A BUSINESS MODEL ONTOLOGY FOR CONSTRUCTION CONTRACTORS

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Degree of Doctor of Philosophy

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July 2022

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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).

Signature: UOM Verified Signature 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……...

ACKNOWLEDGEMENTS

First and foremost, I am extremely grateful to my supervisors, Ch. QS. Prof. (Mrs) B.A.K.S. Perera, and Dr. (Mrs) Chandanie Hadiwattage for the enormous support, continuous guidance, motivation and patience during my PhD research study and related publications. Their immense knowledge and experience have encouraged me all the time. I further extend my sincere gratitude to my progress review panel member, Prof. Andrew Ross, for his constructive feedback, encouragement and guidance. I also extend my heartfelt gratitude to Prof. (Mrs) Udayangani Kulatunga and Dr (Mrs) Tharusha Ranadewa for being my mock viva panel members.

A very special thank is extended to Prof. (Mrs) Yasangika Sandanayake, former Head of the Department of Building Economics, for her valuable support for my study, especially for her encouraging words at the commencement. My sincere thanks also go to Dr D.P. Chandrasekara, Dean of Faculty of Architecture, Ch. QS. Suranga Jayasena, Head of Department of Building Economics, Dr (Mrs) S.B.A. Cooray, former Director of the Postgraduate Studies Division, Dr (Mrs) Sachie Gunatilake, Director of the Postgraduate Studies Division, Dr (Ms) Pournima Sridarran, Postgraduate Research Coordinator of the Department of Building Economics, and to the respective staff of the University of Moratuwa, who provided me with the institutional guidance, research facilities and encouragement.

It is my duty to forward the gratitude and appreciation to all the participants in the data collection process for their valuable time, openness, support and contribution to knowledge in making my study a success. Unfortunately, the confidentiality issues prevent me from mentioning their names. However, the data collection could not have been successfully conducted without their input. My special thank is forwarded to Ms Darshanie Prematilake for her invaluable proofreading of my thesis. Further, I thank my research colleagues for sharing their experience and knowledge. I also thank my beloved friends and colleagues for their constant help and encouragement.

Finally, I am indebted to my parents, husband, son and daughter for all the support, encouragement and sacrifices given throughout my PhD thesis and their unconditional love.

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

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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