

KEY DIMENSIONS OF BUILDING INFORMATION MODELLING (BIM) ORGANISATIONAL ADAPTATION FOR DIGITAL TRANSFORMATION IN MALAYSIAN PUBLIC SECTOR CONSTRUCTION PROJECTS: A CONCEPTUAL REVIEW

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Abstract: *The conceptual review in this study aims to identify areas of organisational adaptation that relate to Building Information Modelling (BIM) in the context of digital transformation, specifically in the Malaysian public sector construction industry. Design/methodology/approach: The eight scholarly studies purposefully chosen for the review were compared to basic methodological and theoretical sources. An interpretative 'construct-classification' approach distinguishes between the drivers of adoption, conditions of readiness, activities of change, domains of adaptation and outcomes of transformation. This is a focused conceptual synthesis, but not a systematic review completed. The results of this test lead to the identification of seven candidate areas of adaptation for further testing: strategy and leadership; organisational structure and governance; human competency and learning; culture and cognition; processes and workflows; technology and information management; collaboration and knowledge sharing. The demands of the institution and its BIM readiness are considered as contextual requirements and as antecedents conditions, not as adaptations. Originality/value: The review suggests explicit decision rules to recognize enacted organisational change and to differentiate permanent organisational arrangements from the temporary practices of projects. Practical implications: The proposed domains can be used for more precise assessment of the organisation by the Malaysian public clients, consultants and contractors, which will be followed by systematic synthesis and empirical validation.*

Keywords: *Building Information Modelling (BIM); Organisational Adaptation; Digital Transformation; Conceptual Review; Public Sector Construction; Construction Project Management; Malaysia*

Introduction

Digital transformation in construction is rapidly becoming a focus on the harmonisation of digital data and project governance, inter-organisational coordination and business processes. The digitisation of individual documents is not the only application of digital construction as integrated information systems can link the activities of an organization throughout the project lifecycle (Ershadi & Lijauco, 2026). Building Information Modelling (BIM) is one of the information practices that are introduced to the multidisciplinary project delivery, however, it requires organisational participation and coordinated action to effectively contribute to the project delivery process (Kassem & Ahmed, 2022). In construction projects, there are often distinct client, consultancy and contracting organisations with inter-dependant responsibilities and hence the need for investigation of organisational arrangements together with technological resources (Enegbuma et al., 2014; Kassem & Ahmed, 2022). Therefore, an analytical approach that is limited to software acquisition or model creation is not enough for comprehending BIM driven digital transformation.

BIM has been linked to better information sharing, better coordination of design work, and making the process of building work better coordinated, but the benefits for the organisation rely on the set up of working practices and information responsibilities (Enegbuma et al., 2014; Kassem & Ahmed, 2022). There are changes to the information protocol, roles and practices of professionals which must be introduced when implementing BIM (Kassem & Ahmed, 2022). Digital technology can thus serve as an enabler without creating long-term shifts in organisational practices or the decision-making process. Digital transformation in construction companies is discussed in Jacobsson and Linderoth (2021) regarding the implementation of digital tools and organisational changes and shifts in mental models of the employees. The difference places BIM-enabled transformation as a socio-technical phenomenon, not just a technological endeavor.

Conceptual clarity is essential as it is about BIM adoption, organisational readiness, BIM implementation, organisational adaptation and digital transformation, which are different analytical objects. In addition, Ahmed and Kassem (2018) developed and empirically tested a taxonomy of factors related to BIM adoption phases among architectural organisations while Magalhães et al. (2023) developed a conceptual construct of organisational readiness for BIM implementation. While the focus on change intention and preparatory capability points to the adoption process, Jacobsson and Linderoth (2021) argue that organisational adaptation involves changes to strategies, work practices, structure, rules and routines, suggesting a focus on something beyond the adoption process. Digital transformation is defined as a larger-scale reconfiguration of an organisation that is linked to digital technologies and digital management practices (Ershadi & Lijauco, 2026; Kassem & Ahmed, 2022).

The conceptual boundaries are followed by the operational criteria and lastly the key dimensions. Adoption drivers refer to influences affecting first innovation, while readiness conditions refer to resources and readiness for potential innovation (Ahmed & Kassem, 2018; Magalhães et al., 2023). Implementation activities refer to introducing and dealing with digital systems, while adaptation activities refer to adapting existing organisational arrangements (Jacobsson & Linderoth, 2021). Outcomes are about the impact of implementation or adaptation, not processes creating change.

While change related constructs are important in the identification of readiness, organisational readiness research serves as an important starting point, but readiness should not be confused

with realised change. Magalhães et al. (2023) analysed 69 Journal articles and created the Organizational Readiness to BIM construct with eleven interacting domains: strategic readiness, cultural readiness, resource readiness, cognitive readiness, technological readiness and partnership readiness. In the conceptual model proposed by Tuan Yaakub et al. (2026), technological readiness, organisational capability and leadership, human competency and digital culture, and external or regulatory conditions are integrated into a conceptual model that is focused on Malaysia. The proposed model for Malaysia has been based on the framework of Technology Organisation Environment (TOE), diffusion of innovation theory and organisational readiness concepts, and was deemed to be one of the future requirements for empirical validation (Tuan Yaakub et al., 2026). Therefore, readiness constructs are candidate explanatory inputs and do not evidence by themselves restructuring or modified work routines or sustained behavioural adaptation.

Complementary evidence for processes and configurations in relation to digital transformation can be found in the research that looks at organisational change. To create a human-centred change management framework for digital transformation in the construction industry, Bidhendi et al. (2026) used a literature review and a social network analysis. Training, assessment of competency and allocation of resources have emerged as major activities. Osorio-Gómez et al. (2024) examined the link between the organisational structure and digital transformation by conducting a survey of construction firms in Colombia. They received responses from 332 construction companies, who were the source of the empirical analysis. To capture organisational and behavioural aspects of digitalisation, Jacobsson and Linderöth (2021) conducted interviews and focus groups with newly graduated employees in the construction industry in Sweden. The various research designs provide evidence on activities, associations and interpretations; but no research offers empirical validation of an organisational adaptation framework for Malaysian public-sector construction projects.

Research on construction business digitalisation and institutional BIM projects provide a wider organisational context. Using a thematic analysis of selected literature, Ershadi and Lijauco (2026) synthesised drivers, barriers and outcomes of construction digitalisation across four domains of organisational, stakeholder, infrastructure and business environment. Kassem and Ahmed (2022) explored BIM adoption within 177 organisations and explored relationships between BIM adoption dynamics in organisations and institutional BIM market level initiatives. The macro–micro perspective stresses on the analytical distinction between external expectations and internal organization responses (Kassem & Ahmed, 2022). Sometimes the pressure from institutions can lead to adoption activity without creating lasting changes in institutional practices.

In the Malaysian context, the public sector are projects that require specific attention as they carry institutional responsibilities, organisational and project delivery processes. Various factors cited in the literature have been explored in Malaysian context such as people, process, technology, collaborative arrangement and strategic information technology (Enegbuma et al., 2014). Another study by Tuan Yaakub et al (2026), which is more recent, highlights leadership, digital culture, workforce capability and regulatory conditions as elements of organisational readiness in Malaysia. In public-sector project delivery, the government needs and the procurement arrangements can be considered as contextual influences, while internal changes in the approval processes, in project information duties and in project coordination processes can be seen as possible organizational responses (Kassem & Ahmed, 2022). The prevalence

and/or configuration of equivalent changes in Malaysian public agencies cannot be established from evidence obtained from private organisation or other national systems alone.

Institutions, permanent organisations and project delivery relationships (for short term projects) are part of the analytical setting. The environment in which BIM is used is influenced by the expectation of the institutions (Moelbye & Jacobsson, 2021; Jacobsson & Linderroth, 2021) and the main areas of focus under examination are the organisational strategies, responsibilities, work routines and information practices (Kassem & Ahmed, 2022). Project interfaces are observable, visible places where coordination and information sharing occurs but the project specific adjustments do not necessarily signify permanent organisational changes. Therefore, it is critical to distinguish between the organisational and the project level in order to understand evidence from multi scientific construction sites.

There is ample existing scholarship that offers significant insights into the drivers of BIM adoption, the readiness of organisations, activities required to implement BIM and broader digitalisation of the construction industry (Ahmed & Kassem, 2018; Bidhendi et al., 2026; Ershadi & Lijauco, 2026; Magalhães et al., 2023). Constructs from various research traditions, however, cannot be used as uniform measures of organisational adaptation. The focused source comparison indicates a potential unclassifiable situation: there is no clear distinction between evidence of willingness and technical capacity or initial implementation, and evidence of changes to an organisational role, recurring procedure, or institutionalised information responsibility. Another analytical constraint is the lack of a comprehensive direct coverage of international organisational evidence when transferring to Malaysian public sector clients, consultants and contractors, addressed in the analysed corpus. Therefore, in the review, clear demarcations are suggested between antecedent conditions, change activities, enacted organizational changes and possible transformation outcomes, with a continued emphasis on a more comprehensive systematic and context-sensitive evidence assessment.

The conceptual review is set to seek to identify, differentiate, and synthesize possible dimensions of BIM organizational adaptation to digital transformation in the construction industry of Malaysia, especially in public sector construction projects. Analytical procedure involves comparing the documented constructs, the role of each construct in the function and the organisational level targeted with each source. The expected deliverables include a defensible preliminary dimensional structure for strategic leadership, structure and governance, human competency and learning, culture and behaviour, processes and workflows, technological information management and collaboration and knowledge exchange. The proposed dimensions are conceptualized as tentative categories not the outcome of an already completed systematic review or an empirically derived measurement model. A systematic evidence synthesis and investigation in the Malaysian public sector is still required before claims with regard to dimensional completeness, relative importance or causal relationships can be supported. Figure 1 is provided immediately below to differentiate the constructs related to BIM without suggesting any order of implementation.

BIM CONSTRUCT CLASSIFICATION

Classification concerns the meaning of evidence, not an assumed implementation sequence.

Construct	Analytical object	Evidence classification
Adoption	Innovation decision or intention	Decision and drivers
Readiness	Capability and commitment before change	Antecedent condition
Implementation	Introduction of BIM tools and practices	Change-management activity
Adaptation	Change to enduring organisational arrangements	Focal construct for this review
Transformation	Broader reorganisation of digital working	Potential consequence

Figure 1: Analytical Distinctions Between BIM Related Constructs

Sources: The classification was developed by the authors based on a conceptual synthesis of the literature (Jacobsson & Linderoth, 2021; Kassem & Ahmed, 2022; Magalhães et al., 2023).

Figure 1 shows the analytical objects of the BIM adoption, readiness, implementation, organisational adaptation and wider transformation. The highlighted adaptation category is related to changes that are visible in the existing strategies, organizational roles, routine practices and information responsibilities. The classification does not allow for the inclusion of preparatory inputs and technology acquisition events as evidence of sustained organisational change. The figure shows a conceptual understanding of the literature cited and does not indicate a causal sequence or empirical stages.

Review Aims and Research Questions

The review is intended to review and compare the BIM adoption, readiness studies, change management studies, and digital transformation studies to establish the provisional domains for organisational adaptation and to assess the possible relevance of these studies to the construction industry in Malaysia. The permanent organisation is the main conceptual interpretation entity, taking into consideration public clients, consultants and contracting agencies. There are related, but different, levels of analysis for temporary project organisations and institutional environments as project delivery may rely on inter organisational coordination. The comparison is thus between changes that are institutionalised in the long-lived organisations and temporary responses which are only implemented in individual projects. The final output is not to be a set of final factor rankings, but a clear set of candidate definitions, exclusions and evidence requirements.

The conceptual review is guided by three article level research questions. Research Question 1 is where does BIM enabled digital transformation studies talk about the domains of organisational change? The next question is how to differentiate the reported domains from adoption drivers, organisational readiness, implementation activities and transformation outcomes in Research Question 2? Research Question 3 is to find out what contextual constraints and confirmatory factors appear when the candidate domains are interpreted in the context of construction projects in the public sector in Malaysia. Questions help define concept definitions, and inclusion boundaries, and formulate initial organisational indicators. The proposed synthesis does not provide any statistical weights, causal coefficients, or empirically validate the candidate domains.

Conceptual Review and Theoretical Positioning

Boundaries between adoption, readiness, implementation, adaptation and transformation

Adoption is the decision to adopt or take up an innovation, readiness is a state of conditions and commitment that facilitate the adoption of a digital technology, implementation is organised activities aimed at bringing a technology into use. In contrast, organisational adaptation is a way that identifies enacted changes within the organisation that in turn allow technology to become part of the way the organization functions. Digital transformation is an organisation wide goal, which requires substantial changes in practice and value creation. This ordering is not necessarily a linear sequence; a firm can adopt BIM, but not necessarily change the organisation's decision routines, and successive projects can be implemented without permanent changes in the organisation (Jacobsson & Linderoth, 2021; Magalhães et al., 2023; Vial, 2019).

Complementary theoretical lenses

For measuring shared commitment and capacity for implementing change, readiness theory, as promoted by Weiner (2009), is most useful. The use of innovation diffusion perspectives to explain adoption decisions, for example, and perceived innovation attributes, as done by Ahmed and Kassem (2018). Technology, organisation, environment and institutional approaches reveal the role of technological characteristics, institutional factors and external factors in influencing adoption. For BIM, the micro macro analysis of Kassem and Ahmed (2022) is particularly relevant since public policy signals do not always have a direct impact on organisational practice. Literature on change management also tells of mobilisation, competence development and routinisation (Bidhendi et al., 2026). Theories, then, have different explanatory functions rather than providing "dimension lists" to be interchanged. Table 1 is provided as shown below to clarify the functional classification of BIM related constructs. The data on market-level BIM diffusion is an extra analytical perspective and not evidence of an organisation's adaptation (Succar & Kassem, 2015).

Table 1: Conceptual Classification Used to Prevent Construct Conflation

Construct category	Meaning in this review	Illustrative distinction
External driver	Condition that motivates or constrains a response.	A public BIM requirement is pressure; an agency revising its approvals is possible adaptation.
Readiness / capability	Resources or commitment available before, or early in, change.	Staff with BIM certificates are capable but may still follow unchanged workflows.
Change activity	Intervention intended to produce organisational change.	Training or a pilot BIM workshop does not alone prove routine level adaptation.
Adaptation dimension	Domain of enacted, repeated or institutionalised organisational change.	Reassigned model review authority documented in a revised approval procedure.
Transformation outcome	Sustained consequences of multiple adaptations.	Embedded model based delivery or improved integration; causal attribution requires evidence.

Source: Authors' synthesis from the reviewed evidence base.

Table 1 differentiates a preparatory condition from an implemented change and an evaluated outcome. Organisational adaptation is operationalised through an identifiable difference between prior and revised institutionalised practice. The categories provide uniform screening and coding guidelines for the future full text synthesis. The classification remains conceptual and requires verification against source-level evidence during systematic analysis.

The boundary test examines whether a suggested construct describes (a) an antecedent, (b) an intervention, (c) a provable alteration in how an organisation functions, or (d) an outcome. The same term may inhabit several categories throughout investigations. For instance, “collaboration” may refer to an enabling attitude, an information-exchange technique, or a completed project result. Classification must rest on operational meaning and evidence, not label matching. Braun and Clarke (2006) inform the logic of systematic theme identification, although theoretical sorting is additionally essential to avoid inadvertently equating conceptually different codes.

Method

Review design and source status

This paper is a focused, critical conceptual review drawing on eight purposefully selected substantive BIM digital construction papers provided for the manuscript and complementary methodological and theoretical publications. The substantive studies comprise Jacobsson and Linderöth (2021); Ahmed and Kassem (2018); Kassem and Ahmed (2022); Magalhães et al. (2023); Enegbuma et al. (2014); Osorio-Gómez et al. (2024); Ershadi and Lijauco (2026); and Bidhendi et al. (2026). Tuan Yaakub et al. (2026) and Hidayah et al. (2020) are considered as targeted Malaysian contextual supplements. These sources were purposively assembled, not retrieved through a completed reproducible database search. Consequently, the sample is a literature based conceptual starting corpus, not the final population of studies meeting PRISMA eligibility criteria.

Eligibility framework and planned search

For a subsequent systematic stage, eligible sources should investigate organisational, project or institutional dimensions of BIM or construction digital transformation and provide interpretable conceptual or empirical evidence on structures, capabilities, governance, routines, culture, learning or collaboration. Purely technical BIM demonstrations without organisational analysis, unsupported commentary and studies lacking extractable constructs would be excluded or retained only for background. The search should combine BIM and digital transformation terms with organisational change and adaptation concepts in Scopus and Web of Science, supplemented by targeted citation chasing and contextual searches concerning Malaysia, public clients and procurement. Search dates, exact Boolean strings, filters, records and exclusion reasons must be deposited in an auditable log (Snyder, 2019).

An illustrative query is ("building information model*" OR BIM) AND ("organisational adapt*" OR "organizational adapt*" OR "organisational change" OR "organizational change" OR "change management" OR "digital transformation") AND (construction OR "built environment"). A second query without the mandatory BIM term should capture research on organisational reconfiguration in construction digitalisation. Adding “Malaysia” to every query would unnecessarily exclude transferable theoretical foundations. Searches should be piloted for recall and precision before the protocol is fixed.

Screening, extraction and analytical procedure

The proposed systematic phase begins with duplicate removal, independent or cross-checked title and abstract screening, full text eligibility assessment and documentation of exclusion reasons. A review log will identify each retrieved record, the source database, search date and the final eligibility decision. PRISMA 2020 can guide transparent reporting of study selection, whereas PRISMA-S can guide reproducible reporting of search strategies (Page et al., 2021; Rethlefsen et al., 2021). No numerical PRISMA results are presented because the current source base was purposively selected rather than generated through a complete protocol-based search. The absence of verified screening data prevents claims concerning review exhaustiveness or the frequency of identified adaptation domains.

For each eligible source the extraction matrix should record author or year, country, organisational level, study design, theoretical lens, definition of the construct, reported antecedents, enacted changes, outcomes, evidential strength and contextual fit. Open coding generates substantive change concepts; axial coding groups related concepts and assesses overlap; selective coding develops provisional higher order domains, while testing contradictory evidence and alternative aggregations. A coding rule requires a source passage indicating organisational practice or structure has changed before the term is classified as an adaptation indicator. Mere mention frequency is insufficient evidence of causal or practical importance (Braun & Clarke, 2006). A preliminary extraction template will preserve source quotations, coding decisions and competing conceptual interpretations. Interpretative coding and thematic synthesis should be organised around documented source concepts and transparent comparison procedures (Braun & Clarke, 2006; Thomas & Harden, 2008).

Quality appraisal and evidence caution

Different study designs warrant differentiated appraisal, and mixed methods designs require criteria appropriate to individual empirical components (Hong et al., 2018). Empirical interviews should be evaluated for sampling, analysis and triangulation; surveys for measurement, sampling and inferential limits; conceptual papers for definitional precision and theory integration; and reviews for transparency of retrieval, screening and synthesis. A cross-design numerical quality score is not inferred. Repeated citation of the same primary research across reviews should not be double counted as independent confirmation. The present paper offers qualitative source level limitations but does not claim formal JBI, MMAT or AMSTAR assessment has been completed. The conclusions remain provisional until a full evidence audit.

Results and Preliminary Conceptual Synthesis

Study coverage and evidence characteristics

The focused source comparison supplies different kinds of knowledge rather than a pooled estimate. Jacobsson and Linderoth (2021) provide a clear conceptualisation of adaptation and qualitative evidence about established work practices in Sweden. Ahmed and Kassem (2018) empirically validate an adoption factor taxonomy but primarily examine the decision process, not longitudinal adaptation. Magalhães et al. (2023) develop readiness domains through literature-informed design science work, explicitly acknowledging the need for real-world testing. Bidhendi et al. (2026) synthesise change-management activities and human centred principles, but the centrality of an activity within an analytic network should not be interpreted as proof of a causal effect in Malaysian public sector organisations.

Additional publications extend the conceptual and geographical scope of the reviewed evidence. Ershadi and Lijauco (2026) synthesise drivers, barriers and outcomes of construction-business digitalisation; Osorio-Gómez et al. (2024) examine organisational structure and digital transformation using Colombian construction sector evidence. Kassem and Ahmed (2022) investigate interactions between organisational BIM adoption and institutional initiatives, while Enegbuma et al. (2014) contribute a preliminary adoption model developed in a Malaysian setting. The conceptual framework of Tuan Yaakub et al. (2026) provides additional Malaysian readiness categories but does not supply empirical proof of realised organisational adaptation. The supply chain management and BIM article by Hidayah et al. (2020) contributes a framework development precedent and a public sector project coordination concern rather than validated organisational change findings. Table 2 is presented immediately below to compare the contributions, study designs and interpretative limitations of the core publications.

Table 2: Core Evidence and Evidential Boundary for Organisational Adaptation

Study	Contribution relevant to Research Objective	Evidence or transferability boundary
Jacobsson & Linderöth (2021)	Three conditions for construction digital transformation; strategies, rules, routines and mental models.	Qualitative Swedish firms; specific to graduates and managers, not Malaysian public agencies.
Ahmed & Kassem (2018)	Validated taxonomy of adoption drivers and decision stages.	Driver taxonomy does not measure changed organisational routines.
Magalhães et al. (2023)	Readiness construct comprising interacting strategic, cultural, IT and other domains.	Conceptual model requires real-life testing; readiness ≠ adaptation.
Bidhendi et al. (2026)	Human centred change activities and phased change framework.	Analytical priority of activities does not demonstrate local causal effectiveness.
Ershadi & Lijauco (2026)	Drivers, barriers and outcomes across organisation, stakeholders, infrastructure and environment.	Broader construction digitalisation, not exclusively BIM or public sector adaptation.
Osorio-Gómez et al. (2024)	Evidence concerning organisational structure and digital transformation.	Colombian construction sample; sector and geographic transfer require caution.
Kassem & Ahmed (2022)	Micro macro interaction, institutional influence and BIM adoption dynamics.	Adoption dynamics and policy relation do not directly establish permanent routine change.
Enegbuma et al. (2014)	Malaysian people, process, technology, strategic IT and collaboration.	Preliminary adoption model; not a validated adaptation framework.

Source: Authors' synthesis from the reviewed evidence base.

Table 2 indicates that the reviewed sources investigate different organisational phenomena with distinct research designs. Empirical associations, qualitative interpretations and conceptual readiness domains cannot be combined into a single validated effect. The Malaysian relevance of each source depends upon the original population, research setting and unit of analysis. The evidence classification therefore informs conceptual selection without establishing a nationally representative dimensional model.

Convergent concepts and rival classifications

Leadership, training, digital culture, integration and collaboration recur in the examined papers, but shared wording does not establish conceptual equivalence. An organisational strategy can be an initial commitment, a mechanism of change, or an enacted governing routine. Similarly, technological infrastructure is primarily a readiness input unless accompanied by changes to responsibility for data ownership, validation, approval, exchange or retention. Public mandates are contextual pressures, while the internal redesign needed to comply with institutional requirements is potentially organisational adaptation. This distinction is crucial in project based industries because a BIM practice can exist within a single project without being institutionalised across the parent organisation.

Seven provisional organisational adaptation dimensions

The conceptual comparison suggests seven candidate dimensions. The candidate domains are proposed as analytically separable domains of change, not seven empirically independent latent variables. For each domain, operationalisation must record the organisational subject, the previous practice, the revised practice, repeated application of the revised practice and documentary or participant corroboration. A dimension should be retained because the proposed construct explains identifiable organisational change rather than simply because the construct appears frequently in BIM literature. *Table 3 is presented immediately below to define the seven provisional domains and the relevant conceptual boundaries.*

Table 3: Candidate Dimensions, Evidence of Adaptation and Exclusions

Domain	Adaptation relevant evidence to seek	Not sufficient by itself
D1 Strategy and leadership	Revised digital decision rights, recurring resource priorities, accountable BIM governance and leadership routines.	Stated vision, executive endorsement or a one-off budget allocation.
D2 Structure and governance	Reassigned approval/coordination roles, updated organisational charts, controls and escalation procedures.	Nominal BIM champion or informal project level assignment.
D3 Human competency and learning	Institutionalised capability assessment, career pathways, peer learning and transferable BIM skill systems.	Training attendance or certificates alone.
D4 Culture, behaviour and cognition	Demonstrable changes in collective work expectations, model trust practices, willingness to share and norms of use.	Positive survey attitude without observed routine change.
D5 Processes and workflows	Repeated BIM integrated approvals, coordination, design review and information handovers.	One BIM enabled pilot or a single clash detection activity.
D6 Technology and information management	Embedded rules for interoperable exchange, access, model validation, information ownership and auditability.	Software purchase, licences or isolated cloud storage.
D7 Collaboration and knowledge sharing	Stable cross party information protocols, lessons learned mechanisms and shared accountability interfaces.	A meeting, project contact list or declared willingness to collaborate.

Source: Authors' synthesis from the reviewed evidence base.

Table 3 links each proposed adaptation dimension with an example of a revised organisational practice and an exclusion test. Routine changes in decision authority, knowledge processes, coordination or information governance provide more direct evidence than general support for BIM. Observed adjustments should be attributable to an organisation rather than solely to a temporary project team. The definitions remain preliminary and may require merging, subdivision or rejection following full evidence synthesis.

Interpretation of individual domains

D1 and D2 describe changes in authority and the governance of digital work. Leadership adaptation involves the recurrent exercise of direction and accountability, while structural adaptation concerns who approves, coordinates and is responsible for information. Although closely connected, the two domains can diverge: managers may support BIM without changing formal roles; conversely, new digital roles can exist without senior level commitment. The source base provides grounds for treating both as candidate domains, but empirical distinctiveness remains open (Osorio-Gómez et al., 2024; Bidhendi et al., 2026).

D3 and D4 concern people yet should not be collapsed prematurely. Competency and learning capture institutional arrangements for developing and retaining expertise; cultural and cognitive adaptation capture changes in collective expectations, beliefs and actual work behaviour. The contrast is evident in Jacobsson and Linderöth (2021): technically competent newcomers can become constrained by established practice. Readiness frameworks identify individual and cultural preparedness, but adaptation research must investigate what employees and managers subsequently do differently (Magalhães et al., 2023; Tuan Yaakub et al., 2026).

D5 and D6 capture process and information dimensions. Workflow adaptation is evidenced by changed sequences of coordination, review and approval across project stages. Information-management adaptation involves durable rules concerning versions, data responsibilities, model assurance, interfaces and access. These domains often co-evolve: a new information protocol that is never used cannot count as an enacted workflow change, while an automated task does not necessarily create organisational transformation. The people, process and technology distinctions in Enegbuma et al. (2014) assist analysis but should not be assumed to establish the seven-domain scheme.

D7 addresses interdependence across professional and contractual boundaries. Collaboration becomes organisational adaptation when responsibilities and communication practices are repeatedly changed, not merely when parties exchange models during one project. Kassem and Ahmed (2022) demonstrate the importance of coordinated micro and macro level action in BIM diffusion; Hidayah et al. (2020) point to coordination and dispute related difficulties in Malaysian public sector project settings. These observations justify examining collaboration carefully, but do not themselves verify durable adaptation in specific agencies.

Public sector clients, consultants and contractors

A Malaysian public client could exhibit D2, D5 and D6 through revised information approval authority, acceptance checkpoints and model delivery requirements embedded in agency operations. A design consultancy may exhibit D3, D5 and D7 through staff development, integrated design review practices and consistent exchanges with project partners. A contractor may demonstrate D1, D5 and D6 through resourced digital planning, site to model feedback, information control and handover routines. These are illustrative assessment propositions, not claims that Malaysian organisations currently perform the stated activities. Evidence should

identify whether documented adjustments belong to an agency, a firm, a project team or the wider delivery network.

Proposed Conceptual Framework

The preliminary conceptual architecture distinguishes the institutional and project context from readiness conditions, planned change management activities and actual organisational adaptation. The seven dimensions describe changes in strategic direction, governance arrangements, learning processes, culture, work routines, digital information management and collaboration. The possible transformation outcomes are analytical consequences requiring subsequent empirical investigation rather than outcomes established by the review. External requirements and BIM readiness are deliberately retained as explanatory context instead of being reported as accomplished organisational change. *Figure 2 is positioned immediately below to display the five analytical layers and seven candidate adaptation domains.*

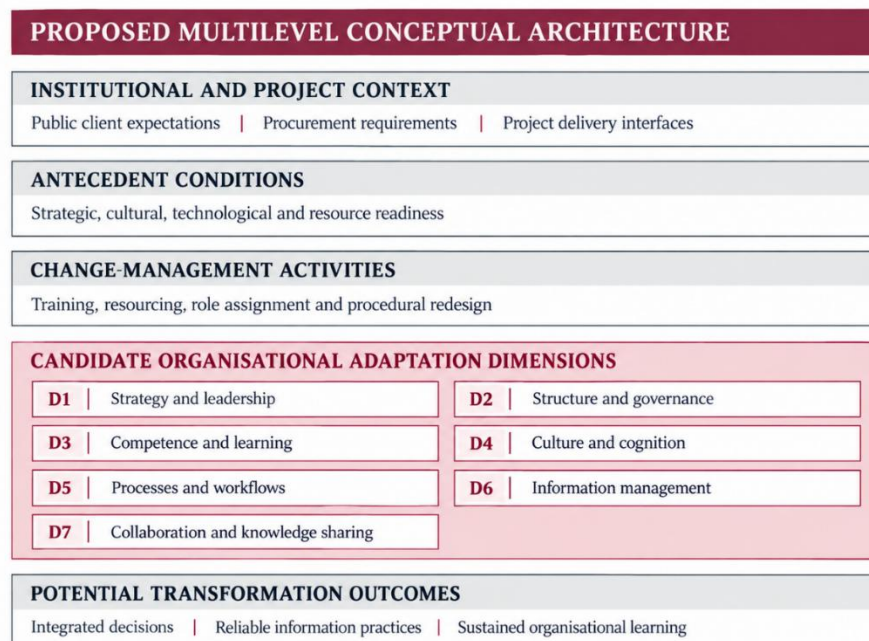


Figure 2: Proposed Multilevel Conceptual Architecture for BIM Organisational Adaptation

Source: Author developed preliminary synthesis; connectors and causal direction are intentionally omitted

Figure 2 distinguishes context, antecedent readiness, change management activities, candidate organisational adaptation domains and possible transformation outcomes. The conceptual layers are presented without arrows because directional or causal linkages have not been tested. The framework is intended to guide subsequent extraction and validation rather than provide an empirically established implementation sequence. Documented organisational adjustments and repeated use across projects remain necessary for classifying any proposed domain as organisational adaptation.

The seven domains are not necessarily mutually exclusive. Strategy and governance may combine into one higher order factor, competency and culture may be empirically inseparable, and process integration may depend on information management. Equally, project level collaboration could form a distinct inter organisational construct rather than an internal organisational dimension. Alternative structures must be retained as plausible until comparative

source extraction and fieldwork establish construct boundaries. Public sector governance can be represented as a contextual influence, while changes enacted within government agencies are evaluated under D1, D2, D5 or D6, depending on the operational meaning of each adjustment.

Discussion

Conceptually new

The proposed conceptual contribution lies in changing the object of explanation from the conditions associated with BIM uptake to the alterations made to recurring organisational practices. Adoption taxonomies examine factors influencing BIM decisions, readiness models examine preparatory capability and commitment, and change management frameworks organise activities intended to facilitate transition (Ahmed & Kassem, 2018; Magalhães et al., 2023; Bidhendi et al., 2026). Organisational adaptation is treated instead as an observable change to governance, roles, routines or information responsibilities through which BIM related work becomes embedded in organisational functioning (Jacobsson & Linderöth, 2021). The proposed distinction is particularly salient when temporary project compliance coexists with unchanged organisational procedures, although the prevalence of such a pattern in Malaysia has not been established. A provisional seven domain classification provides a set of testable analytical boundaries and documentary indicators, not a confirmed measurement scale or demonstration of causal novelty.

Interdependence and competing models

The seven domains should be viewed as an initial taxonomy of questions rather than a prescriptive seven factor measurement instrument. A reduced model with three overarching dimensions governance, people and practices may be preferable if future data show persistent overlap. Conversely, information governance or inter organisational coordination may warrant independent treatment within public programmes. Construct selection should consider conceptual distinctiveness, evidence of actual change and explanatory usefulness for construction project management, rather than statistical fit alone. The framework should also be tested against negative cases in which BIM is implemented yet staffing arrangements, approvals and information decisions remain unchanged.

Integrated Design Studies and project-management implications

For Integrated Design Studies, adaptation should be observable across the design construction operation continuum and at the interface between permanent employers and temporary delivery teams. For project management, organisational adaptation affects how responsibility, communication, decision authority and information assurance are organised. A project may report more efficient coordination without the client institution adopting a new framework review policy; the first statement concerns project performance, while the second concerns organisational change. Cross level analysis can therefore explain why successful pilots do not necessarily become durable organisational capabilities.

In Malaysia, public sector relevance must be argued carefully. Policy and procurement arrangements can create incentives, but the exact current requirements cannot be inferred from international literature or historical BIM adoption studies. The research must obtain current authoritative policy texts, map public client decision processes and triangulate professional accounts with dated organisational documents. Comparisons should also control for firm size, contractual role, organisational maturity, project type and procurement arrangement. The value

of the proposed domains lies in sharpening these empirical questions rather than predetermining the answers.

Future research and validation route

The next stage should undertake a reproducible systematic search, evidence level appraisal and source linked thematic matrix. Candidate dimensions and disconfirming concepts should then be assessed through interviews, document review and, if justified, expert consensus or a survey instrument. Documentary indicators could include revised BIM execution responsibilities, information acceptance policies, training and competency records, change logs, meeting to decision workflows, and repeat use across projects. Longitudinal observation would be particularly valuable for distinguishing a temporary project intervention from sustained organisational adaptation. Model validity should be assessed before any weighting or ranking is proposed.

Potential Biases and Limitations

The present synthesis is limited by purposive source selection, heterogeneity in study designs and a substantial reliance on international evidence. The source comparison is not a completed systematic review and therefore cannot provide exhaustive prevalence, evidence weighting or PRISMA based claims. Conceptual papers often present plausible constructs without demonstrating practical enactment; empirical studies may investigate adoption intentions or single time point organisational perceptions rather than adaptation trajectories. Consequently, no identified domain should be represented as a confirmed Malaysian public-sector determinant.

A second risk is constructing conflation and selective confirmation. Concepts such as readiness, culture, capability, leadership and outcomes recur under different definitions. Coders may inadvertently classify all positive BIM conditions as adaptation, or treat repeated reference to the same primary source as independent corroboration. A full evidence matrix should preserve original terminology, classification rationale, source quotations or page references, disagreements and rival models. Theoretical abstraction must not erase contextual qualifiers. Table 4 is presented immediately below to consolidate principal evidence risks and required safeguards.

Table 4: Main Bias Risks and Next Stage Safeguards

Risk	Consequence	Required next step
Purposive corpus / database coverage	Missing divergent or non successful BIM studies.	Log multi database searches, citation tracing and eligibility exclusions.
Construct conflation	Readiness, implementation and outcomes misclassified as adaptation.	Apply operational coding rules; retain ambiguous and counterexample cases.
Cross study overlap / design heterogeneity	Inflated confidence from dependent or non-comparable evidence.	Map overlapping primary studies and assess each research design appropriately.
Contextual transfer	International/firm level findings treated as public sector Malaysia evidence.	Separate direct Malaysian evidence from analogical international findings.
Temporal/causal limitations	Short term activities mistaken for durable transformation.	Collect before after and cross project organisational records.

Source: Authors' synthesis from the reviewed evidence base.

Table 4 highlights selection limitations, misclassification, source overlap, geographical transferability and temporal ambiguity. Each risk can affect a claim about organisational adaptation even where the cited underlying study is methodologically sound. Future source screening should preserve negative cases, alternative definitions and explicit exclusions. An auditable coding log will be necessary before presenting the conceptual classification as the outcome of a completed systematic review.

Conclusions

In response to Research Objective, the focused conceptual comparison proposes seven candidate domains of BIM organisational adaptation: strategy and leadership, structure and governance, human competency and learning, culture and cognition, processes and workflows, technology and information management, and collaboration and knowledge sharing. These domains describe possible changes to enduring organisational practices rather than indicators of technology possession or willingness to adopt BIM. Documentary evidence of changed responsibilities, repeat use of revised procedures and organisational learning is required before any adaptation claim can be strengthened. The seven-domain specification remains a proposed analytical taxonomy and not an empirically verified seven factor model. Future systematic synthesis and Malaysian public sector investigation must determine dimensional distinctiveness, contextual relevance and evidence strength.

For Malaysian public sector construction, government requirements and initial organisational readiness can be treated as contextual influences and antecedent conditions, while adaptations should be examined within agencies, consultancies, contractors and delivery interfaces. Differences between organisation level and temporary project level arrangements must be retained during empirical investigation. A completed systematic review and context sensitive validation are required before any claim about the completeness, hierarchy, causal relationship or comparative importance of the seven domains can be accepted. The principal contribution is evidence informed framework for asking precise organisational change questions and designing subsequent doctoral research.

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