

WHAT LIMITS EFFECTIVE TARGET VALUE DELIVERY IMPLEMENTATION IN CONSTRUCTION PROJECTS?

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ABSTRACT

Target Value Delivery (TVD) has been recognized in the Lean Construction literature for its potential to maximize project value under early-defined cost constraints. However, its practical implementation remains limited and often partial. This study presents a literature review to identify and analyze the barriers to implementing TVD in construction projects. Based on a structured search conducted in Scopus, 35 studies reporting empirical experiences or applications of TVD were analyzed, leading to the identification of 22 barriers grouped into five categories: organizational, contractual and legal, cultural and behavioral, technical and process-related, and client-related. The results indicate that the most recurrently reported barriers are primarily concentrated in the contractual, cultural, and technical dimensions. In particular, misaligned economic incentives, traditional contractual frameworks, lack of trust, and difficulties in defining and operationalizing value emerge as recurrent constraints across the literature. The study proposes a prioritization logic based on the frequency of occurrence of barriers, interpreted as a proxy for their relative relevance, emphasizing the need for integrated and sequential interventions. This review contributes to Lean Construction research by reinforcing the understanding of TVD as a socio-technical system and by providing an analytical foundation for future research and implementation strategies.

KEYWORDS

Target Value Delivery (TVD), implementation, target cost, barriers, literature review.

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INTRODUCTION

Target Value Delivery (TVD) has gained increasing relevance in the construction industry due to its potential to improve cost control and value generation throughout the project life cycle (Rybkowski et al., 2022). By integrating cost considerations from the early stages of design, TVD enables the alignment of design solutions with client value expectations while addressing persistent industry challenges such as cost overruns and stakeholder misalignment (Ballard & Reiser, 2004).

Despite the well-documented theoretical benefits of TVD, a significant gap persists between its conceptual framework and its practical implementation. Several studies attribute this gap to factors such as organizational resistance to change, lack of knowledge and training, contractual constraints, and cultural barriers, which often result in partial implementations that fail to achieve the expected outcomes (Miron et al., 2015).

Within this context, the objective of this literature review is to systematically analyze existing research on Target Value Delivery, with a particular focus on the barriers that limit its successful implementation in construction projects. The review aims to identify and classify recurring challenges across organizational, contractual, technical, and cultural dimensions, as well as to highlight gaps in the current literature, thereby providing a conceptual foundation for future research and implementation strategies.

BACKGROUND

TARGET VALUE DELIVERY

Target Value Delivery (TVD) is an approach to design management and project delivery that seeks to maximize client value while complying with a target cost defined from the early stages of a project (Miron et al., 2015). Unlike traditional approaches, TVD establishes cost as a design constraint and simultaneously integrates value, cost, and performance objectives. Its fundamental principles include early value definition, interdisciplinary collaboration, information transparency, and continuous learning throughout the design development process (Zimina et al., 2012).

A key distinction from the traditional design–estimate–redesign approach lies in the integrated management of cost-related decisions. While conventional methods develop design solutions without continuous cost feedback, often resulting in late adjustments and rework, TVD continuously evaluates design decisions based on their impact on both the target cost and overall project value. This approach shifts the focus from a logic centered exclusively on cost reduction toward value creation under budgetary constraints, recognizing the multidimensional nature of value and enabling the optimization of overall project value without exceeding established financial limits (Ballard & Reiser, 2004; Rybkowski et al., 2022).

TARGET VALUE DELIVERY WITHIN LEAN CONSTRUCTION

Target Value Delivery (TVD) is conceptually aligned with Lean Construction theory through its adoption of principles such as value maximization, waste elimination, and continuous process improvement (Zimina et al., 2012). From this perspective, TVD can be understood as an operational mechanism that translates lean principles into the design phase, transforming a traditionally fragmented process into a collaborative system oriented toward value generation and the efficient flow of information (Oliva et al., 2023; Zimina et al., 2012).

Furthermore, the implementation of TVD is closely associated with the Integrated Project Delivery (IPD) approach, as both require high levels of collaboration, trust, and incentive alignment among project participants (Tillmann et al., 2017). IPD provides a contractual and organizational framework that facilitates the application of TVD through joint decision-making,

early involvement of key stakeholders, and shared risk and reward, conditions that are essential for value generation under cost constraints (Zimina et al., 2012).

RESEARCH METHODOLOGY

The identification of barriers to the effective implementation of TVD was based on a systematic literature review comprising five main stages: (1) scope definition; (2) identification of relevant documents; (3) document selection; (4) evidence collection, analysis, and synthesis; and (5) selection and classification of barriers into categories.

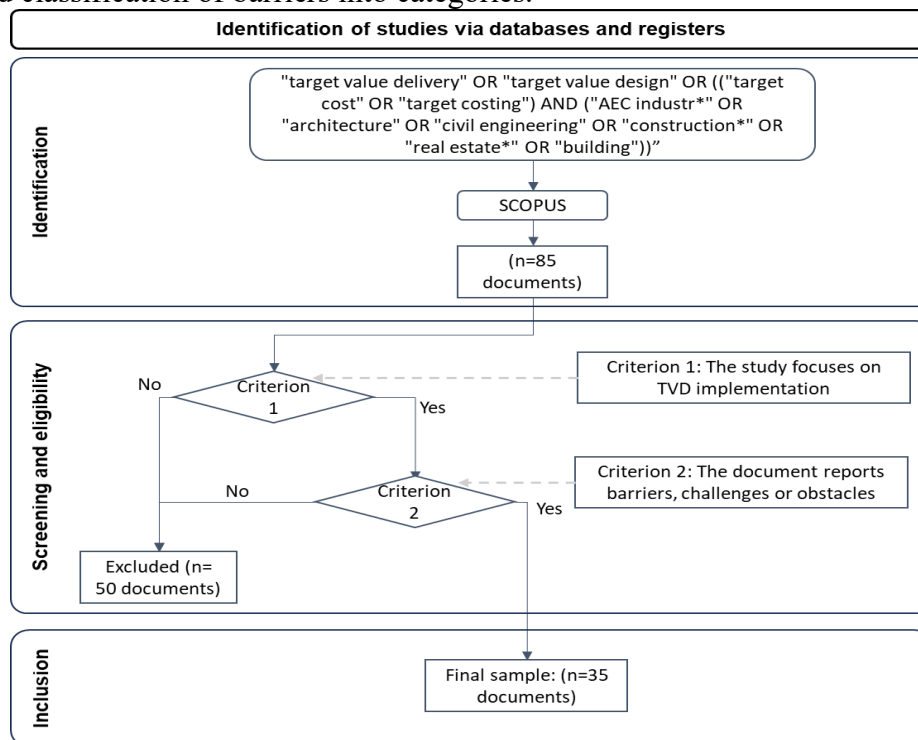


Figure 1: PRISMA-inspired flow diagram of the study selection process

Figure 1 illustrates the process followed to identify and select the barriers analyzed in this review, structured according to a PRISMA-inspired approach including identification, screening, eligibility, and inclusion stages. The scope of the literature review focused on identifying barriers, obstacles, or challenges reported in projects where TVD had been implemented. Initially, a conceptual distinction was proposed to capture different types of difficulties: barriers were understood as structural or systemic factors; obstacles as operational problems arising during implementation; and challenges as tensions associated with the organizational and cultural change implied by TVD.

However, as the literature review and empirical analysis progressed, it became evident that these categories tend to overlap and evolve dynamically throughout the implementation process. A single factor may appear as a barrier in early stages, as an operational obstacle during execution, and simultaneously as a persistent cultural or institutional challenge. This interrelationship complicates rigid classification and may lead to artificial fragmentation of the analysis. Therefore, to prioritize analytical clarity, the subsequent development of this study adopts the term “barriers” in a broad sense to refer to all factors that hinder TVD implementation, acknowledging their systemic and interrelated nature.

The review was conducted in the Scopus database, restricting the search to the *article title* field using the following search query: "target value delivery" OR "target value design" OR ((("target cost" OR "target costing") AND ("AEC industr*" OR "architecture" OR "civil engineering" OR "construction*" OR "real estate*" OR "building"))), resulting in a total of 85

documents, which were coded. The subsequent selection of studies was based on two inclusion/exclusion criteria: (1) the document reported TVD implementation or had strong relevance to its application, and (2) it reported barriers to effective implementation. Documents were individually assessed by the researchers, resulting in the selection of 35 evidence documents and 50 background studies. Accordingly, barrier identification was based on the 35 evidence documents, from which 22 barriers were identified and grouped into five categories.

The search was limited to publications indexed in Scopus due to its broad coverage of peer-reviewed literature in construction and engineering. No time restriction was applied in order to capture the evolution of TVD-related research. Although a formal quality assessment was not conducted, only peer-reviewed journal articles and conference papers reporting empirical evidence or documented applications were included.

RESULTS

BARRIERS IDENTIFICATION

The barriers identified in this study were grouped into five categories based on their characteristics and descriptions. Tables 1 to 5 present the 22 identified barriers, together with their definitions and the category to which each barrier belongs.

Before presenting the individual barriers, it is important to note that the proposed classification does not imply rigid or independent categories. Rather, the barriers reflect different dimensions of the same socio-technical system and frequently interact during TVD implementation. The grouping into five categories is intended to support analytical clarity and facilitate comparison across studies, while acknowledging the interdependent nature of these challenges.

Table 1: Organizational barriers

ID	Barrier	Definition
B-01	Poorly defined teams and roles	The lack of clarity in team structures, critical roles, and responsibilities hinders coordination among specialists and reduces the effectiveness of the integrated work required by TVD.
B-02	Organizational fragmentation and siloed work	Design, cost, and delivery processes are fragmented across organizations, contracts, and disciplines, preventing a system-wide, value-oriented perspective.
B-03	Lack of capabilities, experience, and leadership	There is a shortage of practical experience in TVD/IPD, collaborative leadership, and technical capabilities, which limits effective implementation of the approach.
B-04	Work overload and operational complexity	The iterative and simultaneous management of design and cost, together with high administrative demands, generates pressure, stress, and organizational fatigue within project teams.
B-05	Difficulties adapting TVD to other contexts	Implementing TVD outside its original context requires organizational and structural changes that many organizations are not prepared to undertake.

Organizational barriers (Table 1) capture internal conditions related to team structure, roles, capabilities, and operational demands that influence the ability to implement TVD. These

barriers reflect the level of organizational maturity required to support integrated decision-making, collaborative leadership, and the iterative coordination of design and cost processes.

Table 2: Contractual and legal barriers

ID	Barrier	Definition
B-06	Contracts and legal frameworks that do not support TVD	Traditional contracts and legal constraints do not facilitate early collaboration, team integration, or the risk-sharing mechanisms required for TVD.
B-07	Misaligned economic incentives	Payment mechanisms, risk-sharing, and reward structures are not aligned with project value objectives, reducing motivation to collaborate and pursue opportunities.

Table 3: Cultural and behavioral barriers

ID	Barrier	Definition
B-08	Lack of trust and adversarial culture	Low-trust environments and adversarial relationships promote defensive behaviors, individual agendas, and information hoarding, undermining the genuine collaboration required by TVD.
B-09	Absence of structured collaboration routines	Collaboration is not institutionalized through stable practices, routines, or protocols, and depends excessively on individual or contextual efforts.
B-10	Tension between innovation and cost control	Cultural conflicts arise between pursuing innovation, high performance, and sustainability, and the need to comply with strict target cost constraints.

Table 4: Client-related barriers

ID	Barrier	Definition
B-11	Limited client capability to define value	The client struggles to articulate value priorities and translate them into clear criteria that guide design and team decision-making.
B-12	Weak client leadership in TVD implementation	The client does not take an active and sustained role in leading, protecting, and reinforcing the collaborative logic of TVD throughout the project.
B-13	Late client evaluation of value	The client lacks mechanisms or capabilities to assess value achievement at early design stages, limiting timely correction of deviations.

Contractual and legal barriers (Table 2) shape incentives, risk allocation, and collaboration from the early stages of the project, strongly influencing the feasibility of TVD implementation. Cultural and behavioral barriers (Table 3) affect trust and collaboration practices, often limiting effective application despite formal frameworks. Client-related barriers (Table 4) relate to the client's ability to define value and sustain collaborative leadership, while technical and process-related barriers (table 5) involve challenges in data availability, cost estimation, value definition,

and the integration of design, cost, and risk, reflecting the systemic nature of TVD implementation challenges.

Table 5: Technical and process barriers

ID	Barrier	Definition
B-14	Difficulty defining and measuring value	There are difficulties in capturing, codifying, and operationalizing client and end-user value due to the lack of rigorous methods and clear metrics.
B-15	Late identification of value losses	Value-related problems are identified at advanced design stages, when opportunities for correction are limited and costly.
B-16	Lack of reliable data and evidence	Limited availability of historical data, empirical evidence, and consistent documentation hinders informed decision-making in TVD.
B-17	Cost estimation challenges	Cost estimation remains dominated by deterministic approaches, with limited transparency and difficulties in managing uncertainty and true project costs.
B-18	Poor integration of design, cost, and risk	Design, cost, and risk are not effectively integrated, making it difficult to support simultaneous decision-making under high uncertainty.
B-19	Difficulty defining and setting the Target Cost	The target cost is defined with incomplete information, immature scope, or at unclear moments in the process, leading to rigidity and downstream conflicts.
B-20	Risk of uncontrolled scope growth	The adaptive flexibility of TVD can lead to uncontrolled scope expansion if clear prioritization and control mechanisms are not in place.
B-21	Partial and inconsistent implementation of TVD	In practice, TVD is often implemented incompletely, with selective adoption of principles and tools, reducing its effectiveness and leading to inconsistent outcomes.
B-22	TVD challenges in competitive tendering processes	Integrating TVD into traditional tendering processes creates tensions between competition, collaboration, and transparency, particularly when incentives for non-awarded bidders are absent.

Table 6 synthesizes the barriers identified in the literature related to the implementation of Target Value Design (TVD), showing their presence across the analyzed studies. The results indicate that several barriers persist over time, with contractual and legal barriers, as well as technical and process-related barriers, being the most prominent. This suggests that, despite the evolution of collaborative frameworks and management tools, these structural difficulties continue to constrain the effective adoption of TVD.

More recent literature also highlights the increasing relevance of cultural and behavioral barriers, indicating a shift in focus from predominantly technical issues toward challenges associated with collaboration, trust, shared decision-making, and resistance to change. In contrast, some barriers identified in earlier studies, particularly those related to initial

operational aspects or the lack of basic cost management tools, appear less frequently in recent research, suggesting a partial maturation of practice, although not its complete resolution.

Table 6: Barriers to the implementation of TVD and their presence in the literature

Reference	Barriers	Reference	Barriers
(Nicolini et al., 2000)	1,2,3,6,7,8,9,11, 12,14,15,16,17	(Nanda et al., 2017)	1,3,4,5,8,9,12,16,1 7,19,21
(Ballard & Reiser, 2004)	2,3,6,8,14, 15,16,18,19	(Tillmann et al., 2017)	2,4,6,7,8,16,17,18, 19,20
(Jacomit et al., 2008)	1,2,4,5,6,7,8,9, 11,12,13,14,15,17	(Alwisy et al., 2018)	3,4,8,10,14,16, 18,19,21
(Chan et al., 2010b)	3,6,7,8,9,11, 12,14,15,19,22	(Bu-Hamdan et al., 2018)	3,4,5,7,14,16,17,18 ,21
(Chan et al., 2010a)	3,6,7,8,9,11, 12,14,15,19,22	(Silveira & Alves, 2018)	4,5,6,7,9,10, 11,12,13,14,18
(Chan et al., 2011)	3,6,7,8,9, 14,15,19,22	(Neto et al., 2019)	5,6,7,8,9, 11,12,14,21
(Chan et al., 2012)	6,7,13,16,18	(Torp, 2019)	6,10,11,14,16,17,1 8
(Zimina et al., 2012)	3,6,7,8,9,12,18	(Gutiérrez Lazarte, 2020)	1,2,4,8,18
(Oliva & Granja, 2013)	2,5,6,8,10,11, 12,14,18,19	(Musa & Pasquire, 2020)	6,7,8,22
(Do et al., 2014)	3,5,7,16,18,19	(Engebø et al., 2021)	7,8,10,17,19
(Melo et al., 2014)	2,5,6,7,10,12,14, 16,17,18,19,20	(Johansen et al., 2021)	6,7,8,10,12,14,18,1 9
(Do et al., 2015)	1,3,4,6,7,8,9,12, 14,16,18,19,20	(Malvik et al., 2021)	2,3,4,6,7,8, 10,11,14,19
(Miron et al., 2015)	5,9,10,11, 14,16,18,21	(Oliva et al., 2021)	2,5,7,8,9,10,11,14
(Russell-Smith & Lepech, 2015)	3,5,10,14, 16,18,19	(Giménez et al., 2022)	2,5,8,9,10,14,15
(Melo et al., 2016)	3,5,6,16,21	(Rybkowski et al., 2022)	1,3,4,6,7,9,11,14,1 6,19,21
(Neto et al., 2016)	1,2,3,6,7,8,9,11, 12,14,16,17,18,19,21	(Oliva et al., 2023)	1,2,5,7,9,11,14,21
(Oliva et al., 2016)	2,3,4,5,7,8,9, 11,12,14,18,21	(Kasih et al., 2025) (Shigaki et al., 2025)	3,6,8,9,10,18,19,20 1,4,6,7,9,10,18,19

DISCUSSION

This study contributes not only by classifying barriers, but also by proposing a frequency-informed prioritization framework that supports sequential and systemic intervention in TVD implementation. Based on a sample of 35 studies, the analysis indicates that barriers to TVD implementation are not confined to a single domain but are unevenly distributed across contractual, cultural, organizational, technical, and client-related dimensions (Figure 2).

Figure 2 presents the barriers to TVD implementation organized based on their frequency of occurrence in the reviewed literature. In the graphical representation, this information is conveyed through the size of the bubbles, where larger bubbles indicate more frequently reported barriers. Additionally, the figure uses the distance from the center as a visual device to represent this same recurrence logic, taking the TVD system as the reference point. Thus, the inner circle contains the most frequent barriers, reported more than 20 times; the intermediate circle includes barriers with medium frequency, reported between 10 and 19 times; and the outer circle represents less recurrent barriers, reported fewer than 10 times. It is important to note that frequency does not necessarily imply causal impact, but rather reflects recurrence and visibility across empirical studies.

From a practical perspective, the figure not only describes the distribution of barriers but also supports decision-making by suggesting a prioritization logic. Addressing less recurrent (peripheral) barriers in isolation, such as certain organizational or client-related issues, without first tackling more recurrent barriers, may lead to limited or short-term improvements. In contrast, prioritizing interventions on more recurrent barriers, particularly those related to contractual, technical, and cultural dimensions, may create enabling conditions that support more effective and sustained TVD implementation. In this sense, proximity to the center is interpreted as a heuristic criterion for prioritization, indicating a potential sequence of intervention rather than a definitive measure of impact.

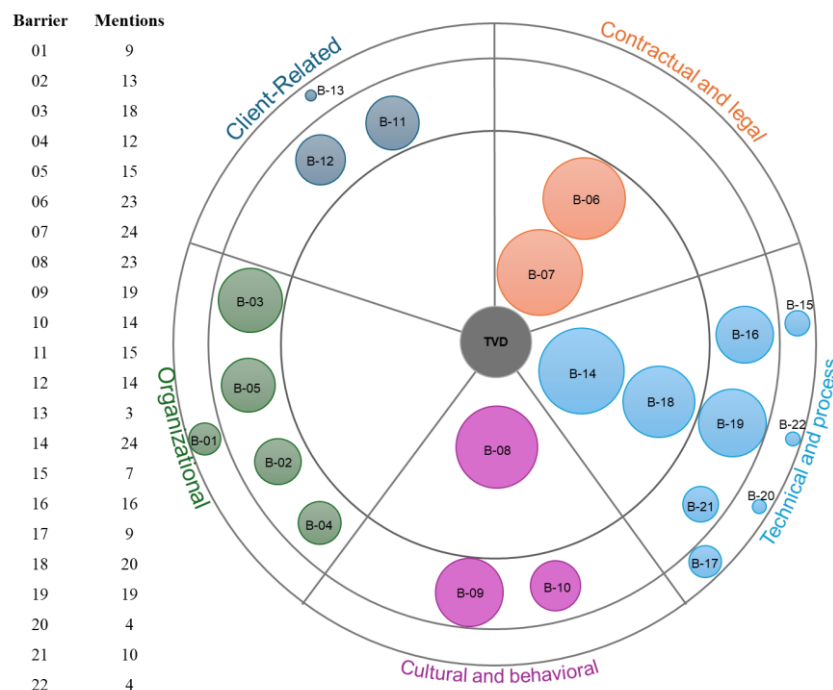


Figure 2: Distribution of barriers to Target Value Delivery by categories and recurrence

The barriers with the highest frequencies belong to the Contractual and Legal category, particularly misaligned economic incentives (B-07, $n = 24$) and contracts and legal frameworks that do not support TVD (B-06, $n = 23$). This finding suggests that even when technical

capabilities or collaborative intent exist, traditional contractual mechanisms continue to reinforce opportunistic behavior, fragmentation, and local optimization. These results suggest that the contractual environment acts as a structural factor that negatively conditions effective TVD adoption by limiting early collaboration, transparency, and equitable risk–reward sharing.

Cultural and Behavioral Barriers also exhibit high frequencies, especially a lack of trust and adversarial culture (B-08, $n = 23$) and the absence of structured collaboration routines (B-09, $n = 19$). These results indicate that organizational culture and behavioral patterns inherited from traditional project delivery models remain a recurrent and significant obstacle to TVD. The coexistence of high levels of distrust and the lack of institutionalized collaborative practices suggests that collaboration in TVD relies excessively on individual or contextual efforts, making it fragile and difficult to sustain throughout the project. In addition, the tension between innovation and cost control (B-10, $n = 14$) reflects a relevant cultural conflict: while TVD promotes the exploration of alternatives and iterative learning, many actors continue to perceive the target cost as a rigid constraint that limits innovation rather than as a mechanism for value maximization.

Technical and Process Barriers constitute the largest category in terms of the number of barrier types, reflecting the operational complexity of TVD. Among these, difficulties in defining and measuring value (B-14, $n = 24$), poor integration of design, cost, and risk (B-18, $n = 20$), and challenges in defining and setting the target cost (B-19, $n = 19$) stand out. These barriers point to a fundamental weakness in the operationalization of the value concept and in simultaneous decision-making under uncertainty, both of which are fundamental to the TVD approach.

In contrast, barriers such as the late identification of value deficits (B-15, $n = 7$) or challenges in competitive tendering processes (B-22, $n = 4$) show low frequencies, suggesting that while these issues may be recurrent in certain contexts, they are not universally reported in the literature and are more context-dependent.

Within the Organizational Barriers category, the lack of capabilities, experience, and leadership (B-03, $n = 18$), as well as difficulties in adapting TVD to other contexts (B-05, $n = 15$), are key barriers. This suggests that successful TVD implementation requires a minimum level of organizational maturity that many organizations have yet to achieve. The relatively high frequency of these barriers reinforces the notion that TVD is not easily transferable across contexts without structural adjustments, training, and explicit collaborative leadership. By contrast, barriers such as poorly defined teams and roles (B-01, $n = 9$) or work overload and operational complexity (B-04, $n = 12$) appear less frequently, indicating that the most important organizational challenges are not operational but strategic and capability-related.

Finally, Client-Related Barriers exhibit moderate frequencies. Both limited client capability to define value (B-11, $n = 15$) and weak client leadership in TVD implementation (B-12, $n = 14$) emerge as recurrent barriers, highlighting that the client plays a central, and possibly underestimated, role in the success of TVD. The low frequency of late client evaluation of value (B-13, $n = 3$) suggests that the issue is not solely the timing of evaluation, but rather the client's structural capacity to lead, articulate, and sustain a value vision throughout the project.

Overall, the findings indicate that the most recurrently reported barriers to TVD implementation are associated with contractual incentives, organizational culture, capabilities, and the definition of value, rather than with the availability of specific tools or techniques. From a Lean Construction perspective, these results highlight the need for greater alignment between TVD practices and the principles of integrated decision-making, collaboration, and value generation. Limitations in contractual arrangements, organizational capabilities, and value articulation affect information flow, learning, and the consistent translation of client value into design decisions. Consequently, the results suggest that effective TVD adoption depends on

coordinated changes in contractual, cultural, and managerial practices, rather than on the isolated introduction of new cost estimation or control methods.

CONCLUSIONS

This literature review analyzed the barriers to the effective implementation of Target Value Delivery (TVD) in construction projects, based on evidence from 35 studies. The results suggest that the difficulties associated with TVD are not isolated nor circumstantial, but rather systemic, interdependent, and persistent over time and across different contexts.

One of the main findings of this study is that the most frequently reported barriers are concentrated in the contractual and legal domain, particularly misaligned economic incentives and contractual frameworks that do not support collaboration. Their high frequency indicates that they act as structural constraints, shaping behaviors, decision-making, and risk allocation throughout the project life cycle. Even when technical capabilities or collaborative intent are present, traditional contracts continue to reinforce fragmentation, adversarial cultures, and local optimization.

Cultural and behavioral barriers, especially the lack of trust and the persistence of adversarial cultures, are also recurrently reported in the literature. Their relevance suggests that TVD implementation is deeply constrained by behavioral patterns inherited from traditional project delivery models. Although collaboration is a core principle of TVD, the literature shows that it is often fragile, dependent on individual efforts, and weakly institutionalized, which undermines its long-term sustainability.

Technical and process-related barriers represent the largest group in terms of identified types, although only a subset appears with high frequency. Difficulties in defining and measuring value, integrating design, cost, and risk, and setting the target cost under uncertainty emerge as structural challenges rather than deficiencies in specific tools.

In contrast, organizational and client-related barriers appear less frequently. While issues such as lack of capabilities, weak leadership, or limited client ability to define value remain relevant, their lower recurrence suggests that addressing them in isolation is unlikely to generate sustainable improvements.

From a Lean Construction perspective, this review reinforces the understanding of TVD as a socio-technical system rather than a set of independent practices. By combining a systematic classification of barriers with a prioritization logic based on their frequency, the study provides an analytical framework to guide more effective and sustainable TVD implementation.

Finally, this study has some limitations. The review is restricted to literature indexed in Scopus and relies on barriers reported by authors, without direct empirical validation of their causal impact. Future research should examine how these barriers interact, evolve across contexts, and which interventions are most effective. Incorporating complementary methods, such as expert surveys or Delphi studies, would help assess their relative importance and strengthen the empirical grounding of the findings.

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