

An Empirical Study Investigating a Business Ecosystem Strategy for Value Co-Creation with BIM in AECO industry

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There is a disproportionately high level of concentration on the technological merits of Building Information Modelling (BIM) as being central to transformation in architecture, construction, engineering and operation (AECO) industry, both in the academy and as policy implementations, BIM practice underpinned by new Information and Communication technologies has been offered to the industry as a fundamentally new method of handling, creating and sharing information and new ways of working with other stakeholders by re-aligning the disciplinary roles and responsibilities (Eastman, Teicholz, Sacks, & Liston, 2011).

Various governments are currently developing strategies and mandates in an attempt to integrate their industry with the use of BIM. Public clients worldwide are implementing BIM with the specific aim of driving industry change (Senate Properties 2007, GSA 2007, UK Cabinet Office 2011, HKCIC 2014). Technocratic optimism amongst policy makers is not new (Dainty, Leiringer, Fernie, & Harty, 2017; Jacobsson, Linderöth, & Rowlinson, 2017). Although mandates for Open BIM are seen as necessary features in some countries, others are differentiating their strategies by re-creating a business ecosystem where public clients act as keystones providing a common BIM platform and integrating the supply chain. Some of these critical perspectives have already been emphasized by a few researchers who have focused on the role that industry plays in the adoption and use of BIM, including the socio-cognitive, socio-organizational, business and other contextual dimensions of the AEC industry in relation to ICT adoption for business transformation (Jacobsson et al., 2017; Langford & Male, 2008; Pries & Janszen, 1995). However, these earlier analytical frameworks which focused primarily on “*how AEC industry shapes the adoption and use of information*” are considered to be obsolete in this research.

Therefore, a “*business ecosystem*” concept is adopted as a useful framework for this research. Business ecosystem extends the focus on value capture from bilateral partnerships (David J. Teece, 1986) and industries (Porter, 1980) to the context of ecosystems. Business ecosystem analogy is not a matter of individual actors of any particular industry, but it rather refers to the structural and functional interrelationships among various actors and their physical environment within which they co-exist and co-evolve and that go beyond the traditional notion of industry towards suppliers of suppliers, clients, union labours, government and academia (Adner, 2017; Iansiti & Levien, 2004; Moore, 1997; David J. Teece & Linden, 2017).

Therefore, this research aims at uncovering the Exogenous vs. Endogenous factors to the evolution of the of long-run enterprise success of AECO organisations in two case studies and what relevant strategic considerations were necessary to innovate that lead to an effective business ecosystem emergence that responds intelligently to BIM adoption in AEC sector.

The first case study, National strategy for ICT development by AECO industry in Finland was chosen due to its characteristics. Finland is known to be one of the leaders in the implementation of BIM on a national scale. Its long history of trust and use of open standards, and its small and agile construction industry are noted to be the perfect environment for BIM to thrive. Although the Finnish AECO industry has been able to establish successful knowledge and innovation ecosystems to support early adoption of BIM, the innovating companies have struggled to establish a new business ecosystem and to create networked practices that were envisioned back in the 1980s. Despite the far-reaching technological capabilities within the industry, BIM has primarily been adopted as a “*productivity tool*” within individual firms which did not lead to a systemic change nor a business transformation within the sector. As a result of this analysis, the understanding of how various components of the ecosystems interacted and overlapped over time contributed to the research gap as an important research theme both for the strategic decision making and their future evolution because the research in *strategic management* studies has been primarily focused only on one of the ecosystems while several ecosystems usually co-exist and support each other (Muegge, 2013; Valkokari, 2015).

The second case study is a business ecosystem strategy for implementation of BIM and Integrated Project delivery by a private insurance company, Sutter Health, in California. Sutter Health has taken a leadership in re-creating a strategy for a business ecosystem with stakeholders from AECO industry in California where the activities are dedicated to maximizing value along with minimizing costs and providing totally new value with BIM to the client. The business ecosystem of Sutter Health has a strong link with knowledge ecosystem where the leadership is taken by the Stanford University. The research completed a full analysis of the first case study while the data for the second case study in California has not been collected yet and will not be collected before the workshop starts. The authors will rather present the preliminary results of the analysis and the analytical framework adopted in this research thus to get the feedback on the further advancement of this research.

The comparison of these two contrasting case studies will explain the sources of Sutter Health enterprise-level capabilities and its interaction with the external environment - that is how, when and why Sutter Health succeed in creating new business ecosystem to support BIM practices and Finland has struggled to make a systemic change in the long run despite all the above-mentioned capabilities.

To achieve the aim of the research, the research method is based primarily on an in-depth, multi-level qualitative inductive case study analysis (Eisenhardt, 1989) of both innovating organizations as well as their evolving ecosystems with the use of a constructivist grounded theory approach (Corbin & Strauss, 2008). The multi-level analysis includes micro (company performance, structure, strategy, endogenous factors), meso (culture, organisational learning and values) and macro (extended enterprise, e.g. business ecosystem - exogenous factors) levels. This study is supplemented with historical comparative analysis of business ecosystem’s evolution. A historical analysis, based on a qualitative inductive research, aids an identification and characterisation of the relationship between the innovating organisations and their external business environment (Clarysse, Wright, Bruneel, & Mahajan, 2014; Moore, 2006; David J. Teece, 2007; David J Teece, 2010).

Research implications: The research provides much needed empirical data for a qualitative BIM research. It covers a gap in BIM research that is mostly focused on technical aspects of BIM adoption while more challenges lay within dynamic capabilities of the innovating organisations and their business and innovation environments.

Practice implications: The research provides crucial insights central to the development of new policies to aid technology-driven industry transformation in various countries.

The originality of the research is in the understanding how business ecosystem evolves with the AECO industry and how exogenous and endogenous factors influence BIM practice in the long run. The research on the business ecosystem in AECO industry is considered nascent by the authors. Moreover, this research adds a new value to the study of business ecosystem evolution with empirical case studies derived from AECO context that is usually not presented in the strategic management literature.

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