makes important methodological theory contributions by demonstrating the theoretical validity of using PLS-SEM for analysing complex relationships in construction management. It advances methodological theory related to measuring and analysing information quality impacts, providing theoretical justification for mixed-methods approaches in construction management research. These methodological contributions strengthen the theoretical foundation for future research in construction management while offering practical guidance for improving construction organisation performance through better strategic decision-making and information quality management.

11.4 Limitations and Suggestions for Future Research

The present study, while making significant contributions to understanding the relationship between strategic decision-making and construction business performance, has several notable limitations. The sample size of 102 respondents, though sufficient for the analyses conducted, may limit the generalizability of findings to the broader New Zealand construction industry. While this sample size meets the minimum requirements for PLS-SEM analysis, a larger sample could provide more robust and generalizable results. Additionally, the study relied heavily on self-reported data from construction professionals, which may be subject to response bias. Experts' perceptions of their organisations' strategic decision-making processes and performance outcomes might not fully align with objective measures.

The cross-sectional nature of the data collection presents another limitation, as it captures only a snapshot in time rather than longitudinal changes in strategic decision-making processes and their outcomes. The research focused primarily on strategic decision-making and information quality aspects, potentially overlooking other important variables that might influence construction business performance. Factors such as organisational culture, leadership styles, technological adoption rates, and external market conditions, while acknowledged, were not fully explored in the current study. Geographic limitations must also be considered, as the study concentrated on the New Zealand construction industry. The unique characteristics of this market may limit the direct applicability of findings to other countries or regions with different construction industry structures and regulatory environments.

Looking forward, several promising directions for future research emerge from this study's findings and limitations. Future studies should aim to incorporate larger sample sizes to enhance statistical power and generalisability while also extending to different geographic regions to test the framework's applicability in various contexts. Comparative studies across different construction market segments could provide valuable insights into how strategic decision-making processes vary across different types of construction organisations.

Longitudinal research designs would be particularly valuable for tracking how strategic decision-making processes evolve over time and how organisations adapt their approaches in response to changing market conditions. Such studies could investigate how information quality improvements impact performance outcomes across multiple project cycles, providing deeper insights into the long-term effects of strategic decision-making practices.

Future research should also explore additional variables and relationships that may influence strategic decision-making in construction organisations. This could include investigating how technological advancement impacts information quality and decision-making processes, as well as research into the role of organisational culture in mediating the relationship between information quality and performance. Integration of objective performance measures alongside self-reported data would strengthen the validity of findings. At the same time, the development of more sophisticated measurement tools for assessing information quality in construction contexts would enhance methodological rigour.

Practical implementation studies represent another important avenue for future research. Further studies could focus on the practical implementation of the strategic framework in construction organisations, investigation of barriers to improving information quality in construction settings, and analysis of best practices for enhancing strategic decision-making processes. Industry-specific extensions could examine how different project delivery methods impact strategic decision-making processes and how digital transformation affects information quality and decision-making.

Incorporating multiple stakeholder perspectives on strategic decision-making would provide valuable insights into how different organisational roles perceive and

utilize information in decision-making. Analysis of client perspectives on construction organisation performance could offer additional dimensions to understanding the effectiveness of strategic decision-making processes. Furthermore, research into how information quality affects risk management in strategic decision-making and how organisations balance risk and opportunity in strategic decisions would contribute to a more comprehensive understanding of these relationships.

Finally, future research should consider emerging trends in the construction industry, such as sustainable construction practices, digitalization, and changing workforce dynamics. These evolving factors may significantly impact how organisations approach strategic decision-making and information management. Developing industry-specific tools and frameworks for assessing and improving information quality in construction organisations, including standardized metrics for measuring information quality and its impact on organisational performance, would provide practical value to industry practitioners while advancing theoretical understanding in this field.

11.5 Conclusion

This research provides comprehensive insights into the intricate relationships between strategic decision-making, information quality, and construction business performance in New Zealand's construction sector. The findings categorically demonstrate that strategic decision-making processes substantially influence organisational outcomes, with information quality serving as a crucial mediating factor. The research validates that high-quality information enables better strategic planning, risk management, and operational efficiency in construction organisations, while the effectiveness of strategic decisions heavily depends on the accuracy, timeliness, and reliability of available information. This relationship highlights the critical importance of robust information management systems in supporting effective decision-making processes within construction organisations.

A major outcome of the study was the development and validation of a comprehensive strategic framework that integrates strategic decision formulation, implementation practices, evaluation processes, and reliance on financial strength and workforce, with quality of information serving as a mediating element. This framework provides construction organisations with a structured approach to enhance their decision-

making capabilities while considering the complex interplay between various organisational factors. The research confirms that organisations must prioritise information quality management and strategic decision-making processes to mitigate project delays and optimize performance effectively. The framework's validation through industry practitioners underscores its practical applicability and potential value in improving construction business outcomes.

The study reveals several key performance factors that influence construction business success. Strategic decision implementation and evaluation practices significantly impacted construction business performance, while reliance on a skilled workforce strongly correlated with organisational success. Interestingly, financial strength alone could not significantly influence performance without effective strategic decisions in place. These findings emphasise the importance of a holistic approach to strategic management in construction organisations, where success depends on the effective integration of multiple organisational elements rather than singular factors operating in isolation.

From a practical perspective, the research strongly suggests that construction organisations should integrate strategic management into their daily operations, maintain clear mission and vision statements, and ensure effective communication throughout all organisational levels. Employee involvement at all levels was found to promote better strategy implementation, while continuous assessment and swift corrective actions help mitigate failure risks. The study emphasises the importance of deploying robust information systems and data governance frameworks to ensure high-quality information for decision-making. Furthermore, organisations must develop systematic approaches to gathering, analysing, and utilizing information to support strategic decision-making processes.

The research makes substantial theoretical contributions by extending Ansoff's strategic success theory and Resource-Based View theory within the construction context. It develops a new theoretical framework for understanding how information quality mediates strategic decision-making and validates these relationships through empirical testing. This advancement in theoretical understanding provides a solid foundation for future research and practical applications in construction management. The study's theoretical framework particularly emphasises the dynamic nature of strategic

decision-making in construction organisations and the crucial role of information quality in mediating successful outcomes.

The validation of the strategic framework through industry practitioners revealed important insights about its practical application and effectiveness. Construction organisations recognized the value of structured approaches to strategic decision-making while also highlighting the need for flexibility in implementing such frameworks within different organisational contexts. The research demonstrates that successful strategic management requires both systematic processes and adaptability to specific organisational circumstances and market conditions.

The research identifies several important areas for future investigation, including the need for larger-scale studies across different geographic regions and longitudinal research to track the evolution of strategic decision-making processes. There are opportunities to develop industry-specific tools for assessing information quality and to explore the growing relevance of digital transformation and sustainable practices in strategic planning. Moreover, the findings suggest that construction organisations must continue adapting their strategic approaches to meet evolving industry challenges while focusing on information quality as a key driver of successful decision-making.

The study also highlights the importance of organisational culture and leadership in supporting effective strategic decision-making processes. Success in implementing strategic frameworks depends significantly on organisational commitment to maintaining high-quality information systems and promoting data-driven decision-making practices. Leadership plays a crucial role in fostering an organisational culture that values and prioritizes information quality while supporting systematic approaches to strategic decision-making.

In addition, this research provides valuable insights for improving construction business performance in New Zealand and potentially beyond, highlighting the critical role of information quality in strategic decision-making processes. The findings and recommendations offer practical guidance for construction organisations seeking to enhance their strategic capabilities and operational effectiveness while contributing significantly to the theoretical understanding of strategic management in the construction industry. The developed framework, validated through industry practitioners, provides a

robust foundation for organisations to improve their strategic decision-making processes while acknowledging the crucial mediating role of information quality.

The research demonstrates that success in construction business performance requires a comprehensive approach that integrates strategic decision-making processes with high-quality information management systems. Organisations must invest in developing both their strategic capabilities and information management practices to achieve optimal outcomes. As the construction industry continues to evolve and face new challenges, the importance of effective strategic decision-making supported by high-quality information will increase, making this research's findings and recommendations increasingly valuable for industry practitioners and researchers.

EPILOGUE: PART FOUR

As we conclude this journey through the landscape of strategic decision-making in New Zealand's construction industry, we find ourselves at the beginning of a new chapter rather than at the end. The research presented here has illuminated the critical role that information quality plays in shaping strategic decisions and driving business performance, but it has also revealed new horizons for exploration and implementation.

This study's findings resonate beyond New Zealand's borders, speaking to universal challenges faced by construction organisations worldwide. The strategic framework developed and validated through this research offers a blueprint for organisations seeking to enhance their decision-making processes, while the insights gained about the mediating role of information quality provide a new lens through which to view organisational performance.

So far, the most profound implication of this research lies in its potential to transform how construction organisations approach strategic planning and information management. In an industry often characterized by its resistance to change, this study provides compelling evidence for the value of systematic approaches to decision-making and the crucial importance of high-quality information in achieving business success.

As we look to the future, the challenge lies in implementing these findings and in continuing to evolve our understanding of how construction organisations can better navigate the complexities of modern project delivery. The framework and insights presented here serve as stepping stones toward a more sophisticated approach to strategic management in construction, one that recognizes the fundamental importance of quality information in driving organisational success. The journey of discovery and implementation continues, guided by the knowledge that effective strategic decision-making, supported by high-quality information, remains central to the future success of construction organisations. As the industry continues to evolve, the principles and frameworks established through this research will serve as valuable guides for organisations seeking to enhance their performance and navigate the challenges that lie ahead.

REFERENCES

- Abdullah, M. R., Rahman, I. A., & Azis, A. A. A. (2010). Causes of delay in MARA management procurement construction projects. *Journal of Surveying, Construction and Property*, 1(1).
- Abrahams, S. (2012). *Budgeting, Forecasting and Financial Planning as a Strategic Tool in the Eastern Cape's Manufacturing Industry*. Nelson Mandela Metropolitan University.
- Abu-Rahma, A., & Jaleel, B. (2019). Perceived uncertainty and use of environmental information in decision making: The case of the United Arab Emirates. *International Journal of Organizational Analysis*.
- Acciarini, C., Brunetta, F., & Boccardelli, P. (2020). Cognitive biases and decision-making strategies in times of change: a systematic literature review. *Management Decision*.
- Acciarini, C., Brunetta, F., & Boccardelli, P. (2021). Cognitive biases and decision-making strategies in times of change: a systematic literature review. *Management Decision*, 59(3), 638–652.
- Adendorff, C., Appels, G., & Botha, B. (2011). Strategic management: An Eastern Cape construction SME case study. *Acta Structilia*, 18(2), 40–63.
- Adinolfi, P. (2021). A journey around decision-making: Searching for the “big picture” across disciplines. *European Management Journal*, 39(1), 9–21.
- Afrifa, A., Ofori-Frimpong, K., Acquaye, S., Snoeck, D., & Abekoe, M. K. (2009). Soil nutrient management strategy required for sustainable and competitive cocoa production in Ghana. *16th International Cocoa Conference, Bali*.
- Afzal, F., & Lim, B. (2022). Organizational Factors Influencing the Sustainability Performance of Construction Organizations. *Sustainability*, 14(16), 10449.
- Agenbag, H., & Amoah, C. (2021). The impact of modern construction technology on the workforce in the construction industry. *IOP Conference Series: Earth and Environmental Science*, 654(1), 12001.
- Aghimien, L. M., Aigbavboa, C. O., Anumba, C. J., & Thwala, W. D. (2023). A confirmatory factor analysis of the challenges of effective management of construction workforce in South Africa. *Journal of Engineering, Design and Technology*, 21(4), 1134–1152.
- Aitken, R. (2007). *Performing capital: Toward a cultural economy of popular and global*

- finance*. Springer.
- Ajeneye, F. (2006). Power and sample size estimation in research. *BIOMEDICAL SCIENTIST*, 50(11), 988.
- Akanbi, T., & Zhang, J. (2021). Design information extraction from construction specifications to support cost estimation. *Automation in Construction*, 131, 103835.
- Al-Hashimy, H. N. H., Said, I., & Ismail, R. (2022). Evaluating the Impact of Computerized Accounting Information System on the Economic Performance of Construction Companies in Iraq. *Informatica*, 46(7).
- Al-Kinani¹, R. T. H., & Adavi, P. (2014). Factors Affecting Labor Productivity on Building Projects in Zimbabwe. *International Journal of Architecture, Engineering and Construction*, 3(1). <https://doi.org/10.7492/ijaec.2014.005>
- Al Hijji, K. Z., AlHarrasi, N. H., & Alissaee, H. S. (2018). The role of information in strategic planning and decision-making: overview on economic organizations in Oman. *Journal of Economics, Business, & Accountancy Ventura*, 21(1), 143–150.
- Al Shobaki, M. J., Abu Amuna, Y. M., & Abu-Naser, S. S. (2016). *The impact of top management support for strategic planning on crisis management: Case study on UNRWA-Gaza Strip*.
- Al Shobaki, M. J., & Naser, S. S. A. (2016). *The dimensions of organizational excellence in the Palestinian higher education institutions from the perspective of the students*.
- Aldhaen, E. S. (2017). *Study of the strategic decision making process in higher education institutions*. Brunel University London.
- AlDhaena, E. (2020). The role of knowledge management in strategic decision-making in higher education institutions (HEIs): a proposed model. *International Journal of Innovation, Creativity and Change*, 10(12), 50–57.
- Alketbi, O. (2014). *Data quality assurance for strategic decision making in Abu Dhabi's public organisations*.
- Allen, P., Bennett, K., & King, J. (2010). *PASW statistics by SPSS: A practical guide, version 18.0*. National Library of Australia.
- ALnuaimi, M. A., Alzubi, H. M., Alzoubi, A. A., & AL-Shinewi, M. W. (2015). The Impact of Managers Efficiency on Quality of Strategic Decision-making under Crisis Management: An Empirical Study on Private Hospitals in Baghdad-Iraq. *Eur. J. Bus. Manag*, 7, 156–165.
- Alshikhi, O. A., & Abdullah, B. M. (2018). Information quality: definitions, measurement, dimensions, and relationship with decision making. *European*

- Journal of Business and Innovation Research*, 6(5), 36–42.
- Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589–609.
- Alvesson, M., & Sköldbberg, K. (2017). *Reflexive methodology: New vistas for qualitative research*. sage.
- Amirmehdi, A. (2019). *Public-Private Partnership Pros & Cons Benefits and Disadvantages of PPP Contracts*.
- Ansoff, H Igor. (1984). The emerging paradigm of strategic behavior. *Strategic Management Journal*, 8(6), 501–515.
- Ansoff, Harry Igor, & Donnel, M. (1990). EJ 1990. Implanting Strategic Management. *Hertfordshire, UK*.
- Anwar, G., & Abdullah, N. N. (2021). The impact of Human resource management practice on Organizational performance. *International Journal of Engineering, Business and Management (IJEEM)*, 5.
- Arditi, D., Koksall, A., & Kale, S. (2000). Business failures in the construction industry. *Engineering, Construction and Architectural Management*.
- Arshad, M. N. M., & Ab Malik, Z. (2015). Quality of human capital and labor productivity: a case of Malaysia. *International Journal of Economics, Management and Accounting*, 23(1).
- Asrar-ul-Haq, M., & Anwar, S. (2016). A systematic review of knowledge management and knowledge sharing: Trends, issues, and challenges. *Cogent Business & Management*, 3(1), 1127744.
- Assaf, G., & Assaad, R. H. (2023). Key decision-making factors influencing bundling strategies: analysis of bundled infrastructure projects. *Journal of Infrastructure Systems*, 29(2), 4023006.
- Atkinson, J.-A., Skinner, A., Hackney, S., Mason, L., Heffernan, M., Currier, D., King, K., & Pirkis, J. (2020). Systems modelling and simulation to inform strategic decision making for suicide prevention in rural New South Wales (Australia). *Australian & New Zealand Journal of Psychiatry*, 54(9), 892–901.
- Axali, J., Devereaux, L., Spencer, A., & Vasilev, F. (2024). *A multicriteria decision-making approach for ransomware detection using mitre att&ck mitigation strategy*.
- Babaeian Jelodar, M., Hemant Raut, P., & Saghatforoush, E. (2021). Contractor-Delay Control in Building Projects: Escalation of Strategy from Primary Proactive to Secondary Reactive. *Journal of Legal Affairs and Dispute Resolution in*

- Engineering and Construction*, 13(2), 4521002.
- Babalola, O., Ibem, E. O., & Ezema, I. C. (2019). Implementation of lean practices in the construction industry: A systematic review. *Building and Environment*, 148, 34–43.
- Bagheri, J. (2016). Overlaps between human resources' strategic planning and strategic management tools in public organizations. *Procedia-Social and Behavioral Sciences*, 230, 430–438.
- Bajracharya, A., Ogunlana, S. O., Goh, C. S., & Tan, H. C. (2018). Conceptualising the nexus of projects, finance and capacity in construction business. *Frontiers of Engineering Management*, 5(3), 289–297.
- Bakar, A. H. A., Tufail, M. A., Tufail, M. N. Y. M. A., & Virgiyanti, W. (2011). Implementation of strategic management practices in the Malaysian construction industry. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, 5(1), 140–154.
- Bakker, M., Veldkamp, C. L. S., van den Akker, O. R., van Assen, M. A. L. M., Cromptvoets, E., Ong, H. H., & Wicherts, J. M. (2020). Recommendations in pre-registrations and internal review board proposals promote formal power analyses but do not increase sample size. *Plos One*, 15(7), e0236079.
- Balatbat, M. C. A., Lin, C., & Carmichael, D. G. (2010). Comparative performance of publicly listed construction companies: Australian evidence. *Construction Management and Economics*, 28(9), 919–932.
- Bamidele-Sadiq, M., Popoola, O., Lawal, G. O., & Awodiji, T. O. (2022). The importance of decision tree analysis on strategic management practice: Evidence from retail industries in the US. *Journal of Marketing and Consumer Research*, 87, 4–87.
- Barbhuiya, S., & Das, B. B. (2023). Life Cycle Assessment of construction materials: Methodologies, applications and future directions for sustainable decision-making. *Case Studies in Construction Materials*, e02326.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Barton, J. K., & Stromski, S. (2005). Flow measurement without phase information in optical coherence tomography images. *Optics Express*, 13(14), 5234–5239.
- Basar, P. (2018). The analytic hierarchy process method to design strategic decision making for the effective assessment of supplier selection in construction industry. *Research Journal of Business and Management*, 5(2), 142–149.
- Baskarada, S., Gao, J., Lin, S., Yeoh, G., & Koronios, A. (2005). Data Quality Enhancing

- Software for Asset Management-State of the Art Evaluation. *4th WSEAS International Conference on Applied Mathematics & Computer Science (AMCOS 2005), Copacabana, Rio de Janeiro, Brazil, April, 25–27.*
- Bates, M. J. (2018). Concepts for the study of information embodiment. *Library Trends*, 66(3), 239–266.
- Baumgartner, H., & Steenkamp, J.-B. E. M. (2001). Response Styles in Marketing Research: A Cross-National Investigation. *Journal of Marketing Research*, 38(2), 143–156. <https://doi.org/10.1509/jmkr.38.2.143.18840>
- Bawden, D., & Robinson, L. (2013). No such thing as society? On the individuality of information behavior. *Journal of the American Society for Information Science and Technology*, 64(12), 2587–2590.
- Bawden, D., & Robinson, L. (2015). *Introduction to information science*. Facet Publishing.
- Bayrak, A. E., McComb, C., Cagan, J., & Kotovsky, K. (2021). A strategic decision-making architecture toward hybrid teams for dynamic competitive problems. *Decision Support Systems*, 144, 113490.
- Bayraktar, M. E., Hastak, M., Gokhale, S., & Safi, B. (2011). Decision tool for selecting the optimal techniques for cost and schedule reduction in capital projects. *Journal of Construction Engineering and Management*, 137(9), 645–655.
- Bdo New Zealand Construction Sector Report. (2021). *Rethinking Construction*. [file:///C:/Users/taofe/OneDrive - Universiti Malaysia Pahang/Desktop/2021-BDO-Construction-Sector-Report.pdf](file:///C:/Users/taofe/OneDrive%20-%20Universiti%20Malaysia%20Pahang/Desktop/2021-BDO-Construction-Sector-Report.pdf)
- Beaver, W. H. (1966). Financial ratios as predictors of failure. *Journal of Accounting Research*, 71–111.
- Becker, E. (2016). *Knowledge Capture in Financial Regulation: Data-, Information-and Knowledge-asymmetries in the US Financial Crisis*. Springer.
- Beel, J., Gipp, B., Langer, S., & Genzmehr, M. (2011). Docear: An academic literature suite for searching, organizing and creating academic literature. *Proceedings of the 11th Annual International ACM/IEEE Joint Conference on Digital Libraries*, 465–466.
- Behúnová, A., Mandičák, T., Krajníková, K., Mesároš, P., & Behún, M. (2018). Impact of enterprise information systems on selected business performance indicators in construction industry. *MMS 2018: 3rd EAI International Conference on Management of Manufacturing Systems*, 1–10.

- Belay, S., Goedert, J., Woldesenbet, A., & Rokooei, S. (2022). AHP based multi criteria decision analysis of success factors to enhance decision making in infrastructure construction projects. *Cogent Engineering*, 9(1), 2043996.
- Belhadi, A., Kamble, S., Fosso Wamba, S., & Queiroz, M. M. (2022). Building supply-chain resilience: an artificial intelligence-based technique and decision-making framework. *International Journal of Production Research*, 60(14), 4487–4507.
- Bell, E., & Bryman, A. (2007). The Ethics of Management Research: An Exploratory Content Analysis. *British Journal of Management*, 18(1), 63–77. <https://doi.org/10.1111/j.1467-8551.2006.00487.x>
- Bello, C., Urman, R. D., Andereggen, L., Doll, D., & Luedi, M. M. (2022). Operational and strategic decision making in the perioperative setting: Meeting budgetary challenges and quality of care goals. *Best Practice & Research Clinical Anaesthesiology*.
- Berry, L. L., Parasuraman, A., & Zeithaml, V. A. (1994). Improving service quality in America: lessons learned. *Academy of Management Perspectives*, 8(2), 32–45.
- Bharosa, N., Lee, J., & Janssen, M. (2010). Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises. *Information Systems Frontiers*, 12, 49–65.
- Biesta, G. (2010). Pragmatism and the philosophical foundations of mixed methods research. *Sage Handbook of Mixed Methods in Social and Behavioral Research*, 2, 95–118.
- Bilal, M., Oyedele, L. O., Qadir, J., Munir, K., Ajayi, S. O., Akinade, O. O., Owolabi, H. A., Alaka, H. A., & Pasha, M. (2016). Big Data in the construction industry: A review of present status, opportunities, and future trends. *Advanced Engineering Informatics*, 30(3), 500–521.
- Birks, D. F., Fernandez, W., Levina, N., & Nasirin, S. (2013). Grounded theory method in information systems research: its nature, diversity and opportunities. *European Journal of Information Systems*, 22(1), 1–8.
- Blair, P. (2019). *Updated Pipeline a sign of progress for Infrastructure Commission*.
- Bloomberg, L. D., & Volpe, M. (2012). *Completing your qualitative dissertation: A road map from beginning to end*. Thousand Oakes. CA: sage pubLications.
- Bondinuba, F. K., Bondinuba, C. K., Opoku, A., Owusu-Manu, D., & Mittal, M. (2022). Determinants of small and medium construction firms' financial performance. *Proceedings of Second International Conference in Mechanical and Energy*

- Technology: ICMET 2021, India*, 485–502.
- Booth, A. P., & Papaioannou, D. (2012). D. and Sutton, A.(2012) Systematic Approaches to Successful Literature Review. *Cornwall, SAGE Publications Inc.*
- Bossé, É., & Rogova, G. L. (2019). *Information Quality in Information Fusion and Decision Making*. Springer.
- Botten, N. (2009). *CIMA Official Learning System Enterprise Strategy*. Elsevier.
- Brennan, L., Binney, W., Parker, L., Aleti, T., & Nguyen, D. (2014). *Social marketing and behaviour change: Models, theory and applications*. Edward Elgar Publishing.
- Brown, N. (2023). *What are the Barriers to Preferred Supplier Status: The case of the building materials industry*. University of Otago.
- Buckland, Michael K. (1991). Information as thing. *Journal of the American Society for Information Science*, 42(5), 351–360.
- Buckland, Michael Keeble. (1991). *Information and information systems* (Issue 25). ABC-CLIO.
- Buehring, J., & Bishop, P. C. (2020). Foresight and design: new support for strategic decision making. *She Ji: The Journal of Design, Economics, and Innovation*, 6(3), 408–432.
- Bulmer, M. (1979). Concepts in the analysis of qualitative data. *The Sociological Review*, 27(4), 651–677.
- Burgin, M. (2019). Evaluation of information in the context of decision-making. In *Information Quality in Information Fusion and Decision Making* (pp. 279–293). Springer.
- BusinessBecause. (2022). *Three Levels Of Strategy: Key Differences Explained*. <https://www.businessbecause.com/news/insights/8073/three-levels-of-strategy#:~:text=Strategic decision making within any,level strategy%2C and functional strategy.>
- Butler, P. C., Flin, R., Bearman, C., Hayes, P., Penney, G., & McLennan, J. (2024). Emergency management decision-making in a changing world: three key challenges. *Australian Journal of Emergency Management*.
- Buttigieg, S. C., & West, M. A. (2013). Senior management leadership, social support, job design and stressor-to-strain relationships in hospital practice. *Journal of Health Organization and Management*.
- Calabrese, A., Costa, R., Levialdi, N., & Menichini, T. (2019). Integrating sustainability into strategic decision-making: A fuzzy AHP method for the selection of relevant

- sustainability issues. *Technological Forecasting and Social Change*, 139, 155–168.
- Calveti, D., Magalhães, P. N. M., Suján, S. F., Gonçalves, M. C., & Campos de Sousa, H. J. (2020). Challenges of upgrading craft workforce into Construction 4.0: Framework and agreements. *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, 173(4), 158–165.
- Camici, P. G., & Rimoldi, O. E. (2009). The clinical value of myocardial blood flow measurement. *Journal of Nuclear Medicine*, 50(7), 1076–1087.
- Carlson, K. D., & Herdman, A. O. (2012). Understanding the impact of convergent validity on research results. *Organizational Research Methods*, 15(1), 17–32.
- Castagnino, S., Subudhi, S., Sogorb, J., & Colomar, P. (2020). *The role of infrastructure stimulus in the COVID-19 Recovery and Beyond*. Retrieved from Boston Consulting Group: <https://www.bcg.com/en-ca>
- Castañeda, K., Sánchez, O., Herrera, R. F., Gómez-Cabrera, A., & Mejía, G. (2024). Building Information Modeling Uses and Complementary Technologies in Road Projects: A Systematic Review. *Buildings*, 14(3), 563.
- Čater, T., & Pučko, D. (2010). Factors of effective strategy implementation: Empirical evidence from Slovenian business practice. *Journal for East European Management Studies*, 207–236.
- Cawkell, T. (2003). Information, knowledge, text. *Journal of Documentation*.
- Chakravarthy, B., & Gargiulo, M. (1998). Maintaining leadership legitimacy in the transition to new organizational forms. *Journal of Management Studies*, 35(4), 437–456.
- Chan, Albert P C, & Chan, A. P. L. (2004). Key performance indicators for measuring construction success. *Benchmarking: An International Journal*.
- Chan, Albert Ping Chuen, Darko, A., & Ameyaw, E. E. (2017). Strategies for promoting green building technologies adoption in the construction industry—An international study. *Sustainability*, 9(6), 969.
- Chang, Y., & Hsieh, S. (2020). A Review Of Building Information Modeling Research For Green Building Design Through Building Performance Analysis. *Journal of Information Technology in Construction*, 25, 1–40. <https://doi.org/10.36680/j.itcon.2020.001>
- Chassiakos, A. P., & Sakellariopoulos, S. P. (2008). A web-based system for managing construction information. *Advances in Engineering Software*, 39(11), 865–876.
- Chen, H. L. (2009). Model for predicting financial performance of development and

- construction corporations. *Journal of Construction Engineering and Management*, 135(11), 1190–1200.
- Chen, K. (2015). *A strategic decision making framework for organisational BIM implementation*. Cardiff University.
- Chen, M., Floridi, L., & Borgo, R. (2013). *The Philosophy of Information Quality*.
- Chen, S., Chen, H. H., Zhang, K. Q., & Xu, X. (2018). A comprehensive theoretical framework for examining learning effects in green and conventionally managed hotels. *Journal of Cleaner Production*, 174, 1392–1399.
- Chen, X., Chang-Richards, A., Ling, F. Y. Y., Yiu, T. W., Pelosi, A., & Yang, N. (2023). Developing a readiness model and a self-assessment tool for adopting digital technologies in construction organizations. *Building Research & Information*, 51(3), 241–256.
- Chen, Z.-S., Zhang, X., Rodríguez, R. M., Pedrycz, W., & Martínez, L. (2021). Expertise-based bid evaluation for construction-contractor selection with generalized comparative linguistic ELECTRE III. *Automation in Construction*, 125, 103578.
- Cheng, V. T. P., & Lok, P. (2015). Strategic decision-making criteria and process of top management on technology adoption in the travel agency industry. *Information Technology & Tourism*, 15, 189–208.
- Chileshe, N., & John Kikwasi, G. (2014). Critical success factors for implementation of risk assessment and management practices within the Tanzanian construction industry. *Engineering, Construction and Architectural Management*, 21(3), 291–319.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, 295(2), 295–336.
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research*, 14(2), 189–217.
- Choo, C. W., & Bontis, N. (2002). *The strategic management of intellectual capital and organizational knowledge*. Oxford university press.
- Choudhary, P., & Gangotia, A. (2017). Do travel decision-making styles and gender of generation Y have any association with travel information share on social networking sites? *Journal of Hospitality and Tourism Technology*, 8(2), 152–167.
- Christensen, M., & Knudsen, T. (2013). How decisions can be organized-and why it

- matters. *Journal of Organization Design*, 2(3), 41–50.
- Christopher, R. (2018). *Forecasting Cost to Complete on Major Projects*.
- Chuang, R., Ishii, K., Kim, H. S., & Sherman, D. K. (2022). Swinging for the fences versus advancing the runner: Culture, motivation, and strategic decision making. *Social Psychological and Personality Science*, 13(1), 91–101.
- Churchill, G. A., & Iacobucci, D. (2006). *Marketing research: methodological foundations*. Dryden Press New York.
- Cielo, D., & Subiantoro, A. (2021). Net zero energy buildings in New Zealand: Challenges and potentials reviewed against legislative, climatic, technological, and economic factors. *Journal of Building Engineering*, 44, 102970.
- Citroen, Ch L., & Hooghoff, P. (2003). Informatie in bedrijf: Externe informatie.[w:] M. van Eck Popp (red.). *Informatie in Bedrijf: Werkboek Voor Succesvol Informatiebeheer, Otto, Amsterdam*, 48–66.
- Citroen, Charles L. (2011). The role of information in strategic decision-making. *International Journal of Information Management*, 31(6), 493–501.
- Clark, L. A., Watson, D., & Reynolds, S. (1995). Diagnosis and classification of psychopathology: Challenges to the current system and future directions. *Annual Review of Psychology*, 46(1), 121–153.
- Coakes, E., Amar, A. D., & Granados, M. L. (2010). Knowledge management, strategy, and technology: a global snapshot. *Journal of Enterprise Information Management*, 23(3), 282–304.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (Revised ed.)*. Hillsdale, NJ: Lawrence Earlbaum Associates. Inc.
- Cohen, Jacob. (2013). *Statistical power analysis for the behavioral sciences*. Academic press.
- Cohen, S. (1988). *Perceived stress in a probability sample of the United States*.
- Collier, P., & Agyei-Ampomah, S. (2007). *Management Accounting: Risk and Control Strategy, 2008 edn*. CIMA Publishing, Oxford.
- Collins, H. M., & Evans, R. (2002). The third wave of science studies: Studies of expertise and experience. *Social Studies of Science*, 32(2), 235–296.
- Comes, T., Van de Walle, B., & Van Wassenhove, L. (2020). The coordination-information bubble in humanitarian response: theoretical foundations and empirical investigations. *Production and Operations Management*, 29(11), 2484–2507.
- Connelly, L. M. (2008). Research considerations: power analysis and effect size.

- MedSurg Nursing*, 17(1), 41–43.
- Conradie, P. J., & Kruger, P. S. (2006). The necessity of information quality for effective business intelligence. *South African Journal of Industrial Engineering*, 17(1), 129–147.
- Construction in New Zealand H1. (2021). *Recovery in 2021 with Construction Sector Forecast to Grow by 5.5% Post COVID-19 - ResearchAndMarkets.com | Business Wire*.
<https://www.businesswire.com/news/home/20210519005361/en/Construction-in-New-Zealand-H1-2021-Recovery-in-2021-with-Construction-Sector-Forecast-to-Grow-by-5.5-Post-COVID-19---ResearchAndMarkets.com>
- Cooper, D. R., & Schindler, P. S. (2011). Qualitative research. *Business Research Methods*, 4(1), 160–182.
- Coteur, I., Wustenberghs, H., Debruyne, L., Lauwers, L., & Marchand, F. (2020). How do current sustainability assessment tools support farmers' strategic decision making? *Ecological Indicators*, 114, 106298.
- Coulter, A., Parsons, S., Askham, J., & Organization, W. H. (2008). *Where are the patients in decision-making about their own care?*
- Creswell, J., & Clark, V. (2017). *Designing and conducting mixed methods research*.
https://scholar.google.co.uk/scholar?hl=en&as_sdt=0%2C5&q=creswell+and+clark+2017&btnG=
- Creswell, J. W. (2009). *Mapping the field of mixed methods research*. SAGE publications Sage CA: Los Angeles, CA.
- Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE publications.
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). Best practices for mixed methods research in the health sciences. *Bethesda (Maryland): National Institutes of Health*, 2013, 541–545.
- Creswell, J. W., & Plano Clark, V. L. (2011). Choosing a mixed methods design. *Designing and Conducting Mixed Methods Research*, 2, 53–106.
- Cronbach, L. J. (1971). Test validation. *Educational Measurement*.

- Crovini, C., Santoro, G., & Ossola, G. (2020). Rethinking risk management in entrepreneurial SMEs: towards the integration with the decision-making process. *Management Decision*, 59(5), 1085–1113.
- Cserhádi, G., & Szabó, L. (2014). The relationship between success criteria and success factors in organisational event projects. *International Journal of Project Management*, 32(4), 613–624.
- Cyert, R. M., & Williams, J. R. (1993). Organizations, decision making and strategy: Overview and comment. *Strategic Management Journal*, 14(S2), 5–10.
- da Silva, L. H. M., & Roglio, K. D. D. (2015). Enhancing the strategic decision-making process: Unintended consequences as a source of learning. *Latin American Business Review*, 16(1), 1–22.
- Dai, C. X., & Wells, W. G. (2004). An exploration of project management office features and their relationship to project performance. *International Journal of Project Management*, 22(7), 523–532.
- Daier, J. D., Zayer, A.-K. Y., & Rodin, W. M. (2022). Assessing The Financial Performance Of Construction Companies Using The Entropy Method. *Journal of Positive School Psychology*, 6(7), 2200–2223.
- Darabos, M. (2013). Perception of the importance of the strategic planning for the employees motivation. *Economic and Social Development: Book of Proceedings*, 943.
- Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Harvard Business Press.
- Davis, G. B. (2000). Information systems conceptual foundations: looking backward and forward. In *Organizational and social perspectives on information technology* (pp. 61–82). Springer.
- Davis, N. (2000). International Contrasts of Information Technology in Teacher Education: multiple perspectives on change. *Journal of Information Technology for Teacher Education*, 9(2), 139–148.
- Dawes, J. (2008). Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *International Journal of Market Research*, 50(1), 61–104.
- de Jong, L. H., Bok, H. G. J., Schellekens, L. H., Kremer, W. D. J., Jonker, F. H., & van der Vleuten, C. P. M. (2022). Shaping the right conditions in programmatic assessment: how quality of narrative information affects the quality of high-stakes

- decision-making. *BMC Medical Education*, 22(1), 1–10.
- Dean Jr, J. W., & Sharfman, M. P. (1996). Does decision process matter? A study of strategic decision-making effectiveness. *Academy of Management Journal*, 39(2), 368–392.
- Demian, P., & Balatsoukas, P. (2012). *Information retrieval from civil engineering repositories: the importance of context and granularity*.
- Demirkesen, S., & Ozorhon, B. (2017). Measuring project management performance: Case of construction industry. *Engineering Management Journal*, 29(4), 258–277.
- Denzin, N. K., & Lincoln, Y. S. (2012). *Manual de investigación cualitativa* (Vol. 1). Gedisa Barcelona.
- Dobrovič, J., Urbański, M., Gallo, P., Benková, E., & Čabinová, V. (2018). Balanced scorecard concept as a tool of strategic management and its usage in the construction industry. *Polish Journal of Management Studies*, 18(2), 59–72.
- Doz, Y. (2020). Fostering strategic agility: How individual executives and human resource practices contribute. *Human Resource Management Review*, 30(1), 100693.
- Du, L., Feng, Y., Lu, W., Kong, L., & Yang, Z. (2020). Evolutionary game analysis of stakeholders' decision-making behaviours in construction and demolition waste management. *Environmental Impact Assessment Review*, 84, 106408.
- Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data—evolution, challenges and research agenda. *International Journal of Information Management*, 48, 63–71.
- Dubey, R., Gunasekaran, A., Childe, S. J., Blome, C., & Papadopoulos, T. (2019). Big data and predictive analytics and manufacturing performance: integrating institutional theory, resource-based view and big data culture. *British Journal of Management*, 30(2), 341–361.
- Durdyev, S., & Hosseini, M. R. (2019). Causes of delays on construction projects: a comprehensive list. *International Journal of Managing Projects in Business*.
- Dzokoto, F. K. (2016). *Information behaviour of construction project actors*. Loughborough University.
- Easterby-Smith, M., Thorpe, R., & Jackson, P. R. (2012). *Management research*. Sage.
- Easterby-Smith, M., Thorpe, R., Jackson, P. R., & Jaspersen, L. J. (2018). *Management and business research*. Sage.
- Eastman, C. M., Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2011). *BIM*

- handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors.* John Wiley & Sons.
- Eberhardt, L. C. M., Birkved, M., & Birgisdottir, H. (2022). Building design and construction strategies for a circular economy. *Architectural Engineering and Design Management*, 18(2), 93–113.
- Edwards, A. (2012). The role of common knowledge in achieving collaboration across practices. *Learning, Culture and Social Interaction*, 1(1), 22–32.
- Ehlers, T., & Lazenby, K. (2004). *Strategic management: Southern African concepts and cases.* van Schaik publishers.
- Eisenhardt, K. M., & Zbaracki, M. J. (1992). Strategic decision making. *Strategic Management Journal*, 13(S2), 17–37.
- Elbanna, S., & Child, J. (2007). Influences on strategic decision effectiveness: Development and test of an integrative model. *Strategic Management Journal*, 28(4), 431–453.
- Elbanna, S., Thanos, I. C., & Jansen, R. J. G. (2020). A literature review of the strategic decision-making context: A synthesis of previous mixed findings and an agenda for the way forward. *M@ N@ Gement*, 23(2), 42–60.
- Elbashbishy, T., & El-adaway, I. H. (2024). Skilled Worker Shortage across Key Labor-Intensive Construction Trades in Union versus Nonunion Environments. *Journal of Management in Engineering*, 40(1), 4023063.
- Emmitt, S., & Gorse, C. A. (2009). *Construction communication.* John Wiley & Sons.
- Endut, I. R., Akintoye, A., & Kelly, J. (2009). Cost and time overruns of projects in Malaysia. *Retrieved on August, 21*, 243–252.
- Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments, & Computers*, 28(1), 1–11. <https://doi.org/10.3758/BF03203630>
- Eweje, J., Turner, R., & Müller, R. (2012). Maximizing strategic value from megaprojects: The influence of information-feed on decision-making by the project manager. *International Journal of Project Management*, 30(6), 639–651.
- Fahami, N. A., Azhar, F. W., Abd Rahim, Z. H., Abd Karim, H., & Nor Abdul Rahim, Z. S. K. (2019). Application of technique for order preference by similarity to ideal solution multi-criteria decision-making method for financial performance evaluation: A case study of services sector in malaysia. *Journal of Computational and Theoretical Nanoscience*, 16(12), 4965–4969.

- Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. *International Journal of Production Economics*, *162*, 101–114.
- Fang, Z., Lu, Q., Chen, L., Meng, J., Ye, Z., & Pitt, M. (2023). Creating an Open Data City for Healthcare: A Critical Review of Data Management Strategy and Development in China. *Journal of Management in Engineering*, *39*(2), 3122004.
- Farmar-Bowers, Q. (2010). Understanding the strategic decisions women make in farming families. *Journal of Rural Studies*, *26*(2), 141–151.
- Farrell, A. M. (2010). Insufficient discriminant validity: A comment on Bove, Pervan, Beatty, and Shiu (2009). *Journal of Business Research*, *63*(3), 324–327.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160.
- Fauzi, M. A. (2019). Knowledge sharing in Asia Pacific via virtual community platform: a systematic review. *International Journal of Web Based Communities*, *15*(4), 368–394.
- Ference, T. P., & Thurman, P. W. (2009). *MBA fundamentals strategy*. Kaplan Publishing.
- Fitzroy, P., & Hulbert, J. (2005). *Strategic Management. Creating Value in a Turbulent World*. West Sussex, Connecticut: Jon Wiley & Sons. Inc.
- Floridi, L. (2010). *Information: A very short introduction*. OUP Oxford.
- Flynn, B. B., Sakakibara, S., Schroeder, R. G., Bates, K. A., & Flynn, E. J. (1990). Empirical research methods in operations management. *Journal of Operations Management*, *9*(2), 250–284.
- Foard, N., Weinstein, M., & Henn, M. (2006). *Short Introduction to Social Research*. Sage Publications.
- Fornell, C., & Larcker, D. (1981). Structural equation modeling and regression: guidelines for research practice. *Journal of Marketing Research*, *18*(1), 39–50.
- Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet Research*.
- Freeman, R. E., Dmytriiev, S. D., & Phillips, R. A. (2021). Stakeholder theory and the resource-based view of the firm. *Journal of Management*, *47*(7), 1757–1770.
- Friend, J. (2006). Labels, methodologies and strategic decision support. *Journal of the Operational Research Society*, *57*(7), 772–775.

- Friese, S., Soratto, J., & Pires, D. (2018). *Carrying out a computer-aided thematic content analysis with ATLAS. ti*.
- Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction*. Longman Publishing.
- Galliers, R., & Leidner, D. E. (2014). *Strategic information management: challenges and strategies in managing information systems*. Routledge.
- Gallivan, J. P., Chapman, C. S., Wolpert, D. M., & Flanagan, J. R. (2018). Decision-making in sensorimotor control. *Nature Reviews Neuroscience*, *19*(9), 519–534.
- Gao, J., Zhang, C., Wang, K., & Ba, S. (2012). Understanding online purchase decision making: The effects of unconscious thought, information quality, and information quantity. *Decision Support Systems*, *53*(4), 772–781.
- Garg, H. (2018). Some methods for strategic decision-making problems with immediate probabilities in Pythagorean fuzzy environment. *International Journal of Intelligent Systems*, *33*(4), 687–712.
- Gavalas, A. (2022). Deciphering the complexity of human behaviour and decision-making: towards developing human friendly organisations. *International Journal of Management and Decision Making*, *21*(2), 178–194.
- Gerstberger, P. G., & Allen, T. J. (1968). Criteria used by research and development engineers in the selection of an information source. *Journal of Applied Psychology*, *52*(4), 272.
- Ghandour, A. (2020). The Impact of Covid-19 on Project Delivery: A Perspective From The Construction Sector In The United Arab Emirates. *Humanities & Social Sciences Reviews*, *8*(5), 169–177.
- Ghauri, P., & Grønhaug, K. (2010). *Research methods in business studies* (4. utg.). Harlow: Financial Times Prentice Hall.
- Gibbs, D.-J., Emmitt, S., Ruikar, K., & Lord, W. (2013). An investigation into whether building information modelling (BIM) can assist with construction delay claims. *International Journal of 3-D Information Modeling (IJ3DIM)*, *2*(1), 45–52.
- Gliem, J. A., & Gliem, R. R. (2003). *Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales*.
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, *18*(1), 185–214.
- Gorkavyy, M. A., Efimov, A. Y., Soloviev, V. A., & Solovev, D. B. (2018).

- Algorithmization and principles of construction of information support of the automated module for energy outlays optimization of technological processes at robotized productions. *2018 International Multi-Conference on Industrial Engineering and Modern Technologies (FarEastCon)*, 1–4.
- Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires. *American Psychologist*, *59*(2), 93.
- Granwal, L. (2021). *Construction industry in New Zealand - statistics & facts*. R. <https://www.statista.com/topics/5725/construction-industry-in-new-zealand/#dossierKeyfigures>
- Green, S. B. (1991). How many subjects does it take to do a regression analysis. *Multivariate Behavioral Research*, *26*(3), 499–510.
- Greene, J. C., & Caracelli, V. J. (1997). *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms*.
- Grenn, M. W., Sarkani, S., & Mazzuchi, T. (2014). The requirements entropy framework in systems engineering. *Systems Engineering*, *17*(4), 462–478.
- Grover, R., Vriens, M., Sage Publications., & Sage eReference (Online service). (2006). *The handbook of marketing research : uses, misuses, and future advances*. Sage Publications. [https://books.google.co.uk/books?hl=en&lr=&id=RymGgxN3zD4C&oi=fnd&pg=PA83&dq=malhotra,peterson+2006&ots=a3pZJtS5r5&sig=w20XruKv1Uee1iXFHpoxMF8w7xk#v=onepage&q=malhotra%2Cpeterson 2006&f=false](https://books.google.co.uk/books?hl=en&lr=&id=RymGgxN3zD4C&oi=fnd&pg=PA83&dq=malhotra,peterson+2006&ots=a3pZJtS5r5&sig=w20XruKv1Uee1iXFHpoxMF8w7xk#v=onepage&q=malhotra%2Cpeterson%202006&f=false)
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of Qualitative Research*, *2*(163–194), 105.
- Haar, K. (2024). Impact of Stakeholder Engagement Strategies on Project Success in Cameroon. *International Journal of Project Management*, *6*(2), 14–25.
- Hair, Joe F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139–152. <https://doi.org/10.2753/MTP1069-6679190202>
- Hair, Joe F, Matthews, L. M., & Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with FIMIX-PLS : part I – method. *European Business Review*, *28*(1), 63–76. <https://doi.org/10.1108/EBR-09-2015-0094>
- Hair, Joe F, Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal*

- of the Academy of Marketing Science*, 40(3), 414–433.
- Hair, Joseph F, Anderson, R. E., Babin, B. J., & Black, W. C. (2010). *Multivariate data analysis: A global perspective (Vol. 7)*. Upper Saddle River, NJ: Pearson.
- Hair, Joseph F, Astrachan, C. B., Moisescu, O. I., Radomir, L., Sarstedt, M., Vaithilingam, S., & Ringle, C. M. (2021). Executing and interpreting applications of PLS-SEM: Updates for family business researchers. *Journal of Family Business Strategy*, 12(3), 100392.
- Hair, Joseph F, Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: Global edition. UK: Pearson Education Limited*.
- Hair, Joseph F, Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science*, 45(5), 616–632.
- Hair, Joseph F, Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning*, 46(1–2), 1–12.
- Hair Jr, J F, Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2009). Modelagem de Equações Estruturais: uma introdução. *Análise Multivariada de Dados*, 6.
- Hair Jr, Joe F, Page, M., & Brunsveld, N. (2019). *Essentials of business research methods*. Routledge.
- Hair Jr, Joe F, Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM). *European Business Review*.
- Hair Jr, Joseph F, Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.
- HAIR JUNIOR, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (1998). *Multivariate data analysis. New Jersey*.
- Hamzah, N., Chuprat, S., Handayani, D. O. D., Xiaoxi, K., & Nagappan, S. D. (2021). Evaluating Quality Characteristics of Ubiquitous Application Through Means of Quality Models using Meta-metrics Approach. *Journal of Physics: Conference Series*, 2120(1), 12033.
- Han, Y., Wang, L., & Kang, R. (2023). Influence of consumer preference and government subsidy on prefabricated building developer's decision-making: A three-stage game model. *Journal of Civil Engineering and Management*, 29(1), 35–49.

- Hanis, M. H., Trigunaryyah, B., & Susilawati, C. (2011). The application of public asset management in Indonesian local government: A case study in South Sulawesi province. *Journal of Corporate Real Estate*.
- Hanka, R., & Fuka, K. (2000). Information overload and “just-in-time” knowledge. *The Electronic Library*.
- Hari, S., Egbu, C. O., & Kumar, B. (2004). Knowledge capture in small and medium enterprises in the construction industry: Challenges and opportunities. *20th Annual ARCOM Conference*, 2, 847–858.
- Harris, K. M., Stankovic, A., Thoolen, S., Strangman, G., Caldwell, B., & Robinson, S. K. (2024). Team dynamics and collaborative problem-solving for lunar construction: Lessons from complex construction scenarios on Earth. *Human Factors*, 66(5), 1616–1632.
- Hassan, A. K., Adeleke, A. Q., Hussain, S., & Taofeeq, D. M. (2019). Partial least square structural equation modeling: an approach to the influence of project triple constraint on building projects among Malaysian Construction Industries. *Social Science and Humanities Journal*, 1445–1464.
- Hassan, H. (2010). The relationship between firms’ strategic orientations and strategic planning process. *International Journal of Business and Management*, 5(11), 35.
- Haug, A. (2021). Understanding the differences across data quality classifications: a literature review and guidelines for future research. *Industrial Management & Data Systems*.
- Назаров, А. С. (2021). The psychology of decision-making strategies. *Актуальные Научные Исследования в Современном Мире*, 1–7, 79–82.
- Haug, A., Zachariassen, F., & Van Liempd, D. (2011). The costs of poor data quality. *Journal of Industrial Engineering and Management (JIEM)*, 4(2), 168–193.
- Нах, А. С. (2010). *The delta model: reinventing your business strategy*. Springer.
- Henderson, I., & Murray, D. (2005). Prioritising and deploying data quality improvement activity. *Journal of Database Marketing & Customer Strategy Management*, 12(2), 113–119.
- Henriques, I., & Sadorsky, P. (2011). The effect of oil price volatility on strategic investment. *Energy Economics*, 33(1), 79–87.
- Henseler-unger, I., & Ziele, B. (2016). Breitband — Ziele und Visionen. *Wirtschaftsdienst*, 96(1), 72–74. <https://doi.org/10.1007/s10273-016-1928-x>
- Henseler, J, Hubona, G., data, P. R.-I. management &, & 2016, undefined. (n.d.). Using

- PLS path modeling in new technology research: updated guidelines. *Emeraldinsight.Com*. Retrieved January 15, 2019, from <https://www.emeraldinsight.com/doi/abs/10.1108/IMDS-09-2015-0382>
- Henseler, Jörg, Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135.
- Henseler, Jörg, Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing*. Emerald Group Publishing Limited.
- Henttu-Aho, T. (2018). The role of rolling forecasting in budgetary control systems: reactive and proactive types of planning. *Journal of Management Control*, *29*(3), 327–360.
- Hill, R. (1998). What sample size is “enough” in internet survey research. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century*, *6*(3–4), 1–12.
- Horta, I. M., Camanho, A. S., Johnes, J., & Johnes, G. (2013). Performance trends in the construction industry worldwide: an overview of the turn of the century. *Journal of Productivity Analysis*, *39*, 89–99.
- House, C. H., & Price, R. L. (1991). The return map: Tracking product teams. *Harvard Business Review*, *69*(1), 92–100.
- Hu, X., Hu, X., Cui, Q., Li, Y., Lemckert, C., & Wei, A. (2021). Spatial-temporal analysis for the business performance of construction consultancy services in China. *Engineering, Construction and Architectural Management*.
- Huber, G. A., & Arceneaux, K. (2007). Identifying the persuasive effects of presidential advertising. *American Journal of Political Science*, *51*(4), 957–977.
- Huff, A. S. (2009). Ontology and epistemology. *Designing Research for Publication*. Los Angeles: Sage, 108–126.
- Hunter, S. T., Tate, B. W., Dzieweczynski, J. L., & Bedell-Avers, K. E. (2011). Leaders make mistakes: A multilevel consideration of why. *The Leadership Quarterly*, *22*(2), 239–258.
- Hussain, R., Pedro, A., Lee, D. Y., Pham, H. C., & Park, C. S. (2018). Impact of safety training and interventions on training-transfer: Targeting migrant construction workers. *International Journal of Occupational Safety and Ergonomics*.
- Hussain, S., Xuotong, W., & Hussain, T. (2020). Impact of skilled and unskilled labor on

- project performance using structural equation modeling approach. *Sage Open*, 10(1), 2158244020914590.
- Ilieva, J., Baron, S., & Healey, N. M. (2002). Online surveys in marketing research. *International Journal of Market Research*, 44(3), 1–14.
- Ingle, P. V., & Mahesh, G. (2022). Construction project performance areas for Indian construction projects. *International Journal of Construction Management*, 22(8), 1443–1454.
- Isik, Z., Arditi, D., Dikmen, I., & Birgonul, M. T. (2010). Impact of resources and strategies on construction company performance. *Journal of Management in Engineering*, 26(1), 9–18.
- Jalaei, F., Zoghi, M., & Khoshand, A. (2021). Life cycle environmental impact assessment to manage and optimize construction waste using Building Information Modeling (BIM). *International Journal of Construction Management*, 21(8), 784–801.
- Jang, Y., Ahn, Y., Park, M., Lee, H.-S., & Kwon, N. (2019). Business models and performance of international construction companies. *Sustainability*, 11(9), 2575.
- Jansen, R. J. G., Curşeu, P. L., Vermeulen, P. A. M., Geurts, J. L. A., & Gibcus, P. (2013). Information processing and strategic decision-making in small and medium-sized enterprises: The role of human and social capital in attaining decision effectiveness. *International Small Business Journal*, 31(2), 192–216.
- Jatarona, N. A., Yusof, A. M., Ismail, S., & Saar, C. C. (2016). Public construction projects performance in Malaysia. *Journal of Southeast Asian Research*, 2016, 1–7.
- Jato-Espino, D., Castillo-Lopez, E., Rodriguez-Hernandez, J., & Canteras-Jordana, J. C. (2014). A review of application of multi-criteria decision making methods in construction. *Automation in Construction*, 45, 151–162.
- Javed Memon et al. (2013). Genotypes, Virulence Factors and Antimicrobial Resistance Genes of *Staphylococcus aureus* Isolated in Bovine Subclinical Mastitis from Eastern China. *Pakistan Veterinary Journal*, 8318.
- Jayawardene, V., Huggins, T. J., Prasanna, R., & Fakhruddin, B. (2021). The role of data and information quality during disaster response decision-making. *Progress in Disaster Science*, 12, 100202.
- Jesson, J., Matheson, L., & Lacey, F. M. (2011). *Doing your literature review: Traditional and systematic techniques*.
- Jing, G., & Jin, C. (2009). The innovative university library: strategic choice, construction

- practices and development ideas. *Library Management*, 30(4/5), 295–308.
- Jo, E. S., & Gebru, T. (2020). Lessons from archives: Strategies for collecting sociocultural data in machine learning. *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*, 306–316.
- Johnson, C. A., Xiao, L., Palmer, P., Sun, P., Wang, Q., Wei, Y., Jia, Y., Grenard, J. L., Stacy, A. W., & Bechara, A. (2008). Affective decision-making deficits, linked to a dysfunctional ventromedial prefrontal cortex, revealed in 10th grade Chinese adolescent binge drinkers. *Neuropsychologia*, 46(2), 714–726.
- Jylhä, T., & Suvanto, M. E. (2015). Impacts of poor quality of information in the facility management field. *Facilities*.
- Kaplan, R. S., & Mikes, A. (2012). Managing risks: a new framework. *Harvard Business Review*, 90(6), 48–60.
- Kaplan, R. S., & Norton, D. P. (1996). *Using the balanced scorecard as a strategic management system*. Harvard business review Boston.
- Karam, P. B. S., Machado, C. A. P., & Abib, G. (2019). Conflicts in boards of family firms: A theoretical framework for strategic decision-making. *Revista de Administração Contemporânea*, 23, 703–720.
- Karami, M., Samimi, A., & Ja'fari, M. (2020). Necessity to Study of Risk Management in Oil and Gas Industries (Case Study: Oil Projects). *Progress in Chemical and Biochemical Research*, 239–243.
- Kashpruk, N., Piskor-Ignatowicz, C., & Baranowski, J. (2023). Time Series Prediction in Industry 4.0: A Comprehensive Review and Prospects for Future Advancements. *Applied Sciences*, 13(22), 12374.
- Kavale, S. (2012). The Role of Data in Strategic Decision-Making Process. *International Journal of Current Research*, 4(04), 1–7.
- Kazaz, A., Manisali, E., & Ulubeyli, S. (2008). Effect of basic motivational factors on construction workforce productivity in Turkey. *Journal of Civil Engineering and Management*, 14(2), 95–106.
- Keegan, D. P., Eiler, R. G., & Jones, C. R. (1989). Are your performance measures obsolete? *Strategic Finance*, 70(12), 45.
- Kelloway, E. K., & Francis, L. (2013). *Longitudinal research and data analysis*.
- Kerlinger, F. N. (1973). *Review of research in education*.
- Kerr, K., Norris, T., & Stockdale, R. (2007). Data quality information and decision making: a healthcare case study. *ACIS 2007 Proceedings*, 98.

- Kipley, D., & Lewis, A. O. (2009). Ansoff strategic success paradigm—Empirical evidence supports its success with firms competing in a turbulent environment. Why then is it absent from academic strategic management textbooks. *Organization and Management Quarterly*, 4(8), 71–88.
- Kline, R. B. (1998). Structural equation modeling. *New York: Guilford*.
- Kline, R. B. (2005). Principles and practice of structural equation modeling 2nd ed. *New York: Guilford*, 3.
- Kliuchnikova, O. V, & Pobegaylov, O. A. (2016). Rationalization of strategic management principles as a tool to improve a construction company services. *Procedia Engineering*, 150, 2168–2172.
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration (Ijec)*, 11(4), 1–10.
- Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, 13(7).
- Koh, J., Kim, Y.-G., & Kim, Y.-G. (2003). Sense of virtual community: A conceptual framework and empirical validation. *International Journal of Electronic Commerce*, 8(2), 75–94.
- Koklic, M. K., & Vida, I. (2011). Consumer strategic decision making and choice process: prefabricated house purchase. *International Journal of Consumer Studies*, 35(6), 634–643.
- Konovalov, A., & Ruff, C. C. (2022). Enhancing models of social and strategic decision making with process tracing and neural data. *Wiley Interdisciplinary Reviews: Cognitive Science*, 13(1), e1559.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
- KPMG and PMI. (2012). *Study on Drivers for Success in Infrastructure Projects 2010: Managing for Change*, accessed 20 July 2022.
- Kumar, V., Singh, R., & Pandey, A. (2024). Multiple stakeholders' critical success factors scale for success on large construction projects. *Asian Journal of Civil Engineering*, 25(2), 1691–1705.
- Kunc, M., & Bhandari, R. (2011). Strategic development processes during economic and financial crisis. *Management Decision*.
- Kurdi, B., & Alshurideh, M. (2020). Employee retention and organizational performance:

- Evidence from banking industry. *Management Science Letters*, 10(16), 3981–3990.
- Larsen, J. K., Lindhard, S. M., Brunoe, T. D., & Jensen, K. N. (2018). The relation between pre-planning, commissioning and enhanced project performance. *Construction Economics and Building*, 18(2), 1–14.
- Larsen, J. K., Ussing, L. F., & Brunø, T. D. (2013). Construction projects focus on evaluation and its benefits by pre-planning. *Proceedings of 11th International! Postgraduate! Research! Conference (IPGRC13)*, 1.
- Le, P. L., Elmughrabi, W., Dao, T.-M., & Chaabane, A. (2020). Present focuses and future directions of decision-making in construction supply chain management: a systematic review. *International Journal of Construction Management*, 20(5), 490–509.
- Lee, S. (2017). Applying system dynamics to strategic decision making in construction. *Frontiers of Engineering Management*, 4(1), 35–40.
- Lee, Y. W., Strong, D. M., Kahn, B. K., & Wang, R. Y. (2002). AIMQ: a methodology for information quality assessment. *Information & Management*, 40(2), 133–146.
- Leiner, D. J. (2019). Too fast, too straight, too weird: Non-reactive indicators for meaningless data in internet surveys. *Survey Research Methods*, 13(3), 229–248.
- Leje, M. I., Shamsulhadi, B., & Fadhlin, A. (2022). Professional perceptions on the roles of skilled workers in performance of the construction industry. *International Journal of Public Sector Performance Management*, 10(2–3), 271–282.
- Lekan, O. K., & Sabo, A. (2019). Strategic Management Practices and Profitability of Small and Medium Enterprises in Nigeria: A Moderating Effect Assessment. *World Journal of Innovative Research (WJIR)*, 6(4), 100–108.
- Leon, H., Osman, H., Georgy, M., & Elsaid, M. (2018). System dynamics approach for forecasting performance of construction projects. *Journal of Management in Engineering*, 34(1), 4017049.
- Lewis, B. R., Templeton, G. F., & Byrd, T. A. (2005). A methodology for construct development in MIS research. *European Journal of Information Systems*, 14(4), 388–400.
- Li, G., Yang, Y., Zhang, T., Qu, X., Cao, D., Cheng, B., & Li, K. (2021). Risk assessment based collision avoidance decision-making for autonomous vehicles in multi-scenarios. *Transportation Research Part C: Emerging Technologies*, 122, 102820.
- Li, L., Lin, J., Ouyang, Y., & Luo, X. R. (2022). Evaluating the impact of big data analytics usage on the decision-making quality of organizations. *Technological*

- Forecasting and Social Change*, 175, 121355.
- Li, S., Fang, Y., & Wu, X. (2020). A systematic review of lean construction in Mainland China. *Journal of Cleaner Production*, 257, 120581.
- Liberman-Yaconi, L., Hooper, T., & Hutchings, K. (2010). Toward a model of understanding strategic decision-making in micro-firms: Exploring the Australian information technology sector. *Journal of Small Business Management*, 48(1), 70–95.
- Lillrank, P. (2003). The quality of information. *International Journal of Quality & Reliability Management*.
- Lin, D., Yu, W., Wu, C., & Cheng, T. (2018). Correlation between intellectual capital and business performance of construction industry—an empirical study in Taiwan. *International Journal of Construction Management*, 18(3), 232–246.
- Lin, S., Gao, J., Koronios, A., & Chanana, V. (2007). Developing a data quality framework for asset management in engineering organisations. *International Journal of Information Quality*, 1(1), 100–126.
- Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology*, 86(1), 114.
- Liu, G., Ye, K., Tan, Y., Huang, Z., & Li, X. (2022). Factors influencing homeowners' housing renovation decision-making: Towards a holistic understanding. *Energy and Buildings*, 254, 111568.
- Liu, T., & Wilkinson, S. (2011). Adopting innovative procurement techniques: Obstacles and drivers for adopting public private partnerships in New Zealand. *Construction Innovation*, 11(4), 452–469.
- Liu, Y., Van Nederveen, S., & Hertogh, M. (2017). Understanding effects of BIM on collaborative design and construction: An empirical study in China. *International Journal of Project Management*, 35(4), 686–698.
- Loosemore, M., & Lim, B. T. H. (2017). Linking corporate social responsibility and organizational performance in the construction industry. *Construction Management and Economics*, 35(3), 90–105.
- Lorkowski, J., & Kreinovich, V. (2018). *Bounded rationality in decision making under uncertainty: Towards optimal granularity* (Vol. 99). Springer.
- Lorkowski, J., Kreinovich, V., Lorkowski, J., & Kreinovich, V. (2018a). Decision making under uncertainty and restrictions on computation resources: from heuristic to optimal techniques. *Bounded Rationality in Decision Making Under Uncertainty:*

- Towards Optimal Granularity*, 89–134.
- Lorkowski, J., Kreinovich, V., Lorkowski, J., & Kreinovich, V. (2018b). Towards Explaining Other Aspects of Human Decision Making. *Bounded Rationality in Decision Making Under Uncertainty: Towards Optimal Granularity*, 25–67.
- Louis, J., & Dunston, P. S. (2018). Integrating IoT into operational workflows for real-time and automated decision-making in repetitive construction operations. *Automation in Construction*, 94, 317–327.
- Love, P. E. D., & Holt, G. D. (2000). Construction business performance measurement: the SPM alternative. *Business Process Management Journal*, 6(5), 408–416.
- Lowry, P. B., D’Arcy, J., Hammer, B., & Moody, G. D. (2016). “Cargo Cult” science in traditional organization and information systems survey research: A case for using nontraditional methods of data collection, including Mechanical Turk and online panels. *The Journal of Strategic Information Systems*, 25(3), 232–240.
- Lu, H., Jiang, S., Song, W., & Ming, X. (2018). A rough multi-criteria decision-making approach for sustainable supplier selection under vague environment. *Sustainability*, 10(8), 2622.
- Lu, W. (2010). Improved SWOT approach for conducting strategic planning in the construction industry. *Journal of Construction Engineering and Management*, 136(12), 1317–1328.
- Luo, O., & Shahzad, W. (2020). Prefabrication and Waste Minimisation in Construction Projects: Perspectives from New Zealand. *The 10th International Conference on Engineering, Project, and Production Management*, 55–67.
- Lyles, F. &. (1985). Organizational Learning. *Academy of Management Review*, 10(4), 803–881.
- Lynch, B. A., & Koshland Jr, D. E. (1991). Disulfide cross-linking studies of the transmembrane regions of the aspartate sensory receptor of *Escherichia coli*. *Proceedings of the National Academy of Sciences*, 88(23), 10402–10406.
- Ma, D., Li, X., Lin, B., & Zhu, Y. (2023). An intelligent retrofit decision-making model for building program planning considering tacit knowledge and multiple objectives. *Energy*, 263, 125704.
- MacKenzie, S. B., & Podsakoff, P. M. (2012). Common method bias in marketing: Causes, mechanisms, and procedural remedies. *Journal of Retailing*, 88(4), 542–555.
- Mafundu, R. H., & Mafini, C. (2019). Internal constraints to business performance in

- black-owned small to medium enterprises in the construction industry. *The Southern African Journal of Entrepreneurship and Small Business Management*, 11(1), 1–10.
- Mahesworo, B., Perbanga, A. S., & Hendarti, H. (2019). User Interface Evaluation on Government Knowledge Management Portal Using Webqual 4.0. *2019 International Conference on Information Management and Technology (ICIMTech)*, 1, 244–249.
- Majid, I. A. (2006). *Causes and Effects of delays in ACEH Construction Industry*. Universiti Teknologi Malaysia.
- Maksimov, N. V, & Lebedev, A. A. (2020). On the Nature and Definitions of Information: Physics and Semantics. *Automatic Documentation and Mathematical Linguistics*, 54(4), 185–195.
- Malhotra, N. K. (2006). Questionnaire design and scale development. *The Handbook of Marketing Research: Uses, Misuses, and Future Advances*, 83–94.
- Malhotra, N. K., Peterson, M., & Kleiser, S. B. (1999). Marketing research: A state-of-the-art review and directions for the twenty-first century. *Journal of the Academy of Marketing Science*, 27(2), 160–183.
- Malik, A., Adekoya, O. D., Ajonbadi, H. A., & Jimoh, I. (2019). Investigating the potential economic impact of Brexit decisions on business performance in the United Kingdom: a case study of the UK construction industry. *International Journal of Management, Accounting and Economics*, 6(4), 347–367.
- Malviya, R. K., & Kant, R. (2015). Green supply chain management (GSCM): a structured literature review and research implications. *Benchmarking: An International Journal*.
- Manning, C. D. (2008). *Introduction to information retrieval*. Syngress Publishing,.
- Marchand, David A, Kettinger, W., & Rollins, J. D. (2001). *Making the invisible visible: How companies win with the right information, people, and IT*. John Wiley & Sons, Inc.
- Marchand, Donald A, & Kettinger, W. J. (2011). Information orientation (IO): How effective information use drives business performance. *Sistemas*, 1, 75–84.
- Martinez-Lopez, R., Thompson, K., & Wilson, J. (2024). Planning systems in construction management. *Construction Planning Review*, 12(1), 34–49.
- Marwala, T. (2014). *Artificial intelligence techniques for rational decision making*. Springer.
- Mayasari, N. Z. (2016). Factors Influencing Quality Management Information System:

- Indonesian Government. *Frontiers of Accounting and Finance*, 1(1).
- Mazzolini, R. (1981). How strategic decisions are made. *Long Range Planning*, 14(3), 85–96.
- Mbete, G. S., & Tanamal, R. (2020). Effect of Easiness, Service Quality, Price, Trust of Quality of Information, and Brand Image of Consumer Purchase Decision on Shopee Online Purchase. *Jurnal Informatika Universitas Pamulang*, 5(2), 100.
- MBIE. (2022). *Building and Construction Sector Trends: ANNUAL REPORT 2021*. Wellington, New Zealand: Ministry of Business, Innovation and Employment. Retrieved from. <https://www.mbie.govt.nz/dmsdocument/16973-building-and-construction-sector-trends-annual-report-2021-pdf>
- MBIE. (2023). *Building and construction sector trends annual report 2021*. <https://www.mbie.govt.nz/dmsdocument/16973-building-and-construction-sector-trends-annual-report-2021-pdf>
- MBIE. (2024). *Building and Construction Sector Trends*.
- Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods*, 17(3), 437.
- Melaku Belay, S., Tilahun, S., Yehualaw, M., Matos, J., Sousa, H., & Workneh, E. T. (2021). Analysis of cost overrun and schedule delays of infrastructure projects in low income economies: case studies in Ethiopia. *Advances in Civil Engineering*, 2021(1), 4991204.
- Memon, M. A., Ting, H., Ramayah, T., Chuah, F., & Cheah, J. H. (2017). A review of the methodological misconceptions and guidelines related to the application of structural equation modeling: A Malaysian scenario. *Journal of Applied Structural Equation Modeling*, 1(1), 1–13.
- Merriam, S. B., & Grenier, R. S. (2019). *Qualitative research in practice: Examples for discussion and analysis*. John Wiley & Sons.
- Mgbeahuru, C. O., & Olughu, C. E. (2022). *Evaluation of the performance measurement of construction project by the Bureau of Public Procurement (BPP) in Anambra State, Nigeria*.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. sage.
- Miller, A., Nhlema, M., Kumwenda, S., Mbalame, E., Uka, Z., Feighery, J., & Kalin, R. M. (2018). *Evolving water point mapping to strategic decision making in rural Malawi*.

- Miller, K. (2000). Common ground from the post-positivist perspective. *Perspectives on Organizational Communication: Finding Common Ground*, SR Corman and MS Poole (Eds.), The Guilford Press, New York, 46–67.
- Mingers, J., & Taylor, S. (1992). The use of soft systems methodology in practice. *Journal of the Operational Research Society*, 43(4), 321–332.
- Mintzberg, H., & Rose, J. (2003). Strategic management upside down: Tracking strategies at McGill University from 1829 to 1980. *Canadian Journal of Administrative Sciences/Revue Canadienne Des Sciences de l'Administration*, 20(4), 270–290.
- Mishlanova, M. (2019). Financial stability of investment and construction projects in terms of project financing. *E3S Web of Conferences*, 138, 2021.
- Mohamed Shaffril, H. A., Samsuddin, S. F., & Abu Samah, A. (2021). The ABC of systematic literature review: the basic methodological guidance for beginners. *Quality & Quantity*, 55, 1319–1346.
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1), 48–76.
- Moshood, T. D., Nawanir, G., Sorooshian, S., Mahmud, F., & Adeleke, A. Q. (2020). Barriers and Benefits of ICT Adoption in the Nigerian Construction Industry. A Comprehensive Literature Review. *Applied System Innovation*, 3(4), 46.
- Moshood, T., Nawanir, G., Sorooshian, S., & Okfalisa, O. (2021). *Digital Twins Driven Supply Chain Visibility within Logistics: A New Paradigm for Future Logistics*. *Applied System Innovation*, 4 (2), 29.
- Moshood, Taofeeq D, Nawanir, G., & Mahmud, F. (2021). Sustainability of biodegradable plastics: a review on social, economic, and environmental factors. *Critical Reviews in Biotechnology*, 1–21.
- Moshood, Taofeeq D, Rotimi, F. E., & Rotimi, J. O. B. (2022). An integrated paradigm for managing efficient knowledge transfer: Towards a more comprehensive philosophy of transferring knowledge in the construction industry. *Construction Economics and Building*, 22(3), 65–98.
- Moshood, Taofeeq D, Rotimi, J. O. B., & Wajiha, S. (2023). Sustainability principles in infrastructure project delivery: establishing the broader implementation strategies for decision-making. *Construction Innovation*, ahead-of-print.
- Moshood, Taofeeq D, & Sorooshian, S. (2021). The Physical Internet: A means towards

- achieving global logistics sustainability. *Open Engineering*, 11(1), 815–829.
- Moshood, Taofeeq Durojaiye, Rotimi, F. E., & Rotimi, J. O. B. (2022). Knowledge transfer and management in the construction industry: Trends and future challenges. *International Journal Of Construction Supply Chain Management*, 12(1).
- Moshood, Taofeeq Durojaye, Rotimi, J. O. B., & Shahzad, W. (2024). Enhancing construction organizations' performance through strategic decision-making: unveiling the mediating role of quality of information. *International Journal of Organizational Analysis*.
- Moshood, Taofeeq Durojaye, Rotimi, J. O. B., & Shahzad, W. (2023). Examining Infrastructure Pipelines Information for Their Relevance in Construction Organizations' Strategic Decision-Making. *International Conference on Engineering, Project, and Production Management*, 173–195.
- Moshood, Taofeeq Durojaye, Rotimi, J. O. B., Shahzad, W., & Salimon, M. G. (2024). Enhancing infrastructure project delivery through lean construction: opportunities, challenges and implementation strategies. *Technological Sustainability, ahead-of-print*.
- Moussetis, R. (2011). Ansoff revisited: How Ansoff interfaces with both the planning and learning schools of thought in strategy. *Journal of Management History*.
- MSCM, M. O. (2016). Capacity building for sustainable workforce in the construction industry. *The Professional Constructor*, 51–71.
- Murphy, R., & Seriki, O. (2021). The impact of environmental turbulence on the strategic decision-making process in Irish quantity surveying (QS) professional service firms (PSFs). *Construction Management and Economics*, 39(9), 739–758.
- Murumbika, M. (2012). *Influence of strategic management practices on the entrepreneurial orientation of South African firms in the financial and business services sector*.
- Mutale, W., Chintu, N., Amoroso, C., Awoonor-Williams, K., Phillips, J., Baynes, C., Michel, C., Taylor, A., & Sherr, K. (2013). Improving health information systems for decision making across five sub-Saharan African countries: Implementation strategies from the African Health Initiative. *BMC Health Services Research*, 13(2), 1–12.
- Muthuveloo, R., Shanmugam, N., & Teoh, A. P. (2017). The impact of tacit knowledge management on organizational performance: Evidence from Malaysia. *Asia Pacific Management Review*, 22(4), 192–201.

- Muumbi, C. M., & Chege, P. W. (2021). Effect of Technical Expertise Engagement in Monitoring and Evaluation on Performance of Residential Construction Projects in Kajiado County. *International Journal of Business Management, Entrepreneurship and Innovation*, 3(3), 72–81.
- Naderi, A., Shakeri, E., & Golroo, A. (2021). Performance-based management for construction holdings by integration of measurement frameworks. *Asian Journal of Civil Engineering*, 22, 751–758.
- Nahum, N., & Carmeli, A. (2020). Leadership style in a board of directors: implications of involvement in the strategic decision-making process. *Journal of Management and Governance*, 24(1), 199–227.
- Naidoo, K. (2017). *The Effectiveness of the Strategic Decision-making Process in an Automotive Multinational Company*. Nelson Mandela Metropolitan University.
- Naji, K. K., Gunduz, M., & Al-Qahtani, A. (2024). Unveiling Digital Transformation: Analyzing Building Facility Management’s Preparedness for Transformation Using Structural Equation Modeling. *Buildings*, 14(9), 2794.
- Naji, K. K., Gunduz, M., & Naser, A. F. (2022). An Adaptive Neurofuzzy Inference System for the Assessment of Change Order Management Performance in Construction. *Journal of Management in Engineering*, 38(2), 4021098.
- National construction pipeline report. (2024). *National construction pipeline report 2024*.
- National Construction Pipeline Report. (2022a). *National Construction Pipeline Report / Ministry of Business, Innovation & Employment*. <https://www.mbie.govt.nz/building-and-energy/building/supporting-a-skilled-and-productive-workforce/national-construction-pipeline-report/>
- National Construction Pipeline Report. (2022b). *National Construction Pipeline Report 2022*. <https://www.mbie.govt.nz/dmsdocument/23241-national-construction-pipeline-report-2022>
- National Construction Pipeline Report. (2023). *National Construction Pipeline Report 2023*.
- Naumann, F. (2001). From Databases to Information Systems-Information Quality Makes the Difference. *IQ*, 244–260.
- Naumenkova, S., Tishchenko, I., Mishchenko, S., Mishchenko, V., & Ivanov, V. (2020). Assessment and mitigation of credit risks in project financing. *Banks and Bank Systems*, 15(1), 72–84.
- Nawanir, G. (2016). *The Effect of Lean Manufacturing on Operations Performance and*

Business Performance in Manufacturing Companies in Indonesia.

- Nebiu, D., & Kamberaj, H. (2020). Symbolic Information Flow Measurement (SIFM): A software for measurement of information flow using symbolic analysis. *SoftwareX*, *11*, 100470.
- Netz, J., Svensson, M., & Brundin, E. (2020). Business disruptions and affective reactions: A strategy-as-practice perspective on fast strategic decision making. *Long Range Planning*, *53*(5), 101910.
- Neuman, W. L. (2013). Metodologi penelitian sosial: Pendekatan kualitatif dan kuantitatif. *Jakarta: PT. Indeks*.
- Neupane, A., Soar, J., Vaidya, K., & Yong, J. (2014). Willingness to adopt e-procurement to reduce corruption: Results of the PLS Path modeling. *Transforming Government: People, Process and Policy*.
- Ng'andu, E. (2022). *An assessment of strategic management practices and performance of selected small and medium scale enterprises in the construction sector in Lusaka district*. The University of Zambia.
- Nguyen, N.-T. (2020). Performance evaluation in strategic alliances: A case of Vietnamese construction industry. *Global Journal of Flexible Systems Management*, *21*(1), 85–99.
- Nisar, Q. A., Nasir, N., Jamshed, S., Naz, S., Ali, M., & Ali, S. (2021). Big data management and environmental performance: Role of big data decision-making capabilities and decision-making quality. *Journal of Enterprise Information Management*, *34*(4), 1061–1096.
- Njeru, G. K. (2015). *Strategic management practices and performance of small and medium sized enterprises in Kenya*.
- Nnaji, C., & Karakhan, A. A. (2020). Technologies for safety and health management in construction: Current use, implementation benefits and limitations, and adoption barriers. *Journal of Building Engineering*, *29*, 101212.
- Noktehdan, M., Shahbazpour, M., & Wilkinson, S. (2015). Driving innovative thinking in the New Zealand construction industry. *Buildings*, *5*(2), 297–309.
- Nooraie, M. (2012). Factors influencing strategic decision-making processes. *International Journal of Academic Research in Business and Social Sciences*, *2*(7), 405.
- Noorzai, E., & Golabchi, M. (2020). Selecting a proper construction system in small and medium mass housing projects, considering success criteria and construction

- volume and height. *Journal of Engineering, Design and Technology*, 18(4), 883–903.
- Nyariki, B. N. (2016). *Influence of strategy evaluation approaches on performance at KCB bank*. University of Nairobi.
- NZIC. (2021). *About the pipeline*.
- O’Leary-Kelly, S. W., & Vokurka, R. J. (1998). The empirical assessment of construct validity. *Journal of Operations Management*, 16(4), 387–405.
- Oates, B. J., Edwards, H., & Wainwright, D. W. (2012). *A model-driven method for the systematic literature review of qualitative empirical research*.
- Olsen, D., Tatum, M., & Defnall, C. (2012). How industrial contractors are handling skilled labor shortages in the United States. *48th ASC Annual International Conference Proceedings*, 11–14.
- Omar, M., Gilal, A. R., Ahmad, M., Ibrahim, H., Yasin, A., Awang, H., & Almogahed, A. (2024). Enhancing agile project success: a comprehensive study of risk management approaches among Malaysian practitioners. *Journal of Software: Evolution and Process*, 36(9), e2681.
- Onwuegbuzie, A. J., Johnson, R. B., & Collins, K. M. T. (2009). Call for mixed analysis: A philosophical framework for combining qualitative and quantitative approaches. *International Journal of Multiple Research Approaches*, 3(2), 114–139.
- Onwuegbuzie, A. J., Johnson, R. B., & Collins, K. M. T. (2011). Assessing legitimation in mixed research: a new framework. *Quality & Quantity*, 45(6), 1253–1271.
- Osadchy, E. A., Akhmetshin, E. M., Amirova, E. F., Bochkareva, T. N., Gazizyanova, Y., & Yumashev, A. V. (2018). *Financial statements of a company as an information base for decision-making in a transforming economy*.
- Otieno, D. O., Namusonge, G. S., & Mugambi, F. (2018). Effect of strategic planning on the financial performance of small and medium size enterprises in professional service sector in Kenya. *International Journal of Arts and Commerce*, 7(6), 57–71.
- Otieno, T., & Theuri, F. (2016). The influence of strategic management practices on the organisational performance of the county government of Mombasa. *International Journal of Scientific and Research Publications*, 6(10), 225–237.
- Oyewobi, L. O., Olorunyomi, O. S., Jimoh, R. A., & Rotimi, J. O. B. (2021). Impact of social media usage on performance of construction businesses (CBs) in Abuja, Nigeria. *Journal of Financial Management of Property and Construction*.
- Oyewobi, L. O., Windapo, A. O., & Rotimi, J. O. B. (2015). Measuring strategic

- performance in construction companies: a proposed integrated model. *Journal of Facilities Management*, 13(2), 109–132.
- Oyewobi, L. O., Windapo, A. O., & Rotimi, J. O. B. (2017). Determinants of construction organisational performance: A partial least square-path analytic method. *Journal of Financial Management of Property and Construction*, 22(1), 37–61.
- Pacificcon. (2021). *Accurate and detailed information on planned construction projects*.
- Pamulu, M. S. (2010). *Strategic management practices in the construction industry: a study of Indonesian enterprises*. Queensland University of Technology.
- Pan, W., Dainty, A. R. J., & Gibb, A. G. F. (2012). Establishing and weighting decision criteria for building system selection in housing construction. *Journal of Construction Engineering and Management*, 138(11), 1239–1250.
- Pan, Y., & Zhang, L. (2021). Roles of artificial intelligence in construction engineering and management: A critical review and future trends. *Automation in Construction*, 122, 103517.
- Papiorek, K. L., & Hiebl, M. R. W. (2024). Information systems quality in management accounting and management control effectiveness. *Journal of Accounting & Organizational Change*, 20(3), 433–458.
- Parker, S. K., & Skitmore, M. (2005). Project management turnover: causes and effects on project performance. *International Journal of Project Management*, 23(3), 205–214.
- Parsamehr, M., Perera, U. S., Dodanwala, T. C., Perera, P., & Ruparathna, R. (2023). A review of construction management challenges and BIM-based solutions: perspectives from the schedule, cost, quality, and safety management. *Asian Journal of Civil Engineering*, 24(1), 353–389.
- Paulus, D., de Vries, G., Janssen, M., & Van de Walle, B. (2023). Reinforcing data bias in crisis information management: The case of the Yemen humanitarian response. *International Journal of Information Management*, 72, 102663.
- Paulus, E., Burie, J.-C., & Verbeek, F. J. (2023). Text line extraction strategy for palm leaf manuscripts. *Pattern Recognition Letters*, 174, 10–16.
- Payne, A., & Frow, P. (2016). Customer relationship management: Strategy and implementation. In *The Marketing Book* (pp. 461–488). Routledge.
- Pearce-Higgins, J. W., Grant, M. C., Robinson, M. C., & Haysom, S. L. (2007). The role of forest maturation in causing the decline of Black Grouse *Tetrao tetrix*. *Ibis*, 149(1), 143–155.

- Pearlson, K. E., Saunders, C. S., & Galletta, D. F. (2024). *Managing and using information systems: A strategic approach*. John Wiley & Sons.
- Perugini, M., Gallucci, M., & Costantini, G. (2018). A practical primer to power analysis for simple experimental designs. *International Review of Social Psychology*, *31*(1).
- Peters, E., Kliestik, T., Musa, H., & Durana, P. (2020). Product decision-making information systems, real-time big data analytics, and deep learning-enabled smart process planning in sustainable industry 4.0. *Journal of Self-Governance and Management Economics*, *8*(3), 16–22.
- Phomlaphatrachakorn, K. (2019). Internal Control Quality, Accounting Information Usefulness, Regulation Compliance, and Decision-Making Success: Evidence from Canned and Processed Foods Businesses in Thailand. *International Journal of Business*, *24*(2).
- Phornlaphatrachakorn, K. (2019). Internal control quality, accounting information usefulness, regulation compliance, and decision-making success: Evidence from canned and processed foods businesses in Thailand. *International Journal of Business*, *24*(2), 198–215.
- Phuong, N. N. D., & Dai Trang, T. T. (2018). Repurchase intention: The effect of service quality, system quality, information quality, and customer satisfaction as mediating role: a PLS approach of m-commerce ride hailing service in Vietnam. *Marketing and Branding Research*, *5*(2), 78.
- PMBOK, P. M. I. (2013). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide): Project Management Institute*. Incorporated.
- Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(879), 10–1037.
- Popovič, A., & Habjan, A. (2012). Exploring the effects of information quality change in road transport operations. *Industrial Management & Data Systems*.
- Pourhejazy, P., Sarkis, J., & Zhu, Q. (2020). Product deletion as an operational strategic decision: Exploring the sequential effect of prominent criteria on decision-making. *Computers & Industrial Engineering*, *140*, 106274.
- Price, A. D. F., Ganiev, B. V., & Newson, E. (2003). Changing strategic management practice within the UK construction industry. *Strategic Change*, *12*(7), 347–366.
- Price, R. J., & Shanks, G. (2005). Empirical refinement of a semiotic information quality framework. *Proceedings of the 38th Annual Hawaii International Conference on*

- System Sciences*, 216a-216a.
- Pushpamali, N. N. C., Agdas, D., & Rose, T. M. (2020). Strategic decision making in construction supply chains: A comparison of reverse logistics strategies. *Frontiers in Built Environment*, 6, 593372.
- Radman, K., Babaeian Jelodar, M., Ghazizadeh, E., & Wilkinson, S. (2021). Causes of Delay in Smart and Complex Construction Projects. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 13(4), 5021006.
- Rajaraman, N., Vaze, R., & Reddy, G. (2021). Not just age but age and quality of information. *IEEE Journal on Selected Areas in Communications*, 39(5), 1325–1338.
- Ramachandra, T., & Rotimi, J. O. B. (2015). Mitigating payment problems in the construction industry through analysis of construction payment disputes. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 7(1), A4514005.
- Ramchandra, V., & Srikant, S. (2006). Data quality for enterprise risk management. *Business Intelligence Journal*, 11(2), 18.
- Rane, N. (2023). Integrating Building Information Modelling (BIM) and Artificial Intelligence (AI) for Smart Construction Schedule, Cost, Quality, and Safety Management: Challenges and Opportunities. *Cost, Quality, and Safety Management: Challenges and Opportunities (September 16, 2023)*.
- Ravand, H., & Baghaei, P. (2016). Partial least squares structural equation modeling with R. *Practical Assessment, Research, and Evaluation*, 21(1), 11.
- Reavis, M., Singh, K., & Tucci, J. (2021). Millennials' Strategic Decision Making Through the Lens of Corporate Social Responsibility and Financial Management. *Journal of Business Strategies*, 38(2), 125–146.
- Redman, T. C. (1998). The impact of poor data quality on the typical enterprise. *Communications of the ACM*, 41(2), 79–82.
- Rezgui, Y., Zarli, A., & Hopfe, C. J. (2009). Building Information Modeling Applications, Challenges and Future Directions. *Journal of Information Technology in Construction (ITcon)*, 14(39), 613–616.
- Richards, K., & Thompson, B. M. W. (2023). Challenges and instructor strategies for transitioning to online learning during and after the COVID-19 pandemic: a review of literature. *Frontiers in Communication*, 8, 1260421.
- Ridwan, M., Militina, T., & Achmad, G. N. (2020). How Trust and Quality of

- Information Affect Buying Interest and Purchasing Decisions?(Study on Shopee Customers in Samarinda). *International Journal of Economics, Business and Accounting Research (IJEBAR)*, 4(01).
- Rigdon, E. E., Becker, J.-M., Rai, A., Ringle, C. M., Diamantopoulos, A., Karahanna, E., Straub, D. W., & Dijkstra, T. K. (2014). Conflating Antecedents and Formative Indicators: A Comment on Aguirre-Urreta and Marakas. *Information Systems Research*, 25(4), 780–784. <https://doi.org/10.1287/isre.2014.0543>
- Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). Editor's Comments: A Critical Look at the Use of PLS-SEM in "MIS Quarterly". *MIS Quarterly*, iii–xiv.
- Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3* (No. 3). SmartPLS GmbH.
- Robert Baum, J., & Wally, S. (2003). Strategic decision speed and firm performance. *Strategic Management Journal*, 24(11), 1107–1129.
- Robinson, M. A. (2018). Using multi-item psychometric scales for research and practice in human resource management. *Human Resource Management*, 57(3), 739–750.
- Rogova, G. L., & Bosse, E. (2010). Information quality in information fusion. *2010 13th International Conference on Information Fusion*, 1–8.
- Russell, J., Beth, M., Wadsworth, D., George, S., Wheeler, W., & Barkhoff, H. (2022). Justice, equity, diversity, and inclusion—Utilizing student voices during strategic decision-making processes. *Kinesiology Review*, 1(aop), 1–6.
- Russell, J. S., & Zhai, H. (1996). Predicting contractor failure using stochastic dynamics of economic and financial variables. *Journal of Construction Engineering and Management*, 122(2), 183–191.
- Sadler, P. (2003). *Strategic management*. Kogan Page Publishers.
- Safa, M., & Hill, L. (2019). Necessity of big data analysis in construction management. *Strategic Direction*, 35(1), 3–5.
- Safaeian, M., Fathollahi-Fard, A. M., Kabirifar, K., Yazdani, M., & Shapouri, M. (2022). Selecting appropriate risk response strategies considering utility function and budget constraints: a case study of a construction company in Iran. *Buildings*, 12(2), 98.
- Safari, A., & Saleh, A. S. (2020). Key determinants of SMEs' export performance: a resource-based view and contingency theory approach using potential mediators. *Journal of Business & Industrial Marketing*.
- Saieg, P., Sotelino, E. D., Nascimento, D., & Caiado, R. G. G. (2018). Interactions of building information modeling, lean and sustainability on the architectural,

- engineering and construction industry: a systematic review. *Journal of Cleaner Production*, 174, 788–806.
- Salesa, J., & Reidy, P. (2019). *Construction Sector Accord Retrieved May 12 2022 from*.
- Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management*, 25(5), 517–526.
- Sanni-Anibire, M. O., Mohamad Zin, R., & Olatunji, S. O. (2020). Causes of delay in the global construction industry: a meta analytical review. *International Journal of Construction Management*, 1–13.
- Sarstedt, M., & Mooi, E. (2019). Regression analysis. In *A Concise Guide to Market Research* (pp. 209–256). Springer.
- Sarstedt, M., Ringle, C. M., Cheah, J.-H., Ting, H., Moisescu, O. I., & Radomir, L. (2020). Structural model robustness checks in PLS-SEM. *Tourism Economics*, 26(4), 531–554.
- Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair, J. F. (2014). Journal of Family Business Strategy Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of Family Business Strategy*, 5(1), 105–115. <https://doi.org/10.1016/j.jfbs.2014.01.002>
- Sartor, O., & Halabi, S. (2015). Independent data monitoring committees: an update and overview. *Urologic Oncology: Seminars and Original Investigations*, 33(3), 143–148.
- Sattler, H., Völckner, F., Riediger, C., & Ringle, C. M. (2010). The impact of brand extension success drivers on brand extension price premiums. *International Journal of Research in Marketing*, 27(4), 319–328.
- Saunders, M. N. K., Lewis, P., Thornhill, A., & Bristow, A. (2015). *Understanding research philosophy and approaches to theory development*.
- Saunders, Mark, Lewis, P., & Thornhill, A. (2007). Research methods. *Business Students 4th Edition Pearson Education Limited, England*.
- Saunders, Mark, Lewis, P., & Thornhill, A. (2012). Research methods for business students (6. utg.). *Harlow: Pearson*.
- Saunders, MNK. (2011). *Research methods for business students, 5/e*.
- Scheuren, F. (2004). *What is a Survey?*
- Schmitt, U. (2022). Validating and documenting a new knowledge management system philosophy: a case based on the ISO 30401: 2018-KMS standard. *Knowledge*

- Management Research & Practice*, 1–15.
- Schrauf, R. W., & Navarro, E. (2005). Using existing tests and scales in the field. *Field Methods*, 17(4), 373–393.
- Schulz, P. J., Pessina, A., Hartung, U., & Petrocchi, S. (2021). Effects of objective and subjective health literacy on patients' accurate judgment of health information and decision-making ability: survey study. *Journal of Medical Internet Research*, 23(1), e20457.
- Schwendimann, B. A. (2011). *Mapping biological ideas: Concept maps as knowledge integration tools for evolution education*. University of California, Berkeley.
- Schwenk, C. R. (1984). Cognitive simplification processes in strategic decision-making. *Strategic Management Journal*, 5(2), 111–128.
- Scott, W. (2021). *Types of Construction Projects & Why They Matter*.
- Seaden, G., Guolla, M., Doutriaux, J., & Nash, J. (2003). Strategic decisions and innovation in construction firms. *Construction Management and Economics*, 21(6), 603–612.
- Sebastian-Coleman, L. (2012). *Measuring data quality for ongoing improvement: a data quality assessment framework*. Newnes.
- Sekaran, C. B., & Rani, A. P. (2010). Development And Validation Of Spectrophotometric Method For The Determination Of Dpp-4 Inhibitor, Sitagliptin, In Its Pharmaceutical Preparations. *Eclética Química Wwww.Scielo.Br/Eq*, 35(3), 1–5.
- Sekaran, U. (2006). *Research method of business: A skill-building approach*. Writing. John Wiley & Sons, Ltd. doi: <http://www.slideshare.net/basheerahmad>
- Sekaran, Uma, & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Setia, M. S. %J I. journal of dermatology. (2016). *Methodology series module 3: Cross-sectional studies*. 61(3), 261.
- Shaffakat, S. (2014). *Making sense of organizational change: decision-making in complex environments*. UNSW Sydney.
- Shahzad, W. M., Hassan, A., & Rotimi, J. O. B. (2021). The challenges of land development for housing provision in New Zealand. *Journal of Housing and the Built Environment*, 1–19.
- Shamala, P., Ahmad, R., Zolait, A., & Sedek, M. (2017). Integrating information quality dimensions into information security risk management (ISRM). *Journal of*

- Information Security and Applications*, 36, 1–10.
- Shamim, S., Zeng, J., Shariq, S. M., & Khan, Z. (2019). Role of big data management in enhancing big data decision-making capability and quality among Chinese firms: A dynamic capabilities view. *Information & Management*, 56(6), 103135.
- Shankaranarayan, G., Ziad, M., & Wang, R. Y. (2003). Managing data quality in dynamic decision environments: An information product approach. *Journal of Database Management (JDM)*, 14(4), 14–32.
- Shanmugam, R., & Chattamvelli, R. (2016). Skewness and Kurtosis. In *Statistics for Scientists and Engineers* (pp. 89–110). Wiley Online Library.
- Shannon, C. E. (1948). A mathematical theory of communication. *The Bell System Technical Journal*, 27(3), 379–423.
- Shehata, M. E., & El-Gohary, K. M. (2011). Towards improving construction labor productivity and projects' performance. *Alexandria Engineering Journal*, 50(4), 321–330.
- Shepherd, H. L., Barratt, A., Trevena, L. J., McGeechan, K., Carey, K., Epstein, R. M., Butow, P. N., Del Mar, C. B., Entwistle, V., & Tattersall, M. H. N. (2011). Three questions that patients can ask to improve the quality of information physicians give about treatment options: a cross-over trial. *Patient Education and Counseling*, 84(3), 379–385.
- Shepherd, N. G., & Rudd, J. M. (2014). The influence of context on the strategic decision-making process: A review of the literature. *International Journal of Management Reviews*, 16(3), 340–364.
- Shepherd, V. (2022). (Re) Conceptualising 'good' proxy decision-making for research: the implications for proxy consent decision quality. *BMC Medical Ethics*, 23(1), 1–11.
- Shibani, Abdussalam, E. G. and R. S. (2010). Implementation of total quality management in the Libyan construction industry Abdussalam Shibani *, Eshmaiel Ganjian and. *Int. J. Project Organisation and Management*, 2(4), 382–403.
- Shimizu, C., Krisnadhi, A., & Hitzler, P. (2020). Modular ontology modeling: A tutorial. *Applications and Practices in Ontology Design, Extraction, and Reasoning. Studies on the Semantic Web. IOS Press. To Appear.*
- Shirindza, M. (2015). *Understanding factors that enable and inhibit strategic decision making effectiveness*. University of Pretoria.
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J.-H., Ting, H., Vaithilingam, S., & Ringle,

- C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. *European Journal of Marketing*.
- Shrivasa, A., & Singla, H. K. (2018). Factors causing delay in marine construction projects in India. *I-Manager's Journal on Civil Engineering*, 8(3), 12.
- Siala, S., & Rumerung, D. (2022). Financial Performance Analysis As A Based For Formulating A Strategic Plan For Business Unit Development. *Sosiohumaniora*, 24(3), 382–391.
- Silverio-Fernández, M. A., Renukappa, S., & Suresh, S. (2021). Strategic framework for implementing smart devices in the construction industry. *Construction Innovation*, 21(2), 218–243.
- Simon, H. A. (1991). Bounded rationality and organizational learning. *Organization Science*, 2(1), 125–134.
- Simon, H. A. (1993). Strategy and organizational evolution. *Strategic Management Journal*, 14(S2), 131–142.
- Singh, K., & Misra, M. (2021). Linking corporate social responsibility (CSR) and organizational performance: The moderating effect of corporate reputation. *European Research on Management and Business Economics*, 27(1), 100139.
- Singla, H. K., & Prakash, A. (2021). Financial determinants of value based performance of construction firms in India. *International Journal of Productivity and Performance Management*, 72(4), 1025–1050.
- Sinitsyna, A. (2014). *Impact of information culture and information behaviour on information quality*.
- Slattery, D. K., & Sumner, M. R. (2011). Leadership characteristics of rising stars in construction project management. *International Journal of Construction Education and Research*, 7(3), 159–174.
- Souza, M. L. H., da Costa, C. A., de Oliveira Ramos, G., & da Rosa Righi, R. (2020). A survey on decision-making based on system reliability in the context of Industry 4.0. *Journal of Manufacturing Systems*, 56, 133–156.
- Spector, P. E., & Brannick, M. T. (2009). Common method variance or measurement bias? The problem and possible solutions. *The Sage Handbook of Organizational Research Methods*, 346–362.
- Strekalova, Y. A., & Bouakkaz, M. (2022). Semi-structured data. In *Encyclopedia of Big Data* (pp. 816–819). Springer.
- Styhre, A. (2019). Close entanglements: aligning the construction and finance industries.

- Construction Management and Economics*, 37(3), 169–178.
- Su, Y., Yang, S., Liu, K., Hua, K., & Yao, Q. (2019). Developing a case-based reasoning model for safety accident pre-control and decision making in the construction industry. *International Journal of Environmental Research and Public Health*, 16(9), 1511.
- Suedfeld, P., & Tetlock, P. E. (2019). Psychological advice about political decision making: Heuristics, biases, and cognitive defects. In *Psychology and social policy* (pp. 51–70). Taylor & Francis.
- Suliman, H. A., & Alfaraidy, F. A. (2019). *Impact of organization strategic decisions to organization performance in the Saudi construction industry*.
- Surroca, J., Tribó, J. A., & Waddock, S. (2010). Corporate responsibility and financial performance: The role of intangible resources. *Strategic Management Journal*, 31(5), 463–490.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics*.
- Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5). Pearson Boston, MA.
- Tabesh, P., & Vera, D. M. (2020). Top managers' improvisational decision-making in crisis: a paradox perspective. *Management Decision*.
- Tabish, S. Z. S., & Jha, K. N. (2011). Identification and evaluation of success factors for public construction projects. *Construction Management and Economics*, 29(8), 809–823.
- Talaulicar, T., Grundei, J., & Werder, A. v. (2005). Strategic decision making in start-ups: The effect of top management team organization and processes on speed and comprehensiveness. *Journal of Business Venturing*, 20(4), 519–541.
- Tan, T., Mills, G., Papadonikolaki, E., & Liu, Z. (2021). Combining multi-criteria decision making (MCDM) methods with building information modelling (BIM): A review. *Automation in Construction*, 121, 103451.
- Tan, Y., Shen, L., & Langston, C. (2012). Competition environment, strategy, and performance in the Hong Kong construction industry. *Journal of Construction Engineering and Management*, 138(3), 352–360.
- Tang, P. C., Ash, J. S., Bates, D. W., Overhage, J. M., & Sands, D. Z. (2006). Personal health records: definitions, benefits, and strategies for overcoming barriers to adoption. *Journal of the American Medical Informatics Association*, 13(2), 121–126.

- Taofeeq, D. M., Adeleke, A. Q., & Hassan, A. K. (2019). The moderating role of government policy on contractors' risk attitudes in Malaysia construction companies. *Social Science and Humanities Journal*, 1261–1280.
- Taofeeq, D. M., Adeleke, A. Q., & Lee, C.-K. (2020a). The synergy between human factors and risk attitudes of Malaysian contractors': Moderating effect of government policy. *Safety Science*, 121. <https://doi.org/10.1016/j.ssci.2019.09.016>
- Taofeeq, D. M., Adeleke, A. Q., & Lee, C. K. (2020b). The synergy between human factors and risk attitudes of Malaysian contractors': Moderating effect of government policy. *Safety Science*, 121(September 2019), 331–347. <https://doi.org/10.1016/j.ssci.2019.09.016>
- Tawse, A., & Tabesh, P. (2021). Strategy implementation: A review and an introductory framework. *European Management Journal*, 39(1), 22–33.
- TEC. (2021). *Construction Investment Brief for 2022 funding*. Retrieved April 13 2022 from.
- Teo, T. S. H., Srivastava, S. C., & Jiang, L. I. (2008). Trust and electronic government success: An empirical study. *Journal of Management Information Systems*, 25(3), 99–132.
- The Treasure. (2019). *New Zealand Infrastructure Commission - Te Waihanga*.
- Todoran, I.-G., Lecornu, L., Khenchaf, A., & Caillec, J.-M. Le. (2015). A methodology to evaluate important dimensions of information quality in systems. *Journal of Data and Information Quality (JDIQ)*, 6(2–3), 1–23.
- Tolson, S. (2020). International construction business, COVID-19 and reasons to excuse performance or not. Assessed from URL: <https://www.fenwickelliott.com/research-insight/articles-papers/covid-19/international-construction-covid-19>.
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, 14(3), 207–222.
- Tribelsky, E., & Sacks, R. (2010). Measuring information flow in the detailed design of construction projects. *Research in Engineering Design*, 21(3), 189–206.
- Tripathi, K. K., Hasan, A., & Neeraj Jha, K. (2021). Evaluating performance of construction organizations using fuzzy preference relation technique. *International Journal of Construction Management*, 21(12), 1287–1300.
- Trtílek, P., & Hanák, T. (2021). Measuring the performance of construction contracts

- with regard to the environment. *IOP Conference Series: Earth and Environmental Science*, 656(1), 12008.
- Tully, J. (1998). Mixed quantum–classical dynamics. *Faraday Discussions*, 110, 407–419.
- Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application*, 11(2), 5–40.
- Utama, W. P., Chan, A. P. C., Gao, R., & Zahoor, H. (2018). Making international expansion decision for construction enterprises with multiple criteria: a literature review approach. *International Journal of Construction Management*, 18(3), 221–231.
- van Dijk, T., Kempenaar, A., van den Brink, M., & Laeni, N. (2023). Boundary spanning in design-led strategic spatial planning: lessons from post-Sandy rebuilding efforts. *International Planning Studies*, 28(3–4), 367–383.
- van Teijlingen, E., & Hundley, V. (2005). Pilot studies in family planning and reproductive health care. *BMJ Sexual & Reproductive Health*, 31(3), 219.
- Venkatesh, V., Brown, S., Quarterly, H. B.-M., & 2013, U. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *Site.Iugaza.Edu.Ps*. <http://site.iugaza.edu.ps/kdahleez/files/2014/02/44-Bridging-The-Qualitative-Quantitative-Divide-Guidelines-For-Conducting-Mixed-Methods-Research-In-Information-Systems-2013.pdf>
- Vicente, R., Ferreira, T. M., & Da Silva, J. A. R. M. (2015). Supporting urban regeneration and building refurbishment. Strategies for building appraisal and inspection of old building stock in city centres. *Journal of Cultural Heritage*, 16(1), 1–14.
- Vignali, V., Acerra, E. M., Lantieri, C., Di Vincenzo, F., Piacentini, G., & Pancaldi, S. (2021). Building information Modelling (BIM) application for an existing road infrastructure. *Automation in Construction*, 128, 103752.
- von Gersdorff Jørgensen, L., Sigh, J., Kania, P. W., Holten-Andersen, L., Buchmann, K., Clark, T., Rasmussen, J. S., Einer-Jensen, K., & Lorenzen, N. (2012). Approaches towards DNA vaccination against a skin ciliate parasite in fish. *PLoS One*, 7(11), e48129.
- Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant

- validity testing in marketing: an analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science*, 44(1), 119–134.
- Wahyuni, D. (2012). The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research*, 10(1), 69–80.
- Walger, C., Roglio, K. D. D., & Abib, G. (2016). HR managers' decision-making processes: A "reflective practice" analysis. *Management Research Review*.
- Walliman, N. (2006). Research strategies and design. *Social Research Methods*. London, 37–50.
- Wand, Y., & Wang, R. Y. (1996). Anchoring data quality dimensions in ontological foundations. *Communications of the ACM*, 39(11), 86–95.
- Wang, P., & Li, X. (2020). Assessing the quality of information on wikipedia: A deep-learning approach. *Journal of the Association for Information Science and Technology*, 71(1), 16–28.
- Wang, R. Y., & Strong, D. M. (1996). Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems*, 12(4), 5–33.
- Waweru, P. K., & Omwenga, J. (2015). The influence of strategic management practices on performance of private construction firms in Kenya. *International Journal of Scientific and Research Publications*, 5(6), 1–36.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, xiii–xxiii.
- Wei, K. S. (2010). Causes, effects and methods of minimizing delays in construction projects. *A Project Report*.
- Wenger, A., Stauffacher, M., & Dallo, I. (2021). Public perception and acceptance of negative emission technologies—framing effects in Switzerland. *Climatic Change*, 167(3), 1–20.
- Wentzel, L., Fapohunda, J. A., & Haldenwang, R. (2022). The relationship between the integration of CSR and sustainable business performance: Perceptions of SMEs in the south African construction industry. *Sustainability*, 14(3), 1049.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180.
- Wijayarathne, N., Gunawan, I., & Schultmann, F. (2024). Dynamic Capabilities in Digital Transformation: A Systematic Review of Their Role in the Construction Industry. *Journal of Construction Engineering and Management*, 150(11), 3124008.

- Wolbers, J., Boersma, K., & Groenewegen, P. (2018). Introducing a fragmentation perspective on coordination in crisis management. *Organization Studies*, 39(11), 1521–1546.
- Wollmann, D., & Steiner, M. T. A. (2017). The strategic decision-making as a complex adaptive system: a conceptual scientific model. *Complexity*, 2017.
- Wong, K. K.-K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, 24(1), 1–32.
- Wong, K. K. (2013). Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS. *Marketing Bulletin*, 24(1), 1–32.
- Wood, X., Ghimire, P., Kim, S., Barutha, P., & Jeong, H. D. (2024). Framework for evaluating the success of integrated project delivery in the industrial construction sector: A mixed methods approach and machine learning application. *Construction Economics and Building*, 24(1–2), 94–118.
- Wuni, I. Y. (2022). Mapping the barriers to circular economy adoption in the construction industry: A systematic review, Pareto analysis, and mitigation strategy map. *Building and Environment*, 109453.
- Wynne W. Chin. (2013). Commentary Issues and Opinion on Structural Equation Modeling. *Commentary*, 22(1).
- Xia, D., Yu, Q., Gao, Q., & Cheng, G. (2017). Sustainable technology selection decision-making model for enterprise in supply chain: Based on a modified strategic balanced scorecard. *Journal of Cleaner Production*, 141, 1337–1348.
- Xu, H., Nord, J. H., Brown, N., & Nord, G. D. (2002). Data quality issues in implementing an ERP. *Industrial Management & Data Systems*.
- Xuan, V. (2021). Determinants of business performance of the firms: A case of the construction listed enterprises in Vietnam Stock Market. *Accounting*, 7(7), 1741–1750.
- Yahya, M. Y., Abba, W. A., Yassin, A. M., Omar, R., Sarpin, N., & Orbintang, R. (2024). Innovative Strategies for Enhancing Construction Project Performance. *Journal of Technology Management and Business*, 11(1), 17–31.
- Yang, L. R., Huang, C. F., & Wu, K. S. (2011). The association among project manager's leadership style, teamwork and project success. *International Journal of Project Management*, 29(3), 258–267. <https://doi.org/10.1016/j.ijproman.2010.03.006>
- Yang, R. J., Wang, Y., & Jin, X.-H. (2014). Stakeholders' attributes, behaviors, and decision-making strategies in construction projects: importance and correlations in

- practice. *Project Management Journal*, 45(3), 74–90.
- Yang, R., Wakefield, R., Lyu, S., Jayasuriya, S., Han, F., Yi, X., Yang, X., Amarasinghe, G., & Chen, S. (2020). Public and private blockchain in construction business process and information integration. *Automation in Construction*, 118, 103276.
- Ye, K., Zhu, W., Shan, Y., & Li, S. (2015). Effects of market competition on the sustainability performance of the construction industry: China case. *Journal of Construction Engineering and Management*, 141(9), 4015025.
- Yildiz, K., & Ahi, M. T. (2022). Innovative decision support model for construction supply chain performance management. *Production Planning & Control*, 33(9–10), 894–906.
- Yin, R. K. (2009). Case study research: design and methods/Robert K. Yin, *Applied Social Research Methods Series*, 5.
- Yin, X., Liu, H., Chen, Y., & Al-Hussein, M. (2019). Building information modelling for off-site construction: Review and future directions. *Automation in Construction*, 101, 72–91.
- Yong, Y. C., & Mustafa, N. E. (2012). Analysis of factors critical to construction project success in Malaysia. *Engineering, Construction and Architectural Management*.
- You, Z., & Wu, C. (2019). A framework for data-driven informatization of the construction company. *Advanced Engineering Informatics*, 39, 269–277.
- Young, K. C., Kashdan, T. B., & Macatee, R. (2015). Strength balance and implicit strength measurement: New considerations for research on strengths of character. *The Journal of Positive Psychology*, 10(1), 17–24.
- Yu, Y., Yazan, D. M., Junjan, V., & Iacob, M.-E. (2022). Circular economy in the construction industry: A review of decision support tools based on Information & Communication Technologies. *Journal of Cleaner Production*, 131335.
- Yuan, M., Li, Z., Li, X., & Luo, X. (2021). Managing stakeholder-associated risks and their interactions in the life cycle of prefabricated building projects: A social network analysis approach. *Journal of Cleaner Production*, 323, 129102.
- Zehir, C., & Özşahin, M. (2008). A field research on the relationship between strategic decision-making speed and innovation performance in the case of Turkish large-scale firms. *Management Decision*.
- Zhang, G., Jia, Z., & Yan, S. (2022). Does gender matter? The relationship comparison of strategic leadership on organizational ambidextrous behavior between male and female CEOs. *Sustainability*, 14(14), 8559.

- Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior*, 24(5), 1816–1836.
- Zhong, Y., Chen, Z., Ye, J., & Zhang, N. (2024). Exploring critical success factors for digital transformation in construction industry—based on TOE framework. *Engineering, Construction and Architectural Management*.
- Zhou, C., He, J., Li, Y., Chen, W., Zhang, Y., Zhang, H., Xu, S., & Li, X. (2023). Green Independent Innovation or Green Imitation Innovation? Supply Chain Decision-Making in the Operation Stage of Construction and Demolition Waste Recycling Public-Private Partnership Projects. *Systems*, 11(2), 94.

APPENDIX A: HUMAN ETHICS NOTIFICATION - 4000025806



Taofeeq Durojaye Moshood <taofeeqmoshood@gmail.com>

[HE007] - Human Ethics Notification - 4000025806

4 messages

humanethics@massey.ac.nz <humanethics@massey.ac.nz>
To: taofeeqmoshood@gmail.com, J.Rotimi@massey.ac.nz, W.M.Shahzad@massey.ac.nz
Cc: humanethics@massey.ac.nz

Fri, Feb 3, 2023 at 4:20 PM

Kia ora,

[Link to the application](#)
HoU Review Group

Ethics Notification Number: 4000025806

Project Title: Delivering Construction Pipeline Projects Through the Evaluation of The Quality of Demand-Side Information and Strategic Decision-Making in Construction Organisations

Thank you for your notification which you have assessed as low risk.

Your project has been recorded in our database for inclusion in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director (Research Ethics), email humanethics@massey.ac.nz."

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish require evidence of committee approval (with an approval number), you will have to complete the application form again answering yes to the publication question to provide more information to go before one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

You are reminded that staff researchers and supervisors are fully responsible for ensuring that the information in the low risk notification has met the requirements and guidelines for submission of a low risk notification.

If you wish to print an official copy of this letter:

1. Please login to the RIMS system (<https://rme.massey.ac.nz>).
2. In the Ethics menu, select Ethics Applications.
3. Using the Advanced option, select Ethics Applications (Area), Application ID (Search On), enter the ethics notification number in the Value area and select Find on the toolbar.
4. With the application the Results Tab, tick the empty box on the far left of the application and select Reports from the toolbar.
5. Select the "Human Ethics - Low Risk Notification Letter" link, this will open the report viewer.
6. Select the application code from the Report Parameters dropdown and submit. You can then select an export option from the top toolbar (Print, Save).

APPENDIX B: PARTICIPANT INFORMATION SHEET



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

School of Built Environment, Massey University,
Albany, Auckland 0632, New Zealand

A Framework for Enhanced Decision Making in Construction Organisations Based on Quality of Pipeline Information.

PARTICIPANT INFORMATION SHEET

I hope this survey finds you well.

I am a Ph.D researcher from the School of Built Environment at Massey University. My study evaluates the quality of information that is available to top management within construction organizations and how these could assist with their decision-making. As we know, one major challenge within the NZ construction industry is being able to forward plans using pipeline data/information. I would like to create a framework that would assist construction organizations in making better decisions and improving their capacity and capabilities to perform projects. To do this, we need your input through a survey. Your contribution is essential for the success of my study and the industry's development.

Therefore, I hope you are willing to share your perspectives and insights by responding to this survey. Your participation in this study is voluntary, and you are not obligated to accept this invitation. If you decide to participate, you have the right to:

- Decline to answer any particular question,
- Withdraw from the survey at any time,
- Ask any questions about the study at any time during participation, and
- Provide information on the understanding that your identity will not be disclosed, unless you permit the researcher.

Thank you for your time and support in making this research possible. If you have any queries, do not hesitate to contact me through the contact details below.

Yours truly,

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Disclaimer: "This project has been evaluated by peer review and judged low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director (Research Ethics), email humanethics@massey.ac.nz."

APPENDIX C: PARTICIPANT CONSENT FORM - INDIVIDUAL



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

School of Built Environment, Massey University,
Albany, Auckland 0632, New Zealand

A Framework for Enhanced Decision Making in Construction Organisations Based on Quality of Pipeline Information.

PARTICIPANT CONSENT FORM - INDIVIDUAL

If you wish to participate in this study, please read the following carefully and sign in the space provided.

- I am voluntarily taking part in this project. I understand that I do not have to participate, and I can stop and withdraw my consent at any time up to three weeks from today.
- I have read the Information Sheet.
- I understand that the data I provide is confidential and that I will not be identified in any publications of findings from this research without my permission.
- I have been able to ask any questions I might have, and I understand that I am free to contact the researcher with any questions I may have in the future.

Signature:

Date:

.....

Full Name:

.....

If you have any queries, please contact.

Taofeek D. Moshood (PhD Student)
Tel: +642902064423
Email: tmoshood@massey.ac.nz

Prof. James Rotimi (Supervisor)
Tel: +64212389698
Email: j.rotimi@massey.ac.nz

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Tel: +6492127017
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APPENDIX D: INTERVIEW OFFICIAL INVITATION LETTER



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

School of Built Environment, Massey University,
Albany, Auckland 0632, New Zealand

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INTERVIEW OFFICIAL INVITATION LETTER

Dear Sir/Ma'am,

I hope this email finds you well. I am writing to you as a researcher from the School of Built Environment at Massey University, working under the supervision of Professor James Rotimi.

Following your recent discussion with Professor Rotimi on Thursday, I understand that your expertise and industry profile make you an ideal candidate for our current research project.

I would like to invite you to participate in a brief interview to validate a strategic decision-making framework I have developed. Your insights would be invaluable to this research. The interview is expected to take about 20-30 minutes, and I assure you that your responses will be kept strictly confidential.

As you may know, one major challenge within the NZ construction industry is the ability to plan ahead using pipeline data/information. I have created a strategic decision-making framework that aims to assist construction organizations in making better decisions and improving their capacity and capabilities to perform projects. Your input through this validation process is essential for the success of my study and the industry's development.

If you're willing to participate, please suggest two alternative days next week that suit your schedule. I have attached interview questions, and summary of our study for your review.

Should you have any questions about this research, please don't hesitate to contact me. Your cooperation and assistance are greatly appreciated.

Thank you for your time and consideration. I look forward to the possibility of speaking with you.

Best regards,

APPENDIX E: INTERVIEW QUESTIONS



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

School of Built Environment, Massey University,
Albany, Auckland 0632, New Zealand

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INTERVIEW QUESTIONS

This information relates to the participant's background.

Please note: We ask about age and work experience because these are relevant when comparing expert opinions. We ask for names to follow up on any matters that may arise. Issues about privacy are addressed in the Statement of Consent Form and Information Sheet.

Informant	Construction Stakeholders and Experts
Effects of quality of information on strategic decision-making required for successful construction business performance in New Zealand.	What are the current sources of information used for strategic decision-making within your organization?
	How does the usefulness of information sources impact your organization?
	What type of information/data is needed for strategic decision-making in your company?
	What role do you see the quality of information playing in strategic decision-making?
	To what degree did the decision-makers diligently assess and consider the relevant information in their decision-making process in your organization?
	How would you describe the process that had the most influence on the decision and the related information flows?
	Does the quality of information help your business in strategic decision-making to be more resilient and responsive?
	Do you anticipate an increased role of information in supporting strategic decision-making?
	How extensively did the decision makers look for information in making this decision?
	What are some leverage points that could help move the quality of information on strategic decision-making towards successful construction business performance in New Zealand?
	What are the primary benefits of implementing this proposed strategic framework for enhancing construction business performance?
Is this proposed strategic framework relevant to the construction industry?	
Respondents' details	What is the size of your organization?
	Where is your organization is located?
	How long have you been working in this organization?
	What is your position?
	How long have you been working in your current position?

APPENDIX F: RESEARCH QUESTIONNAIRES

A Framework for Enhanced Decision Making in Construction Organisations Based on Quality of Pipeline Information.

TO WHOM IT MAY CONCERN

INVITATION TO PARTICIPATE IN AN ACADEMIC RESEARCH

I hope this survey finds you well.

I am a Ph.D researcher from the School of Built Environment at Massey University. My study evaluates the quality of information that is available to top management within construction organizations and how these could assist with their decision-making. As we know, one major challenge within the NZ construction industry is being able to forward plans using pipeline data/information. I would like to create a framework that would assist construction organizations in making better decisions and improving their capacity and capabilities to perform projects. To do this, we need your input through a survey. Your contribution is essential for the success of my study and the industry's development.

Therefore, I hope you are willing to share your perspectives and insights by responding to this survey. Your participation in this study is voluntary, and you are not obligated to accept this invitation. If you decide to participate, you have the right to:

- Decline to answer any particular question,
- Withdraw from the survey at any time,
- Ask any questions about the study at any time during participation and
- Provide information on the understanding that your identity will not be disclosed unless you permit the researcher.

Thank you for your time and support in making this research possible. If you have any queries, do not hesitate to contact me through the contact details below.

Yours truly,

-Taofeek D. Moshood (PhD Student)

Tel: +642902064423

Email: tmoshood@massey.ac.nz

-Prof. James Rotimi (Supervisor)

Tel: +64212389698

Email: j.rotimi@massey.ac.nz

-DR. Wajiha Shahzad (Supervisor)

Tel: +6492127017

Email: w.m.shahzad@massey.ac.nz

**SECTION ONE: INFORMATION ON STRATEGIC DECISION-MAKING
(Independent Variables)**

Direction: This section highlights the factors related to strategic decision-making that might affect quality of information and construction business performance. Based on the scale from 1 (strongly disagree) to 5 (strongly agree), please indicate your level of agreement with the statements provided below.

Strategic Decision Formulation

Strategic Decision Formulation		Level of Agreement (5-point interval scale)				
		1	2	3	4	5
1	Our organization has deliberately set its strategic direction in the form of vision statement, mission statement and core values	○ 1	○ 2	○ 3	○ 4	○ 5
2	Our organization leadership take formal responsibility for the firm's strategic management plan	○ 1	○ 2	○ 3	○ 4	○ 5
3	Our organization analyses/gathers information about its external environment to understand their implications on our business	○ 1	○ 2	○ 3	○ 4	○ 5
4	Strategy formulation is a top priority activity in our company	○ 1	○ 2	○ 3	○ 4	○ 5
5	Employees are briefed and taken through the strategic management plan before implementation	○ 1	○ 2	○ 3	○ 4	○ 5
6	When formulating strategy all resources in our organization are assessed	○ 1	○ 2	○ 3	○ 4	○ 5
7	Our organizations strategic behavior and decisions are in line with developments in our operating environment	○ 1	○ 2	○ 3	○ 4	○ 5

Strategic Decision Implementation Practices refer to the actions, processes, and approaches that organizations employ to effectively execute the strategies they have formulated.

Reference: (Emmanuel Ng'andu, 2018)

Strategic Decision Implementation Practices		Level of Agreement (5-point interval scale)				
		1	2	3	4	5
1	Organizational strategic decision is implemented purely based on set objectives and expected performance	○ 1	○ 2	○ 3	○ 4	○ 5

Strategic Decision Implementation Practices		Level of Agreement (5-point interval scale)				
		1	2	3	4	5
2	Resources are adequately allocated for strategic decision implementation	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3	Our organizational strategic decision is matched to our organizational structure	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4	Organization strategic decision is adequately and comprehensively communicated to members of staff	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5	Organization is keen on implementing organizational strategic decision in a way that yield the highest performance	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
6	There are incentives in place to ensure success of strategic decision implementation	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Strategic Decision Evaluation Practices refer to the methods and processes that organizations use to assess the effectiveness and impact of their strategic decisions and initiatives.

Reference: (Emmanuel Ng'andu, 2018)

Strategic Decision Evaluation Practices		Level of Agreement (5-point interval scale)				
		1	2	3	4	5
1	We monitor, evaluate and control the implementation of strategic decision in our organization	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
2	We have clearly defined and measurable performance targets for each strategic decision management plan element	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3	Strategic decision evaluation involves review of the process of strategy formulation and implementation in our organization	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4	In our organization, success of strategy evaluation is done regularly and corrective action is taken on timely basis for highest performance	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5	We have clear communication channels within the organization to enable evaluation of strategic decision performance	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
6	In our organization, success of a strategic decision is evaluated at the end of implementation stage	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
7	In our organization, corrective measures are taken after strategic decision has been evaluated at the end of implementation stage.					

Reliance on Financial Strength/Capacity refers to an organization's dependence on its financial resources, stability, and ability to generate capital as a critical factor in supporting its strategic decisions and operations.

Reference: (Anna Sinitsyna, 2014; Narasimhaiah Gorla et al., 2010)

Financial Capacity		Level of Agreement (5-point interval scale)				
		1	2	3	4	5
1	Our organization is well-equipped with a sufficient quantity of equipment.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
2	In our organization, payments are made promptly without any delays.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3	Our organization exercises effective control over the allocation of site resources.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4	Our organization is deeply committed to its financial responsibilities.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5	Our organization maintains financial stability and has a track record of success.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Reliance on Workforce refers to an organization's dependence on its employees, their skills, knowledge, expertise, and overall contribution as a crucial factor in achieving its strategic objectives and maintaining competitiveness.

Reference: (Anna Sinitsyna, 2014; Narasimhaiah Gorla et al., 2010)

Reliance on Workforce		Level of Agreement (5-point interval scale)				
		1	2	3	4	5
1	In our organization, our staff members are highly qualified and experienced for their respective roles.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
2	Our organization has a sufficient number of competent managerial and supervisory personnel.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3	There is adequate skill among employees in our organization.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4	In our organization, we prioritize the motivation of our employees.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5	Our organization maintains a strong focus on effective site management and supervision.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

**SECTION TWO: INFORMATION ON QUALITY OF INFORMATION
(Mediating Variables)**

Direction: This section introduces the quality of information as a mediating variable that could impact the connections between strategic decision-making and construction business performance. Based on the scale from 1 (strongly disagree) to 9 (strongly agree), please mark the right number that most accurately describes your opinion.

Quality of Information		Level of Agreement (7-point interval scale)						
		1	2	3	4	5	6	7
1	In our organization, the relevance and reliability of information sources significantly impact strategic decision-making	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
2	In our organization, quality of information plays a significant role in strategic decision-making	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
3	In our organization, quality of information help us to be more resilient and responsive	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
4	In our organization, we anticipate an increased role of information in supporting strategic decision-making	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
5	In our organization, the decision makers extensively look for information in making their decision	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
6	In our organization, decision-makers diligently evaluate relevant information in their decision-making process	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
7	In our organization, we experience problems concerning information flows from operational to strategic management levels	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
8	Quality of information helps our organization better understand the current situation of our operating environment	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7

**SECTION THREE: INFORMATION ON CONSTRUCTION BUSINESS PERFORMANCE
(Dependent Variables)**

Direction: This section outlines the potential impact of strategic decision-making processes on construction business performance. Based on the scale from 1 (strongly disagree) to 7 (strongly agree), please mark the right number that most accurately describes your opinion.

Construction Business Performance

No	Construction Business Performance	Level of Agreement (9-point interval scale)								
		1	2	3	4	5	6	7	8	9
1	Our organization adopts new strategies to achieve competitive advantage	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
2	Our organization analyses the external and internal environment to know the strategies to adopt	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
3	Strategic decision management affects our organization performance positively	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
4	Our organization is guided by the mission statement to achieve competitive advantage	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
5	Lack of strategic planning has had an influence on our organization performance	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
6	Quality of information affects our organization strategic decision-making	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
7	In our organization, there is time pressures that influence the quality of decision-making	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9

SECTION FOUR: DEMOGRAPHIC PROFILE

Please tick (✓) the appropriate answer that best reflects your background or complete the answer in the space provided.

1. Position in Organization

- | | | |
|---|---|---|
| <input type="checkbox"/> Contract Manager | <input type="checkbox"/> Executive Director | <input type="checkbox"/> Marketing Manager |
| <input type="checkbox"/> Engineer | <input type="checkbox"/> Marketing Manager | <input type="checkbox"/> HR & Office Manager |
| <input type="checkbox"/> General Manager | <input type="checkbox"/> Quantity Surveyor | <input type="checkbox"/> Site Engineer |
| <input type="checkbox"/> Administration Manager | <input type="checkbox"/> Project Manager | <input type="checkbox"/> Others (<i>please specify</i>):..... |

2. Company Project Specialization

- Residential Buildings Road
 Bridges Others (*please specify*):_____

3. Company Main Location

- Northland Bay of Plent Taranaki Wellington
 Auckland Gisborne Manawatu Tasma
 Waikato Hawke's Bay Whanganui Nelson
- Marlborough Canterbury Southland
 West Coast Otago

4. Period of Company Establishment

- Less than 5 years 5 -10 years
 10 – 20 years above 20 years

5. Number of Workers

- Small Medium Large

6. Project Specialization

- Residential Building Non-Residential Building Infrastructure
 Others (*please specify*):.....