

A BUSINESS MODEL ONTOLOGY FOR CONSTRUCTION CONTRACTORS

Dilani Niroshika Abeynayake

178086U

Degree of Doctor of Philosophy

Department of Building Economics
Faculty of Architecture

University of Moratuwa
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Thesis submitted in partial fulfilment of the requirements for the degree of
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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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Date: 12.07.2022

The above candidate has carried out research for the PhD thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of the supervisor: **Ch. QS. Prof. (Mrs) B. A. K. S. Perera**

Signature of the supervisor: *UOM Verified Signature*

Date : 12.07.2022

Name of the supervisor: **Dr (Mrs) Chandanie Hadiwattage**

Signature of the supervisor: *UOM Verified Signature*

Date : 12.07.2022

DEDICATION

*I would like to dedicate this thesis
to my parents, husband, son and daughter
for their endless support, and unconditional love.....*

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ABSTRACT

Today's hostile business environment, economic uncertainties and external shocks make construction companies vulnerable to business failures. In facing such challenges, contractors' businesses should be with informed decisions, enabling management of complicated supply chains, strategic partnerships, featured and complex project scopes, tight programmes and numerous project participants while serving clients with high expectations. A Business Model (BM) is fundamental to the success of any business, supporting high-quality business decisions. Hence, contractors must develop their business by adopting proper BMs. However, in construction industry, it is still a novel concept with relatively few ontologies to support contractors in designing their BMs. Thus, this research aimed to propose a developed and validated BM ontology for the construction context to facilitate contractors designing BMs. This research was positioned on pragmatism philosophical stance and followed abductive approach. The Research Questions (RQs) were answered through a multi-method qualitative study. Phase I data were collected through multiple case studies by interviewing two top managers from each case and analysing the websites. Case study results were used in the subsequent qualitative survey conducted among 15 construction business experts.

A BM development process with five stages toward improved BM application was identified by reviewing the literature on BM evolution. The absence of stage-wise BM development in the construction industry urged following the BM development process to develop a BM ontology for contractors, enabling BM design. Construction Business Model (CBM) was defined following a systematic process under literature review, which was empirically validated for compatibility and comprehensibility, completing Stage 1 of the BM development process. During Stage 2, thirty-four elements constituting the Construction Business Model Ontology (CBMO) were identified and classified based on their relationships, roles and positions. One 'Desired Element', one 'Inherent Element', three 'Shared Elements', two 'Bridging Elements', and four 'Value Pillars' with their respective 'CBM Elements' and 'CBM Sub-elements' were explored. In addition, new elements, e.g. 'Professionalism', 'Key Subcontractors', 'Construction Expertise' and 'Workmanship', were introduced concerning contractors' business. Describing parameters for each CBMO element were established at Stage 3, and CBMO was developed considering established relationships of CBMO elements at Stage 4. A step-by-step guide with guiding questions for CBMO would help contractors design their CBMs. Validation of the CBMO with two groups using a sample scenario confirmed its clarity, understanding and significance by providing a business case's big picture and common language. CBMO enables handling clients and stakeholders, using specified processes, handling risks, choosing strategies, utilising resources and promoting value-based competition in the construction industry.

Keywords: Business Model Development Process; Construction Business Model Definition; Construction Business Model Ontology; Construction Contractors

TABLE OF CONTENTS

DECLARATION.....	i
DEDICATION.....	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT.....	iv
TABLE OF CONTENTS	v
LIST OF TABLES	xii
LIST OF FIGURES	xiv
LIST OF ANNEXURES	xvi
LIST OF ABBREVIATIONS	xvii
1. INTRODUCTION.....	1
1.1. Background	1
1.2. Problem Statement	4
1.3. Research Aim	6
1.4. Objectives	6
1.5. Research Methodology	7
1.6. Structure of the thesis	8
1.7. Significance of the study	9
2. LITERATURE REVIEW	10
2.1. Introduction	10
2.2. Introduction to the Construction Industry	10
2.3. Concept of Value in the construction business	11
2.4. Significance and role of Business Models (BMs)	12
2.5. Business model vs strategy.....	15
2.6. Evolution of the business model concept.....	16
2.7. Business model development stages.....	23
2.8. Construction industry-related business model research.....	27
2.9. Stage 1 - Define ‘Business Model’ in relation to the construction industry.....	32
2.9.1. The necessity of defining business model for the construction business	33
2.9.2. The process for developing Construction Business Model (CBM) definition	34
2.9.2.1. Step 1 -Extraction of existing business model definitions	36

2.9.2.2. Step 2 - Analyse business model definitions to identify underlying ‘themes’	37
2.9.2.3. Step 3 - Selection of fundamental themes for the “Construction Business Model” (CBM) definition	44
2.9.2.4. Step 4 - Selection of ‘wordings’ from the BM definitions to represent the fundamental themes of the Construction Business Model (CBM)	46
2.9.2.5. Step 5 - Defining the Construction Business Model (CBM)..	47
2.10. Stage 2 - List business model elements	49
2.10.1. Different business model elements in the literature.....	49
2.11. Stage 3 - Describe business model elements	56
2.11.1. Brief descriptions of business model elements	56
2.11.1.1. Value Proposition	56
2.11.1.2. Value Network	57
2.11.1.3. Value creation	58
2.11.1.4. Value Capture.....	58
2.11.1.5. Revenue	58
2.11.1.6. Costs.....	58
2.11.1.7. Profit	59
2.11.1.8. Resources and Capabilities.....	59
2.11.1.9. Processes	59
2.11.1.10.Partnerships	60
2.11.1.11.Customers.....	60
2.11.1.12.Government.....	61
2.11.1.13.Strategic Choices	61
2.11.1.14.Mission.....	61
2.11.1.15.Change Management.....	62
2.11.1.16.Technology	62
2.11.1.17.Culture.....	62
2.11.2. Parameters for describing business model elements	62
2.12. Stage 4 –Model BM elements as a business model ontology.....	63
2.12.1. What is an “ontology”?	64
2.12.2. Business model frameworks/ ontologies	64
2.12.3. Method of creating an ontology	65

2.12.4. The process of developing a business model ontology for the construction business	68
2.12.5. Composition and relationships of business model ontology.....	69
2.13. Stage 5 - Apply the business model concept using a business model ontology	71
2.14. Development of Conceptual Framework.....	73
2.15. Chapter summary.....	77
3. RESEARCH METHODOLOGY	78
3.1. Introduction	78
3.2. Reviewing literature	78
3.3. Research Questions (RQs)	79
3.4. Purpose of the research.....	79
3.5. Research design	80
3.6. Research Philosophy	82
3.7. The philosophical position of the research.....	84
3.8. Research Approaches.....	86
3.9. Methodological Choices	88
3.10. Research Strategies	90
3.11. Time horizon	93
3.12. Techniques and procedures.....	93
3.12.1. Techniques and procedures for data collection	94
3.12.2. Phase I – Selection of cases for qualitative data collection.....	94
3.12.3. Phase II – Sample selection for qualitative survey with experts	98
3.12.4. Data collection techniques.....	99
3.13. Pilot study.....	102
3.14. Data analysis	102
3.15. Research ethics and quality of the research.....	105
3.16. Reliability and validity of the research.....	106
3.17. Chapter summary.....	107
4. RESEARCH FINDINGS AND ANALYSIS: PHASE I.....	108
4.1. Introduction	108
4.2. Analysing case studies	108
4.2.1. Backgrounds of cases.....	108

4.2.2. Pilot study	111
4.2.3. Reflection on within-case analysis	113
4.2.4. Cross case Analysis	113
4.3. Nature of the construction business	117
4.4. The business model concept in the construction industry	120
4.5. Stage 1 – BM development process: Definition for Construction Business Model (CBM)	122
4.5.1. Requirement of a definition for Construction Business Model (CBM)	122
4.5.2. Confirmation of derived “fundamental themes” for defining CBM	123
4.6. Stage 2 – BM development process: Elements and composition of Construction Business Model Ontology (CBMO)	125
4.7. Stage 3 – BM development process: Describing Construction Business Model Ontology (CBMO) elements	129
4.7.1. Value Inputs (Value Propositions)	129
4.7.1.1. Time, Cost and Quality.....	132
4.7.1.2. Add-ons	133
4.7.2. Value Network.....	135
4.7.2.1. External Network.....	137
4.7.2.2. Internal Network.....	146
4.7.3. Value Creation	147
4.7.3.1. Processes	150
4.7.3.2. Resources and Capabilities	151
4.7.3.3. Technology.....	151
4.7.4. Value Capture	152
4.7.4.1. Revenue.....	152
4.7.4.2. Expectations.....	153
4.7.5. Strategic Choices.....	154
4.7.6. Change Management.....	155
4.7.7. Professionalism.....	157
4.7.8. Company Culture	158
4.7.9. Company Vision.....	160
4.7.10. Describing parameters for the elements of CBMO	160

4.8. Stage 4 – BM development process: Developing initial Construction Business Model Ontology (CBMO) based on Phase I findings	161
4.9. Chapter summary	163
5. RESEARCH FINDINGS AND ANALYSIS: PHASE II	164
5.1. Introduction	164
5.2. Analysing Phase II data: Qualitative survey.....	164
5.3. Nature of the construction business	165
5.4. The business model concept in the construction industry	167
5.5. Stage 1 – BM development process: Validated definition for Construction Business Model (CBM).....	167
5.6. Stage 2 – BM development process: Elements and composition of Construction Business Model Ontology (CBMO)	168
5.6.1. Changes and modifications to the taxonomy of ‘Value Inputs’	170
5.6.2. Changes and modifications to the taxonomy of ‘Value Stakeholders’	171
5.6.3. Changes and modifications to the taxonomy of ‘Value Creation’	173
5.6.4. Changes and modifications to the taxonomy of ‘Value Capture’	174
5.7. Stage 3 – BM development process: Describing Construction Business Model Ontology (CBMO) elements	175
5.7.1. Describing CBMO elements at the broadest levels.....	176
5.7.2. Describing CBMO elements at middle levels	177
5.7.3. Describing CBMO elements at the detail level.....	182
5.7.3.1. Descriptions of CBM Elements: Value Inputs	182
5.7.3.2. Descriptions of CBM Elements and Sub-Elements: Value Stakeholders	185
5.7.3.3. Descriptions of CBM Elements and Sub-Elements: Value Creation	187
5.7.3.4. Descriptions of CBM elements: Value Capture	190
5.8. Stage 4 – BM development process: Developing Construction Business Model Ontology (CBMO)	190
5.8.1. Establishing relationships among CBMO elements	190
5.8.1.1. Broadest level and middle level relationships among CBMO elements.....	191
5.8.1.2. The detailed level of relationships among CBMO elements	194

5.8.2. Development of the Construction Business Model Ontology (CBMO)	200
5.9. Guide to use Construction Business Model Ontology (CBMO)	202
5.10. Validation of the Construction Business Model Ontology (CBMO).....	211
5.11. Chapter Summary	213
6. DISCUSSION ON RESEARCH FINDINGS	214
6.1. Introduction to the chapter.....	214
6.2. The business model concept in the construction industry	214
6.3. The business model development process	214
6.4. Business model development in the construction industry.....	215
6.5. Stage 1 - Define ‘Business Model’ in relation to Construction Industry	216
6.6. Stage 2 – List BM elements constituting the Construction Business Model Ontology (CBMO)	219
6.7. Stage 3 – Describe BM elements constituting Construction Business Model Ontology (CBMO)	222
6.8. Stage 4 – Model BM elements as a Construction Business Model Ontology (CBMO).....	223
6.9. Stage 5 – Apply BM concept using Construction Business Model Ontology (CBMO).....	225
6.10. Chapter Summary	227
7. CONCLUSIONS	228
7.1. Introduction	228
7.2. Conclusions of the research	228
7.2.1. Critically review the literature on the BM concept to interpret the gaps, particularly in construction industry application (OB1).....	228
7.2.2. Define BM corresponding to the construction business to scope BM ontology development, in particular to the contractors’ business (OB2)	229
7.2.3. Investigate BM elements essential for a BM ontology applicable to construction contractors’ business (OB3).....	230
7.2.4. Analyse the BM elements identified above (OB3) for establishing parameters to describe BM elements (OB4).....	231
7.2.5. Establish relationships among BM elements for developing a BM ontology applicable to construction contractors’ business (OB5)	232

7.2.6. Propose a developed and validated BM ontology for construction contractors' business, facilitating BM design for different construction business ideas/ options (OB6)	233
7.3. Contribution to Knowledge - Theoretical Implications	234
7.4. Contribution to Knowledge - Practical Implications	235
7.5. Scope and Limitations of the study	236
7.6. Recommendations.....	237
7.7. Recommendations for future research	237
REFERENCES.....	239
ANNEXURES.....	267

LIST OF TABLES

Table 2.1 Multivalent roles of the Business Model	14
Table 2.2 Business Model vs Strategy	15
Table 2.3 Concerns under BM research sub-domains.....	17
Table 2.4 Contribution of BM articles to BM development areas from 2006 to 2020.....	21
Table 2.5 Mapping of the evolutionary phases of BM research proposed in different studies.....	24
Table 2.6 Mapping BM research studies related to the construction industry with stages of BM development process.....	28
Table 2.7 Analysis of the keywords of the identified BM definitions in the literature	38
Table 2.8 'Wordings' extracted from the BM definitions for fundamental themes ...	46
Table 2.9 Business Model Elements in different studies	50
Table 2.10 Deducted BM elements and different terms used in literature.....	54
Table 2.11 Describing parameters of BM elements	63
Table 2.12 Stages of creating an ontology	66
Table 2.13 Mapping of BM development process with stages of ontology creation	68
Table 2.14 Composition of BM ontologies/ BM frameworks	69
Table 2.15 Literature outcomes and research questions for achieving objectives	74
Table 3.1 Characteristics of Philosophical assumptions at two extremes.....	83
Table 3.2 Comparison of Philosophical positions.....	84
Table 3.3 Philosophical assumptions adopted for this research.....	85
Table 3.4 Characteristics of the abductive approach.....	87
Table 3.5 Use of different research choices	89
Table 3.6 Characteristics of quantitative and qualitative research designs.....	89
Table 3.7 Characteristics of research strategies	91
Table 3.8 The population of Phase I and selection of cases.....	97
Table 3.9 Details of experts in Phase II data collection	98
Table 3.10 Summary of data collection techniques of the study	101
Table 3.11 Background information of validation group members	106
Table 4.1 Codings of interviewees and websites of the cases.....	111
Table 4.2 Semi-structured interview questions before and after the Pilot study.....	113
Table 4.3 Fields of involvement and availability of company BMs of Cases	114
Table 4.4 Business attributes of cases identified against the BM elements of literature findings.....	114
Table 4.5 Additional BM elements (business attributes) considered in cases	115

Table 4.6 Appropriate BM elements for developing CBMO – BM elements creating taxonomies.....	126
Table 4.7 Appropriate BM elements for developing CBMO.....	127
Table 4.8 Describing parameters for the elements of CBMO.....	160
Table 5.1 Descriptions of main CBMO element categories at the broadest level ..	176
Table 5.2 Descriptions of Inherent Element, Desired Element and Shared Elements at the middle level	178
Table 5.3 Descriptions of Bridging Elements and Value Pillars at the middle level	179
Table 5.4 Descriptions of CBM Elements and CBM Sub-Elements of Value Inputs and Value Stakeholders	183
Table 5.5 Descriptions of CBM Elements and CBM Sub-Elements of Value Creation and Value Capture	189
Table 5.6 Connotations of sample relationship indicators	191
Table 5.7 Primary guiding questions for CBMO elements.....	204
Table 6.1 Process of systematically developing a BM definition	217
Table 6.2 Number of Studies that use BM elements similar to the elements of the CBMO	220

LIST OF FIGURES

Figure 1.1 Structure of the Thesis	8
Figure 2.1 The framework for BM concept development with sub-domains	17
Figure 2.2 Evolution of the BM concept.....	18
Figure 2.3 Business Model Research Schema (BMRS)	19
Figure 2.4 The course of the development phases of BM	20
Figure 2.5 BM concept development from 2006 to 2020	22
Figure 2.6 Roadmap for BM development	25
Figure 2.7 BM Development Process	27
Figure 2.8 Process of developing Construction Business Model (CBM) definition	35
Figure 2.9 Informal process of creating an ontology	66
Figure 2.10 Sub-stages of Conceptualisation stage in ontology creation	67
Figure 2.11 Change of BMs	72
Figure 2.12 Conceptual Framework.....	76
Figure 3.1 The Research Onion	81
Figure 3.2 The abduction process followed in this study	88
Figure 3.3 The unit of analysis and boundary of the research	95
Figure 3.4 Case study design	96
Figure 3.5 The thematic analysis process followed in this research.....	103
Figure 4.1 Process of analysing data from case studies in Phase I.....	116
Figure 4.2 Coding Structure for perceptions of nature of the construction business	117
Figure 4.3 Coding structure of perceptions of the BM concept in the construction industry	120
Figure 4.4 Coding structure for implications on the BM concept in the construction industry	122
Figure 4.5 Taxonomy levels of Value Pillars	128
Figure 4.6 Coding structure of the nature and purpose of Value Propositions in the construction business	130
Figure 4.7 Taxonomy of Value Inputs	132
Figure 4.8 Coding structure of purpose of Value Network.....	135
Figure 4.9 Taxonomy of Value Network	137
Figure 4.10 Coding structure of the factors considered about Clients by the contractors	138
Figure 4.11 Considerations and actions for effective handling of Clients.....	139
Figure 4.12 Process of handling Clients	141
Figure 4.13 Benefits from Partners and Subsidiaries.....	142
Figure 4.14 Ways of Dealing with Government	144
Figure 4.15 Taxonomy of Other External Parties	146
Figure 4.16 Coding structure of the importance and methods used to enhance the efficiency of Internal Network	147
Figure 4.17 Coding structure of methods of creating value.....	148
Figure 4.18 Taxonomy of Value Creation	150

Figure 4.19 Taxonomy of Value Capture	152
Figure 4.20 Concerns in Revenue Generation	153
Figure 4.21 Details for Strategic Choices	155
Figure 4.22 Details for Change Management	157
Figure 4.23 Details of Professionalism	158
Figure 4.24 Details of Company Culture	159
Figure 4.25 Details of Company Vision	160
Figure 4.26 Initial CBMO with taxonomies of Value Pillars	162
Figure 5.1 Process of analysing data from the qualitative survey in Phase II	165
Figure 5.2 Additional quotations about the nature of the construction business at Phase II.....	166
Figure 5.3 Change in composition of CBMO from Phase I to Phase II	169
Figure 5.4 Changes and modifications to the taxonomy of Value Inputs at Phase II.....	171
Figure 5.5 Changes and modifications to the taxonomy of Value Stakeholders at Phase II.....	172
Figure 5.6 Changes and modifications to the taxonomy of Value Creation at Phase II.....	173
Figure 5.7 Changes and modifications to the taxonomy of Value Capture Phase II.....	175
Figure 5.8 Levels of describing CBMO elements.....	176
Figure 5.9 Levels of presenting relationships among the CBMO elements	191
Figure 5.10 Broadest-level and middle-level relationships among CBMO elements	193
Figure 5.11 Detail-level relationships of Value Inputs	195
Figure 5.12 Detail-level relationships of Value Stakeholders	196
Figure 5.13 Detail-level relationships of Value Creation	198
Figure 5.14 Detail-level relationships of Value Capture	199
Figure 5.15 Construction Business Model Ontology (CBMO)	201
Figure 5.16 Indications of the arrows in CBMO	202
Figure 5.17 Guide to using CBMO.....	203
Figure 5.18 Guiding questions directing to decide Value Inputs.....	206
Figure 5.19 Guiding questions directing to create value under Value Creation	207
Figure 5.20 Guiding questions directing to handle Partners, Key Internal Team and Key Connected Stakeholders under Value Stakeholders	208
Figure 5.21 Guiding questions directing to handle the Client under Value Stakeholders	209
Figure 5.22 Guiding questions directing to capture value under Value Capture	210
Figure 7.1 Use of CBMO in the construction business management	235

LIST OF ANNEXURES

Annexure 2.1: Allocation of literature articles from 2006 to 2020 for areas of BM development	267
Annexure 2.2: Mapping of BM studies related to the construction industry with stages of BM development process	270
Annexure 2.3: Selected business model definitional views.....	274
Annexure 2.4: BM Main Elements and BM Sub-elements identified in selected articles with their numbers.....	277
Annexure 2.5: Mapping of BM elements in the literature.....	281
Annexure 2.6: Features of different BM ontologies/ frameworks selected from the literature.....	293
Annexure 3.1: Business Model Concept map.....	294
Annexure 3.2: BM Vocabulary from literature (Sample).....	295
Annexure 3.3: Semi-Structured Interview Guideline – Phase I.....	303
Annexure 3.4: Alternative terms for elements of a business model.....	305
Annexure 3.5: Semi-Structured Interview Guideline – Phase II.....	308
Annexure 5.1: Changes in Proposed CBM definition after Validation at Phase II.....	313
Annexure 5.2: Summary of Describing Parameters of CBMO elements after Phase II.....	314
Annexure 5.3: Meanings of CBMO elements.....	316
Annexure 5.4 –A: Options/ Examples available for Guiding Questions of Inherent Element, Shared Elements, Bridging Elements and Value Pillars.....	317
Annexure 5.4 –B: Options/ Examples available for Guiding Questions of CBM Elements of Value Pillars.....	319
Annexure 5.5: Construction Business Model Ontology Skeleton (CBMOS)..	321
Annexure 5.6: A Step-by-Step Guide of the CBMO.....	322
Annexure 5.7: A Sample Scenario for designing CBM using CBMO.....	340
Annexure 5.8: Construction Business Model Ontology Skeleton (CBMOS) filled with key selected outcomes in relation to given sample scenario obtained from the validation process	341
Annexure 6.1: Related Fundamental theme of CBMO elements.....	342

LIST OF ABBREVIATIONS

BIM	- Building Information Modelling
BM	- Business Model
BMC	- Business Model Canvas
BMO	- Business Model Ontology
BMRS	- Business Model Research Schema
BMTC	- Business Model Transformation Canvas
CAQDAS	- Computer-Aided Qualitative Data Analysis Software
CB	- Construction Business
CBM	- Construction Business Model
CBMO	- Construction Business Model Ontology
CBMOS	- Construction Business Model Ontology Skeleton
CBR	- Case-Based Reasoning
CIDA	- Construction Industry Development Authority
CM	- Contracts Manager
CPD	- Continuous Professional Development
D & B	- Design and Build
DGM	- Deputy General Manager
ERP	- Enterprise Resource Planning
GBM	- Green Business Model
GDP	- Gross Domestic Product
GM	- General Manager
HIT	- Health Information Technology
ICT	- Information and Communication Technology
IS	- Information Systems
ISO	- International Organisation for Standardisation
IT	- Information Technology
MBA	- Master of Business Administration
MNE	- Multinational Enterprise
QMS	- Quality Management Systems
RDA	- Road Development Authority
SM	- Senior Manager
SME	- Small and Medium Enterprise
SWOT	- Strengths, Weaknesses, Opportunities and Threats