

**Building Information Modelling (BIM)  
adoption and implementation:  
interaction between BIM specialists  
and non-BIM specialists in Vietnam**

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the degree of

**Doctor of Philosophy**

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# CERTIFICATE OF ORIGINAL AUTHORSHIP

I, **Ngoc Quyet Le** declare that this thesis, is submitted in fulfilment of the requirements for the award of *doctor of philosophy*, in the *School of Built Environment- Faculty of Design, Architecture and Building* at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

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# List of Research Papers

- Le, N.Q., Er, M., Sankaran, S. & Ta, N.B. 2020, 'Perspectives on BIM profession of BIM specialists and non-BIM specialists : case study in Vietnam', in H.M. Cuong, D. Van Dao, F. Benboudjema, S. Derrible, D.V.K. Huynh & A.M. Tang (eds), *Innovation for Sustainable Infrastructure, Lecture Notes in Civil Engineering 54*, vol. 54, Springer Nature Singapore Pte Ltd., pp. 1223–8.
- Le, N.Q., Er, M. & Sankaran, S. 2018a, 'Building Information Modeling (BIM) adoption and implementation: interaction between BIM users and non-BIM users', J. Shiau, V. Vimonsatit, S. Yazdani & A. Singh (eds), *Proceedings of the 4th Australasia and South-East Asia Structural Engineering and Construction Conference, 3-5 December 2018 in Brisbane, Australia*, 2018 ISEC Press, Fargo, ND, USA, pp. 1–6.
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# List of Acronyms

AEC: Architecture, Engineering and Construction

AT: Activity Theory

BEP: BIM Execution Plan

BIM: Building Information Model

BOQ: Bill of Quantity

CAD: Computer Aided Design

CDE: Common Data Environment

DOIT: Diffusion of Innovation Theory

EIR: Employer's Information Requirement

FM: Facility Management

ICT: Information Communication Technology

IFC: Industry Foundation Class

LOD: Level of Detail

LODt: Level of Development

MEP: Mechanical, Electrical and Plumbing

O&M: Operation and Maintenance

QS: Quantity Surveyor

RFI: Request for Information

SMEs: Small and Medium Sized Enterprises



# Abstract

Building Information Modelling (BIM) offers a digital platform for the integration of all project related information to facilitate effective communication vital to the success of construction projects. Recognising the importance of BIM in construction projects the Vietnamese government issued a mandate in 2016 requiring all public and “first category” projects (buildings which are 20 floors and greater or with a floor area greater than 20,000 square metres) to be implemented using BIM by 2021. This mandate and its implementation provide the context for this research.

This study introduces the combination of Diffusion of Innovation Theory (DOIT) and Activity Theory (AT) as a theoretical framework to investigate the current implementation of BIM in the Vietnamese context. Using a qualitative approach, 17 case studies from medium to large sized Architecture, Engineering and Construction (AEC) firms were studied to present a comprehensive understanding of the current status of BIM practices in the construction industry in Vietnam.

The units of analysis for this study were BIM specialists and non-BIM specialists working in the case studies as their roles are essential for the appropriate use of BIM in projects. 67 semi-structured interviews were used as the main instrument to collect data from these specialists. The data was analysed using a thematic analysis method aided by qualitative analysis software NVivo.

An interpretive framework combining DOIT and AT was used as a lens to identify the main themes of this research. The identified themes (i.e. the major findings) were then developed and reported including perspectives of BIM and non-BIM specialists on the BIM profession, the collaboration using BIM and the responses to contradictions emerging during BIM collaboration activities.

The significant contribution of this study arises from the development and application of the combined DOIT and AT framework which potentially assists the Vietnamese Government and AEC firms to examine BIM interactions in the context of recent BIM mandate. Many sources of conflicts during BIM interactions could be well defined under the lens of the framework and this creates conditions for planning BIM mediation. This study also contributes to research methodology as it applied the systematic combining research process (i.e. abductive approach) in which the initial theory (e.g. DOIT) is not fixed but evolves through on-going case analysis, the revision of literature and the combination with other theory (e.g. AT). In addition to the popularly inductive or deductive approach, abductive approach provides a more creative and flexible mode to gain insights of empirical phenomena and their contexts, in particular the issues on innovation adoption in fast moving digital era.