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A CONCEPTUAL FRAMEWORK FOR THE ADOPTION OF A LIFE CYCLE ASSESSMENT-BASED EMISSIONS TRADING SCHEME IN THE AUSTRALIAN CONSTRUCTION SECTOR

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ABSTRACT

As carbon governance in the construction sector shifts from a narrow focus on operational energy towards whole-of-life performance, understanding stakeholder intentions to adopt a Life Cycle Assessment (LCA)-based Emissions Trading Scheme (ETS) becomes increasingly relevant to exploring market-driven decarbonisation pathways for the industry. This study proposes a conceptual framework for understanding the factors influencing stakeholder adoption of an LCA-based ETS in the Australian construction sector. Drawing on a literature review, the proposed framework is underpinned by institutional theory, the technology acceptance model (TAM), and stakeholder theory, with systems thinking providing a broader analytical perspective. Three groups of factors form the basis of the framework. The first concerns the implementation barriers and potential benefits associated with LCA and ETS. The second involves the institutional conditions shaping the adoption context, including coercive, normative, and mimetic pressures, alongside stakeholder-related factors such as carbon mitigation perception and stakeholder pressure. The third relates to the behavioural constructs through which stakeholders form adoption intentions, namely perceived usefulness, perceived ease of use, and behavioural intention. The framework brings these factors together into a structured relationship linking external context, cognitive appraisal, and behavioural judgement. It suggests that the adoption of an LCA-based ETS should be understood as a progressive process situated within a broader socio-technical and institutional system.

Keywords: *Conceptual Framework; Construction Sector; Emissions Trading Scheme (ETS); Life Cycle Assessment (LCA); Stakeholder Adoption.*

1. INTRODUCTION

The construction sector is one of the major sources of global carbon emissions, accounting for around 37 to 39 per cent of energy- and industrial process-related carbon

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dioxide emissions worldwide (United Nations Environment Programme & Global Alliance for Buildings and Construction [UNEP & GlobalABC], 2024). In Australia, the sector also occupies an important position in national energy use and decarbonisation efforts, making it a critical area for climate change mitigation (Department of Climate Change, Energy, the Environment and Water [DCCEEW], 2026). As electricity systems continue to decarbonise, the relative share of operational emissions is gradually declining, while emissions associated with material production and construction are becoming more significant (Röck et al., 2020; UNEP & GlobalABC, 2024). This shift indicates that whole-of-life considerations are becoming increasingly important in carbon governance for the built environment. In this context, Life Cycle Assessment (LCA) and Emissions Trading Scheme (ETS) have been discussed as two potential mechanisms that may support this transition. LCA provides a systematic approach to assessing environmental impacts across the life cycle of buildings (Abd Rashid & Yusoff, 2015), while ETS introduces economic incentives for emission reduction through market-based carbon pricing (Aldy & Stavins, 2012). However, although both have been widely discussed within their respective fields, limited attention has been paid to the conditions under which they could be integrated in the construction sector (Ibn-Mohammed et al., 2013; Liu & Loo, 2026).

Central to this discussion is whether stakeholders in the construction sector would regard an LCA-based ETS as a feasible and worthwhile governance mechanism. Existing studies on carbon trading in the construction sector have mainly focused on jurisdictions where ETS or carbon pricing frameworks are already in place, such as China, South Korea, the European Union, and California, with more attention given to institutional design than to stakeholder adoption behaviour (Chen et al., 2015; Du et al., 2025; Liu & Loo, 2026). In Australia, the national carbon pricing mechanism was repealed in 2014, and there is still no ETS covering the construction sector (Commonwealth of Australia, 2014; International Carbon Action Partnership [ICAP], 2024). Research on stakeholder willingness to adopt such a mechanism therefore remains limited. Current research has not sufficiently explained how institutional pressures, perceived barriers, perceived benefits, and stakeholder expectations may interact to shape adoption intention towards an LCA-based ETS, especially where mature carbon market infrastructure is absent. In response to these gaps, this study proposes a conceptual framework for understanding the factors influencing stakeholder adoption of an LCA-based ETS in the Australian construction sector. Through a literature review, the paper integrates institutional theory, the technology acceptance model (TAM), and stakeholder theory, with systems thinking providing a broader analytical perspective. The contribution of the paper does not lie in reporting empirical findings, but in identifying the key factors influencing adoption of an LCA-based ETS and offering a theoretical foundation for subsequent empirical research.

2. METHOD

This study is a conceptual paper based on a targeted literature review. The review focused on four areas: the shift towards whole-of-life carbon management in construction, the roles and constraints of LCA and ETS as complementary mechanisms, institutional and stakeholder factors shaping adoption contexts, and technology acceptance as a lens for understanding behavioural intention. Publications were selected based on their relevance to whole-of-life carbon management, LCA and ETS mechanisms, construction sector decarbonisation, and stakeholder adoption behaviour. Studies outside the construction or built environment context were included only where they provided transferable insights into ETS mechanisms or adoption theory. The selected literature was synthesised thematically to identify the technical, institutional, cognitive, and stakeholder-related factors informing the proposed conceptual framework.

The review was organised around three strands: problem context, implementation conditions, and adoption-related constructs. The first strand addresses the decarbonisation challenges associated with whole-of-life considerations in the construction sector. The second examines the respective roles and implementation constraints of LCA and ETS. The third considers the institutional, stakeholder, and behavioural factors that may shape adoption. These strands are then brought together to inform the development of a conceptual framework for understanding stakeholder adoption intention.

3. LITERATURE REVIEW FINDINGS

3.1 THE SHIFT TO WHOLE-OF-LIFE DECARBONISATION AND THE NEED FOR A SYSTEMS PERSPECTIVE

The preceding discussion indicates that decarbonisation in the construction sector increasingly requires attention to whole-of-life carbon performance, rather than operational energy use alone. In low-energy buildings, embodied carbon may account for close to half of whole-of-life emissions and, in some cases, may exceed operational emissions (Pomponi & Moncaster, 2018; Röck et al., 2020; UNEP & GlobalABC, 2024). As embodied carbon becomes more significant within total life cycle emissions, key decarbonisation opportunities are increasingly associated with material selection, supply chain management, and early design decisions (De Wolf et al., 2017; Pomponi & Moncaster, 2018). In this context, LCA has become an important tool for identifying emission hotspots and supporting whole-of-life decision-making (Abd Rashid & Yusoff, 2015; Buyle et al., 2013).

This shift also suggests that an LCA-based ETS may be better understood as more than a simple combination of two separate tools, but rather as a governance issue that spans multiple project stages and involves diverse stakeholder interests, as indicated by the construction carbon trading literature and stakeholder theory (Liu & Loo, 2026; Mitchell et al., 1997). LCA provides a relatively static basis for carbon quantification, while ETS operates as a dynamic market mechanism whose effects depend on policy design, market conditions, and behavioural response (Aldy & Stavins, 2012; Ellerman et al., 2010). The former supports the identification and comparison of emissions, while the latter introduces economic incentives for behavioural adjustment. From this perspective, their integration appears to depend not only on technical linkage, but also on how data, institutions, and behaviour are connected within a broader framework (Checkland, 1981; Jackson, 2003; Meadows, 2008). Therefore, a systems perspective is adopted in this study as an overall analytical boundary that frames the study, rather than as a standalone theoretical variable.

3.2 LCA AND ETS: COMPLEMENTARY FUNCTIONS AND IMPLEMENTATION CONSTRAINTS

The core value of LCA lies in its ability to provide a systematic assessment of environmental impacts across the life cycle of buildings (International Organization for Standardization [ISO], 2006a, 2006b). It makes carbon impacts across different stages more visible and supports the comparison of design options and the identification of decarbonisation pathways (Dossche et al., 2017). However, the visibility of carbon information does not automatically translate into influence over decision-making (De Wolf et al., 2017; Pomponi & Moncaster, 2018). This is mainly due to the fragmented information chains in construction projects, which often lead to the loss of key metadata, such as system boundaries and data quality, as information moves across multiple parties (Marsh et al., 2023). Methodological inconsistency adds a further difficulty. Konradsen et al. (2024) noted that differences in product category rules and allocation methods can weaken the comparability of assessment results, a concern also raised by De Wolf et al. (2017) and Feng et al. (2022). More fundamentally, carbon reduction in most project settings still relies more on voluntary action than on direct market constraints, which limits the economic incentives for LCA implementation. This problem is likely to be more pronounced for small and medium-sized enterprises (SMEs), which often face ongoing costs in data collection and staff training (Gómez-Garza et al., 2024). These studies suggest that while LCA can improve carbon visibility, its influence on project decisions may remain constrained in practice.

The logic of ETS is different. Rather than improving carbon visibility, ETS seeks to influence organisational behaviour through market-based compliance obligations and carbon pricing. In the energy and heavy industry sectors, ETS has been associated with emissions reductions of around 5 to 21 per cent (Döbbeling-Hildebrandt et al., 2024), while also encouraging low carbon innovation in upstream industries (Calel & Dechezleprêtre, 2016). However, in the construction sector, the project-based nature of delivery, the dispersion of participants, and the ambiguity of responsibility boundaries can weaken the transmission of carbon price signals through the supply chain (Liu & Loo, 2026). In many cases, the party paying the carbon cost is not the same party making design or procurement decisions (Cludius et al., 2020). In Australia, this disconnection appears particularly strong because formal carbon pricing arrangements remain focused on large industrial facilities (Clean Energy Regulator, 2026), while a national framework for embodied carbon accounting in buildings has not yet been fully established (Infrastructure Australia [IA], 2024). This suggests that the application of ETS logic in construction may depend on more than carbon pricing alone.

To contextualise the discussion above, it is useful to outline the basic operation of ETS as a market-based mechanism. An ETS typically operates through a cap-and-trade structure, in which a regulatory authority sets an aggregate emissions cap and allocates or auctions tradable emission allowances to covered entities. Firms that reduce emissions below their allocation can sell surplus allowances, while those exceeding their cap must purchase additional permits, thereby establishing a carbon price signal that incentivises cost-effective abatement (Aldy & Stavins, 2012; Ellerman et al., 2010). This mechanism has been implemented in various jurisdictions, including the European Union Emissions Trading System, the Korean Emissions Trading Scheme, and California's Cap-and-Trade Program, each with different sectoral coverage, allocation methods, and compliance obligations (ICAP, 2024). However, these systems predominantly target large stationary emitters in energy and heavy industries, while embodied emissions in building construction remain largely outside mainstream ETS compliance coverage (Döbbeling-Hildebrandt et al., 2024; Liu & Loo, 2026). In Australia, the Safeguard Mechanism covers facilities exceeding 100,000 tonnes of CO_2-equivalent per year (Clean Energy Regulator, 2026), leaving the construction sector's embodied emissions largely outside formal carbon pricing frameworks.

While LCA and ETS address different aspects of the carbon management problem, LCA may provide a critical technical foundation for extending ETS logic into the construction sector. Conventional ETS frameworks primarily account for direct operational emissions at facility level, but in the construction sector, a substantial share of emissions is embodied in materials, transport, and construction processes that occur across fragmented supply chains (Ibn-Mohammed et al., 2013; Röck et al., 2020). LCA can expand the carbon accounting boundary by quantifying emissions across life cycle stages, including material extraction, manufacturing, transport, construction, and end-of-life (Abd Rashid & Yusoff, 2015; Buyle et al., 2013). In principle, this enables a more comprehensive basis for carbon pricing that captures embodied as well as operational emissions. However, this facilitation is conditional rather than automatic. For LCA outputs to serve as credible inputs to ETS-style compliance, they would need to meet minimum standards of data quality, system boundary consistency, transparent reporting, and verification readiness—requirements that current practice does not yet reliably satisfy (De Wolf et al., 2017; Konradsen et al., 2024; Marsh et al., 2023). The gap between LCA's technical potential and the verification demands of ETS compliance is therefore a key consideration for any future integration.

Taken together, LCA and ETS appear complementary in principle, but their integration in the construction sector is constrained by technical, organisational, and institutional conditions. The literature review reveals that the issue is not only whether the two mechanisms are theoretically compatible, but also whether these conditions support their practical use in the sector. This highlights the relevance of stakeholder judgement in the present study. Table 1 summarises the main barriers and potential benefits discussed above.

Table 1: Key implementation barriers and potential benefits of LCA and ETS in the construction sector

	LCA	ETS
Main barriers	Metadata loss across project parties (Marsh et al., 2023) Methodological inconsistency and weak comparability (De Wolf et al., 2017; Feng et al., 2022; Konradsen et al., 2024) Cost and capacity constraints for implementation (Gómez-Garza et al., 2024) Limited influence on project decision-making (De Wolf et al., 2017; Pomponi & Moncaster, 2018)	Weak carbon price signal transmission across the supply chain (Cludius et al., 2020; Liu & Loo, 2026) Split incentives between cost bearers and decision-makers (Cludius et al., 2020) Limited ETS compliance coverage for embodied emissions in building construction (Döbbeling-Hildebrandt et al., 2024; Liu & Loo, 2026) National embodied carbon accounting framework not yet fully established (IA, 2024) Limited SME compliance capacity (Gómez-Garza et al., 2024)
Potential benefits	Enhanced visibility of whole-of-life carbon emissions (Buyle et al., 2013)	Associated emissions reductions in energy and heavy industry contexts (Döbbeling-Hildebrandt et al., 2024)

	LCA	ETS
	Supports hotspot identification, option comparison, and carbon-informed decision-making (Abd Rashid & Yusoff, 2015; Dossche et al., 2017)	Encourages low-carbon innovation in upstream industries (Calel & Dechezleprêtre, 2016)

3.3 INSTITUTIONAL AND STAKEHOLDER CONDITIONS INFLUENCING ADOPTION

Table 2 summarises institutional and stakeholder factors influencing the adoption of an LCA-based ETS. Beyond the barriers and benefits associated with the tools themselves, adoption is also shaped by the institutional environment in which organisations operate and by organisational relationships with multiple stakeholders. Institutional theory provides a useful starting point for this external dimension of analysis. Drawing on the logic of institutional isomorphism proposed by DiMaggio and Powell (1983), this study groups external pressures into three forms. Coercive pressure arises from policy and compliance requirements, as well as government incentive schemes that create obligations or economic signals for organisations (DiMaggio & Powell, 1983; Scott, 2014). For example, the Building Information Modelling (BIM) Level 2 mandate in the United Kingdom strengthened digital information management in public projects. This created more favourable conditions for data coordination relevant to LCA (HM Government, 2012). Similarly, recent Australian policy and procurement developments suggest that embodied carbon measurement and transparency are beginning to enter formal implementation discussions (IA, 2024). Normative pressure is reflected in industry standards, green certification, and ESG expectations, as well as competitive market dynamics that collectively shape carbon management practices (Green Building Council of Australia [GBCA], 2025; Kazemi et al., 2023). Mimetic pressure refers to the tendency of firms to adopt carbon mitigation strategies modelled on leading organisations in order to minimise uncertainties and reduce the risks associated with trial and error (DiMaggio & Powell, 1983). Teece et al. (1997) suggest that organisations often look to established leaders when responding to strategic uncertainty, and this logic is also reflected in emerging low-carbon initiatives in the construction sector (Singapore Green Building Council, 2023). These forms of pressure provide part of the external context in which organisations interpret implementation barriers, potential benefits, and the practical relevance of a new governance mechanism. In the Australian context, however, the institutional environment is related to both the existence and stability of external pressures. Where policy signals are inconsistent, institutional pressure may not strengthen adoption confidence and may instead weaken it (Scott, 2014).

Table 2: Institutional and stakeholder factors influencing the adoption of an LCA-based ETS

Factor category	Specific factors	Representative references
Coercive pressure	• Policy and compliance requirements • BIM-related data coordination • Embodied carbon policy attention • Government incentive schemes	DiMaggio & Powell, 1983; HM Government, 2012; IA, 2024; Scott, 2014
Normative pressure	• Industry standards	GBCA, 2025; Kazemi et al., 2023

Factor category	Specific factors	Representative references
	• Green certification • ESG expectations • Competitive market dynamics	
Mimetic pressure	• Imitation under uncertainty • Adoption of carbon mitigation strategies modelled on leading organisations	DiMaggio & Powell, 1983; Singapore Green Building Council, 2023; Teece et al., 1997
Stakeholder-related conditions	• Divergent stakeholder interests • Cost and risk concerns • SME resource and compliance constraints	Freeman, 1984; Gómez-Garza et al., 2024; IA, 2021; Mitchell et al., 1997
Carbon mitigation perception	• Managerial carbon awareness • Perceived relevance of proactive decarbonisation	Jiang et al., 2023; Sadri et al., 2022

Additionally, adoption of a new governance mechanism in the construction sector is not an isolated organisational decision. Projects usually involve developers, contractors, design consultants, clients, and supply chain actors whose interests and responsibilities are not always aligned (Freeman, 1984; Mitchell et al., 1997). Evidence from Australia suggests that stakeholder responses to decarbonisation are not uniform. Developers may support carbon reduction in principle, while remaining concerned about additional cost exposure, delivery risk, and the practical implications of implementation (IA, 2021). Contractors, on the other hand, may take a more cautious position when profit margins are tight and project risk increases (IA, 2021). SMEs may also face additional difficulties due to limited trained personnel, weak data foundations, and restricted organisational resources, which make carbon accounting and related compliance more difficult to absorb (Gómez-Garza et al., 2024). Stakeholders' carbon mitigation perception also appears relevant to adoption judgement. Jiang et al. (2023) reported that stronger managerial awareness of carbon issues was associated with a greater willingness to pursue proactive decarbonisation rather than minimum compliance, consistent with Sadri et al. (2022). From this perspective, stakeholder-related conditions may play a more immediate role in shaping adoption judgement than external pressures alone. They may also influence whether a new governance mechanism is seen as relevant to organisational responsibility, competitiveness, or project delivery.

While institutional pressures and stakeholder conditions may be important, this study argues that they do not automatically lead to adoption behaviour (Ajzen, 1991; Davis, 1989). Their influence is likely to depend on whether external pressures enter routine project logic and come to be understood as relevant to compliance, competitiveness, or risk management (Räihä et al., 2024; Venkatesh & Davis, 2000). This prepares the ground for the next part of the review, which focuses on how such stakeholder judgements are formed.

3.4 BEHAVIOURAL INTENTION AND THE APPLICABILITY OF TAM

Even if institutional pressure is present, adoption still depends on how stakeholders interpret the value, feasibility, and organisational implications of a given mechanism (Davis, 1989; Räihä et al., 2024). Existing studies on carbon pricing often assume that firms will respond rationally to price signals, and pay less attention to the subjective judgements and implementation concerns of actors in the construction sector (Räihä et al., 2024). For construction-related organisations, an LCA-based ETS may have implications for accounting procedures, procurement arrangements, and contractual responsibilities (Cludius et al., 2020; Liu & Loo, 2026). Adoption judgement may therefore involve an assessment of expected costs, perceived value, and practical difficulty, rather than a direct response to external pressure alone (Davis, 1989; Venkatesh & Davis, 2000). From this perspective, adoption is not only a matter of institutional context, but also of behavioural judgement (Ajzen, 1991; Davis, 1989).

The TAM provides a useful analytical logic for this part of the discussion (Davis, 1989). In the context of this study, perceived usefulness (PU) refers to whether stakeholders believe that an LCA-based ETS can improve carbon transparency, compliance readiness, or organisational competitiveness. Perceived ease of use (PEOU) is interpreted here in relation to implementation practicality in the construction sector, including the extent to which the mechanism is manageable in terms of accounting, coordination, and execution. Behavioural intention (BI) refers to the willingness to adopt, support, or engage with the mechanism. Given the absence of a mandatory ETS in the Australian construction sector, BI is treated in this study as a practical indicator of adoption readiness (Ajzen, 1991; Venkatesh & Davis, 2000). At the same time, TAM on its own is not sufficient to explain a sector shaped by multi-actor coordination and policy uncertainty. For this reason, TAM is used here together with institutional and stakeholder perspectives rather than as a standalone explanation. Together, these three groups of factors form the basis for the conceptual framework presented in the next section.

4. THE PROPOSED CONCEPTUAL FRAMEWORK

4.1 FRAMEWORK DIAGRAM AND OVERALL INTERPRETATION

Figure 1 presents the conceptual framework proposed in this study.

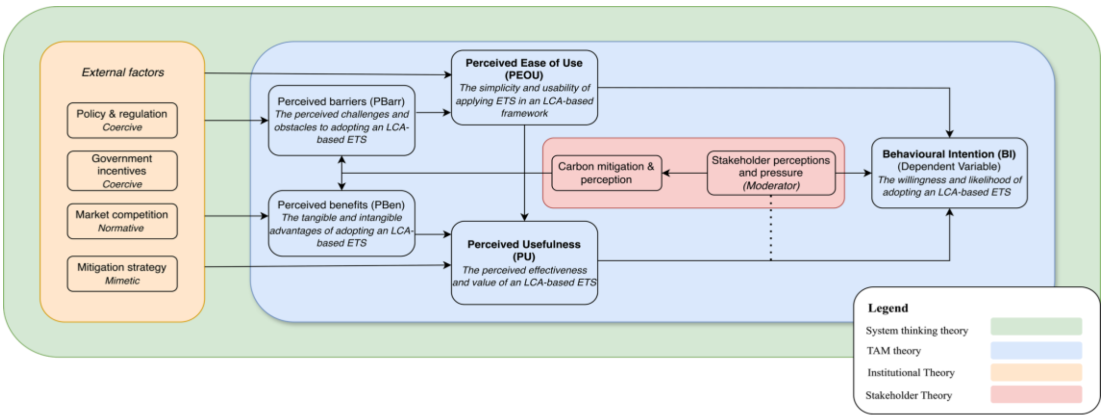

Figure 1: The conceptual framework of stakeholder adoption intention towards an LCA-based ETS

The framework integrates four theoretical perspectives, which inform different parts of the overall structure and their relationships. Systems thinking provides the overall analytical boundary. Institutional theory frames the external environment shaping the adoption context. The TAM represents the central cognitive-to-behavioural pathway. Stakeholder theory reflects the relational conditions that influence how adoption judgement develops. A colour legend is included in the figure to indicate the theoretical basis of each part of the framework.

The framework suggests that the adoption of an LCA-based ETS is not driven by technical performance or policy direction alone. Rather, it can be understood as a progressive process shaped by system conditions, structured by the institutional environment, mediated through cognitive appraisal, and influenced by stakeholder-related conditions. By visually linking each component to its underpinning theory, the framework clarifies how the four theoretical perspectives are integrated into a single conceptual structure rather than treated as separate explanatory elements. The framework will be further examined and refined through empirical research in the next stage of the study.

4.2 THEORETICAL FOUNDATION AND DIVISION OF ROLES

This study integrates four theoretical perspectives to support the proposed conceptual framework explaining stakeholder adoption intention towards an LCA-based ETS in the Australian construction sector. These theories are not presented as a parallel list. Instead, each is used to address a different dimension of the adoption problem. Systems thinking provides the overall analytical boundary. As discussed in sub-section 3.1, the adoption of an LCA-based ETS involves interactions across project stages, stakeholder groups, and levels of decision-making, and cannot be reduced to a technical assessment of a single tool. From this perspective, LCA and ETS are understood as interconnected parts of the same system rather than as separate objects of analysis (Checkland, 1981; Meadows, 2008). Systems thinking is therefore not introduced in the framework as a specific explanatory variable, but as the broader boundary within which the other three perspectives are applied.

Institutional theory is used to explain how the external institutional environment shapes the conditions under which adoption is considered. As reviewed in sub-section 3.3, coercive, normative, and mimetic pressures together form part of the external context in which organisations assess an LCA-based ETS. As argued in sub-section 3.3, these pressures do not determine adoption directly. Rather, they influence how organisations interpret the barriers, expectations, and possible value associated with the mechanism (DiMaggio & Powell, 1983; Scott, 2014).

TAM provides the main behavioural pathway in the framework. As noted in sub-section 0, adoption ultimately depends on how stakeholders interpret the value and practicality of the mechanism. In this study, TAM is used to explain how cognitive appraisal may be translated into adoption intention (Davis, 1989; Venkatesh & Davis, 2000).

Lastly, stakeholder theory adds a relational and contextual dimension to this process. Adoption of a mechanism in the construction sector is not simply an internal organisational judgement, but is shaped by ongoing interaction with clients, investors, governments, industry networks, and supply chain actors. Stakeholder theory is therefore used to explain how these external expectations and relationships may affect organisational judgement and its translation into adoption intention (Freeman, 1984; Mitchell et al., 1997). Taken together, systems thinking defines the problem boundary, institutional theory explains the external context, TAM provides the cognitive-to-behavioural pathway, and stakeholder theory adds relational and contextual influence. This combination allows the framework to address the technical, institutional, and behavioural dimensions involved in the adoption of an LCA-based ETS.

It is important to note that these four perspectives are not simply combined as a parallel list of explanatory lenses. Their integration provides two specific analytical insights for interpreting LCA-based ETS adoption in the construction sector. First, institutional theory and TAM interact in a way that goes beyond a simple antecedent-outcome relationship. In contexts where institutional pressure is weak or absent, perceived usefulness may be understood primarily in terms of voluntary benefits such as improved sustainability performance or corporate reputation. However, under strong coercive pressure, the meaning of perceived usefulness itself may shift towards compliance readiness, risk reduction, and access to future carbon markets (DiMaggio & Powell, 1983; Venkatesh & Davis, 2000). In other words, institutional pressure does not merely increase the level of perceived usefulness; it may redefine what usefulness means in the adoption context. Second, stakeholder theory qualifies the assumptions of TAM in an important way. TAM assumes that adoption intention is primarily shaped by an individual or organisational actor's cognitive evaluation of usefulness and ease of use (Davis, 1989; Venkatesh & Davis, 2000). However, in the construction sector, adoption decisions are often distributed across multiple parties with unequal decision-making authority. Clients, principal contractors, and regulatory bodies may hold disproportionate power in determining whether an LCA-based ETS is adopted at the project level, while subcontractors and smaller firms may adopt primarily in response to contractual obligations rather than their own assessment of usefulness (Freeman, 1984; Mitchell et al., 1997). This suggests that TAM needs to be contextualised by stakeholder theory, because adoption intention in the construction sector may be shaped not only by cognitive evaluation, but also by power relations and project-based dependencies.

4.3 CORE CONSTRUCTS AND LOGICAL RELATIONSHIPS

Based on the three groups of factors identified in the preceding literature review, the proposed conceptual framework consists of several main constructs and their logical relationships. The framework begins with external inputs from the institutional environment. Coercive, normative, and mimetic pressures are treated as external factors that enter the framework from the left-hand side. These factors are not assumed to generate adoption intention directly. Instead, they influence how organisations interpret perceived barriers (PBarr) and perceived benefits (PBEn), and may also shape later judgements about perceived usefulness (PU) and perceived ease of use (PEOU). In this sense, the institutional environment affects how organisations understand an LCA-based ETS, rather than directly determining whether it will be adopted.

At the centre of the framework is the cognitive-to-behavioural pathway derived from TAM. As discussed in the previous sections, PBarr and PBEn provide a more immediate basis for pre-adoption judgement. PBarr refers to expected implementation difficulties, including issues such as fragmented data, methodological inconsistency, limited economic incentives, and capability constraints. PBEn refers to the expected strategic and operational value of the mechanism, including improved carbon transparency, stronger compliance readiness, and possible gains in competitiveness. These two forms of evaluation are not treated as adoption intention in themselves. Rather, they are expected to shape how organisations judge the usefulness and practical manageability of the mechanism through PU and PEOU. At the same time, institutional pressures may also shape PU and PEOU more directly, particularly where regulatory expectations or industry norms influence how the practicality or strategic value of the mechanism is understood.

The framework also incorporates stakeholder-related constructs as contextual influences on this central pathway. Carbon mitigation perception (CMP) reflects the extent to which organisations recognise climate responsibility and the importance of carbon management. This may affect how barriers and benefits are interpreted and, in turn, how the value of the mechanism is judged. At the same time, stakeholder pressure (SP) represents the relational conditions surrounding adoption. In this framework, SP refers not only to the influence of external expectations and relationship networks, but is also expected to influence the extent to which positive judgements translate into adoption intention. Where low-carbon expectations from clients, investors, governments, or industry communities are more explicit, positive views of usefulness may be more likely to develop into adoption intention. Where such external pressure is weaker, organisations may still recognise potential value but delay action.

Behavioural intention (BI) represents the outcome variable in the framework. It is used here as the main outcome, representing an organisation's willingness to adopt, support, or engage with an LCA-based ETS. In the Australian context, where no mandatory ETS currently applies to the construction sector, BI is treated as a more suitable indicator of adoption readiness than actual behaviour. From this perspective, the adoption of an LCA-based ETS is not understood as an immediate response to a single policy or tool, but as a progressive process shaped by external inputs, cognitive appraisal, and stakeholder-related influences.

5. CONCLUSIONS

Through a targeted literature review, this paper proposes a conceptual framework for understanding the factors influencing stakeholder adoption of an LCA-based ETS in the Australian construction sector. The framework is underpinned by four theoretical perspectives, namely: systems thinking, institutional theory, TAM, and stakeholder theory. It brings the influencing factors together into a structure linking external context, cognitive appraisal, and stakeholder-related influences, suggesting that adoption is better understood as a progressive process rather than as an immediate response to a single tool or policy.

At the theoretical level, the contribution of this paper is not simply the use of multiple theories, but the way these theories are connected to explain how macro-level institutional pressures are translated into stakeholder-level adoption intention in a specific sectoral context. In particular, the framework reveals that institutional pressure may not only influence but redefine what stakeholders perceive as useful, and that stakeholder power asymmetries may limit the explanatory reach of TAM when applied to multi-actor project delivery settings. At the practical level, the framework suggests that promoting the application of an LCA-based ETS in the construction sector is unlikely to depend on carbon accounting accuracy or pricing design alone. It may also require attention to institutional stability, industry capability, and stakeholder coordination. This is particularly relevant in the Australian context, where no mandatory ETS currently applies to the construction sector. In such a setting, questions of feasibility, institutional confidence, and implementation readiness become especially important to stakeholder adoption. However, the proposed framework remains conceptual and has not yet been empirically validated. Its contribution at this stage lies in providing a theoretically grounded structure for understanding the multi-level factors that may influence LCA-based ETS adoption. Future research should test and refine the proposed relationships through questionnaire-based empirical work within the Australian construction sector, with particular attention to whether the hypothesised interactions between institutional pressure, stakeholder power, and cognitive appraisal hold across different organisational types and project contexts.

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