FRAMEWORK OF UNDERSTANDING FOR BIM ADOPTION IN A BIM INFANT INDUSTRY: CASE OF SRI LANKA

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DECLARATION

I declare that this is my own work, and this thesis 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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Himal Suranga Jayasena

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.

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DEDICATION

Dedicated to Sanjeevi
my beloved wife
for not just being by my side

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ABSTRACT

Being a technological innovation with ability to address many of the problems in the construction industry, Building Information Modelling (BIM) has got significant attention both in academia and in practice. Proper strategizing of BIM adoption by both adopters and supporting agents is crucial for success. In this, inability to formulate structured understanding of BIM adoption decision context was found a limitation, and this study aimed to develop a framework of understanding of BIM adoption decision in a context of BIM infant industry taking Sri Lanka as a case. Affordances concept was utilized to conceptualize wide knowledge in BIM adoption into one framework. Introduced in ecological psychology, affordances are the potential uses or actions that an object or environment offers to a user. It is a versatile concept that could effectively represent not only what an adopter perceives and expects from BIM implementation, but also, what the adopter in fact can achieve from it. With the assertion that there is a generalizable underlying framework of BIM adoption decision that can be observed through socially constructed experience it caused, the study took a Retroductive Approach to theory with Critical Realism research philosophy. Data was collected through semi-structures interviews with nine participants purposively selected to maximize the breadth and depth of data. After each interview, an iterative inductive and deductive data analysis process was followed by developing thick narratives and qualitatively validating the developing framework with data thus far. Findings present the Affordance-led Framework of Understanding that can effectively capture the BIM adoption decision context in a BIM infant industry and offer a deeper contextualized view of BIM adoption decision that was absent in current innovation studies. Study findings contribute pertinent affordances as a new concept for which an equivalent concept or an explanation was not found either in behavioural or innovation adoption theories. While the framework supports the strategizing of BIM adoption, it has shown potential use in many other contexts even outside of construction.

Keywords: Building Information Modelling, BIM, BIM Infant Industry, innovation, adoption

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LIST OF ABBREVIATIONS

Abbreviation	Description
3D	3-Dimensional
4D	4-Dimensional
5D	5-Dimensional
ABM	Agent-Based Modelling
AC	Air Condition/Conditioning
AEC	Architecture, Engineering, and Construction
AECO	Architecture, Engineering, Construction and Operation
AFU	Affordance-led Framework of Understanding
AOT	Availability, Observability and Trialability
ATT	Analog Terrestrial Television
BC	Before Christ
BIM	Building Information Model / Modelling
BoQ	Bill of Quantities
BS	British Standard(s)
CAD	Computer Aided Design/Drafting/Draughting
CDN	Common Data Environment
CEO	Chief Executive Officer
CNC	Computer Numerical Control
CoP	Communities-of-Practice
COVID19	Coronavirus disease 2019
DB	Distribution Board
DOI	Diffusion of Innovations

Abbreviation	Description
DTT	Digital Terrestrial Television
ed.	edition
Ed. (Eds.)	Editor (Editors)
e.g.	for example
et al.	and others
HMSAM	Hedonic-Motivation System Adoption Model
IAI	International Alliance for Interoperability
ICT	Information and Communication Technology
IDDS	Integrated Design and Delivery Solutions
IFC	Industry Foundation Classes
IIA	Infant Industry Argument
IKBMS	Integrated Knowledge-based Building Management System
IMB	Integrated Model of Behaviour
IMD	Integrated Models of Diffusion
IPD	Integrated Project Delivery
IT	Information Technology
MEP	Mechanical, Electrical and Plumbing
MIS	Management Information Systems
MM	Motivational Model
MPCU	Model of PC Utilization
MSBA	Model of Systemic BIM Adoption
NBS	National Building Specification
n.d.	no date

Abbreviation	Description
nD	n-Dimensional
p. (pp.)	page (pages)
PC	Personal Computer
PDF	Portable Document Format
QS	Quantity Surveyor/Quantity Surveying
QTO	Quantity Take/Taking Off
RAA	Reasoned Action Approach
ROI	Return on Investment
SCT	Social Cognitive Theory
SI	Social Influence
SMEs	Small and Medium Enterprises
SNA	Social Network Analysis
SNS	Social Network Site
SNT	Social Network Theory
SP	Sustainable Procurement
T&M	Transcript and Memos
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TV	Television
UK	United Kingdom
US	United States (of America)
UTAUT	Unified Theory of Acceptance and Use of Technology

Abbreviation	Description
VAM	Value-Based Adoption Model
viz.	namely
Vol.	Volume
WAP	Wireless Application Protocol
WC	Water Closet

LIST OF APPENDICES