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Approaches to Mitigating Material Cost Escalation and Volatility under the 2025 U.S. Tariffs in the Construction Sector: A Constructivist Grounded Theory Study

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Trade tariffs affecting construction materials, including increased tariffs on imported steel and aluminum to 50%, applying a 50% duty on semi-finished copper, and imposing 10–25% tariffs on softwood lumber and related derivatives, have intensified price instability and compliance risk for U.S. construction contractors. Existing research models price escalation and examines macroeconomic impacts; however, little empirical research explains how contractors respond to tariff-driven volatility in practice. Using Charmaz's Constructivist Grounded Theory, this study develops an inductively derived explanation of contractor decision-making under the 2025 U.S. tariff regime. Ten semi-structured interviews were conducted with general contractors, specialty contractors, and residential builders across multiple U.S. states. Data collection and analysis occurred concurrently using initial, focused, and theoretical coding until theoretical saturation was reached. The core category—manufacturing stability in volatile markets—shows that contractors assume pricing instability and proactively contain exposure before volatility materializes. Contractors achieve this through accelerated procurement and price locking, contractual transfer of tariff-related risk, strategic substitution of tariff-sensitive materials, and relationship-driven market intelligence. The findings indicate that contractors are responding not to higher prices alone, but to unpredictability. Stability, rather than lowest price, has emerged as the new basis of competition, extending existing escalation research by explaining how contractors proactively contain tariff-driven uncertainty.

Keywords: Construction industry, Contractual risk transfer, Material escalation, Tariff volatility

Introduction

U.S. construction costs have experienced heightened volatility over the past decade due to trade policy shifts, supply chain disruptions, and broader macroeconomic shocks. Among these factors, recent tariff actions affecting imported steel, aluminum, copper, and lumber have further intensified uncertainty in material pricing and procurement. The 2018 Section 232 tariffs on imported steel and aluminum imposed levies of 25% and 10% respectively, raising costs for structural components and disrupting supply chains (Kitamura & Hammond, 2025). The U.S. president's March 2025 tariff package dramatically expanded these duties: it increased tariffs on imported steel and aluminum to 50%, applied a 50% tariff to semi-finished copper products, levied a 10% duty on softwood lumber (25% on certain derivatives), and raised universal reciprocal tariffs to between 15% and 40%

(Associated General Contractors of America, 2025a). China faces a total tariff rate of about 30% on all goods after combining a 10% universal tariff with two successive 10 point increases, while non USMCA compliant products from Mexico and Canada are subject to 25% and 35% duties respectively (Associated General Contractors of America, 2025a).

These policies coincide with existing tariffs on lumber and gypsum and have collectively raised the average cost of building a house by roughly $6,400 to $10,900 (Klapsa, 2025). Brookings economists estimate that the combined tariffs on lumber, gypsum, steel and cabinetry could add around $30 billion to residential investment costs, with about 90% of the burden falling on new construction (Patel, McClelland, & Wong, 2025). This evolving environment introduces uncertainty not only about cost but also about compliance. According to Associated General Contractors of America (AGC), the U.S. Department of Justice has announced it will "aggressively" enforce the False Claims Act (FCA) to pursue importers who undervalue or misclassify products to evade tariffs; fiscal year 2024 FCA settlements exceeded $2.9 billion, with $2.4 billion arising from whistle blower cases (Associated General Contractors of America, 2025b). General contractors can incur treble damages and fines of up to $27,894 per violation if they submit or cause submission of false customs declarations. AGC advises contractors to vet suppliers, verify country of origin and tariff classifications, and implement compliance procedures to avoid being found willfully blind to suppliers' duty evasion.

Against this backdrop of cost volatility, heightened enforcement, and market uncertainty, there remains little empirical research explaining how U.S. construction contractors respond to tariffs in their day-to-day operations. Recent U.S.-focused research has examined tariff policy primarily through macroeconomic and financial lenses. At the project and contract level, Jezzini et al. (2025) develop probabilistic, data-driven frameworks to quantify construction material price volatility and integrate forecasted risk into escalation clauses. However, these approaches do not explain how contractors interpret, anticipate, and respond to tariff-driven uncertainty in day-to-day decision making. As a result, the behavioral and strategic processes through which contractors actively contain uncertainty before price impacts materialize remain underexplored. This study addresses that gap by applying a constructivist grounded theory approach to develop an empirically grounded explanation of how contractors manage material cost escalation, procurement challenges, and contractual risk under the 2025 U.S. tariff regime.

Literature review

Tariff policies and macroeconomic shocks

Protectionist trade policies have reversed decades of trade liberalization and significantly affected global supply chains. Lee and Khan (2025) argue that U.S. tariffs on China, the EU, Canada and Mexico have raised consumer prices and disrupted international commerce. Castelblanco et al. (2024) note that pandemic triggered global supply chain disruptions have intensified price volatility, leading to project suspensions, productivity losses and time delays. Chammout et al. (2024) emphasize that the combined effects of the 2018 steel and aluminum tariffs, the COVID 19 pandemic and the Russia–Ukraine war have produced unprecedented rises in material costs, constrained labor markets and escalating fuel prices. Nabi, El Adaway and Assaad (2024) confirm that the 25% steel and 10% aluminum tariffs increased input costs and that supply chain disruptions during the pandemic further escalated construction material prices. Computer Methods International Corporation (CMiC) industry report further explains that tariffs have driven up prices for structural steel components, aluminum window systems, engineered wood, glazing systems and imported mechanical and electrical assemblies, and coupled with persistent supply chain disruptions, these tariffs have lengthened lead times and heightened uncertainty about material availability (CMiC Global, 2025. However, tariffs

are also beneficial and act as protection for different sectors and countries. According to Contractor (2025), any shift in economic policy creates both advantages and disadvantages. Raising tariffs can help certain industries, generate additional government revenue since tariffs function like taxes, and may shift some manufacturing jobs from countries such as China to the United States.

Construction cost volatility in crises

The construction industry is inherently susceptible to cost overruns and schedule delays because it relies on heterogeneous resources exposed to market fluctuations. Adepu et al. (2024) observe that fluctuating material prices, contractual disputes and regulatory changes already challenge projects in normal times; the COVID 19 pandemic amplified these challenges by causing material shortages, labor disruptions and increased project delays. Sadeh et al. (2023) report that pandemic impacts led to a $60.9 billion GDP loss and reduced the construction workforce by more than one million workers. Castelblanco et al. (2024) show that global shocks doubled shipping costs and exposed foreign bottlenecks in supply chains, resulting in inflation and cost escalation. These studies all state that pandemics and geopolitical crises magnify cost volatility and call for resilient procurement strategies.

Approaches to mitigating material escalation and volatility from tariffs

Researchers have proposed a range of analytical, contractual, and procurement-based approaches to mitigate material cost escalation and volatility under uncertain market conditions. One stream of research applies advanced analytics to quantify and price construction cost risk. For example, Jezzini et al. (2025) developed probabilistic deep-learning models to forecast material price distributions and integrate these forecasts into stochastic risk models and price escalation clauses. Similarly, Nabi et al. (2024) examined inflation transmission across multiple construction materials and found that metals and plastic products exhibit strong cross-material price spillovers, highlighting the interconnected nature of material cost escalation. Beyond analytical modeling, tariff-driven volatility has prompted renewed attention to contractual risk allocation mechanisms. Chammout et al. (2024) reviewed standard design–bid–build contracts and found wide variability in price escalation provisions; many contracts fix prices with limited exceptions for legislative changes, while others allow supplementary clauses to counteract escalation risks. The authors note that courts seldom grant relief except in cases of unforeseen and severe economic conditions, underscoring the legal challenges of managing price escalation. At the same time, Cohane (2021) and Carroll et al. (2025) advise contractors to negotiate escalation clauses, include contingency allowances and adopt early procurement strategies; they also emphasize the role of contractual language in transferring risk to owners or subcontractors. AGC's risk management guidance warns that contractors may incur False Claims Act liability if they knowingly pass through suppliers' under reported tariffs, recommending due diligence procedures and documentation (Associated General Contractors of America, 2025b).

Research also suggests other strategies for supply-chain and procurement during volatility. Contractors should buy key or volatile materials early during uncertain market conditions and use collaborative delivery methods to manage risk (Castelblanco et al., 2024). Reliable cost data and early warning indicators are important because inflation varies across different materials, and rising prices are reducing contractors' confidence in future sales and profits (Nabi et al., 2024). Since costs for materials, labor, and equipment are unstable, responsibilities and risk in contracts may need to be restructured (Chammout et al., 2024).

Although macro level analyses and modelling studies offer valuable insights into tariff impacts, pandemics and price escalation, there is little research on how contractors integrate these strategies in practice. Existing studies focus on forecasting prices, examining legal frameworks or analyzing

macroeconomic impacts, but do not capture contractors' day to day decision making or the co construction of risk containment strategies.

Research Methods

This study used a constructivist grounded theory methodology, based on Charmaz (2014), to develop an empirically derived explanation of how U.S. contractors are responding to material price volatility, procurement challenges, and contractual risk under the recently reinstated the U.S. tariff policies affecting imported construction materials. CGT was selected because tariffs represent an emerging and evolving phenomenon; little academic literature exists on how contractors manage tariff-induced pricing instability. Rather than testing a predetermined model, CGT allowed theory to be co-constructed from the meanings participants assign to their experiences, recognizing that researcher interpretation and participant interpretation are inseparable in qualitative inquiry.

Data collection consisted of ten semi-structured interviews with general contractors, specialty contractors, and residential builders across multiple U.S. states. The interview protocol focused explicitly on contractor actions taken in response to tariff-related uncertainty, and the analysis is intentionally bounded to tariff-driven decision making rather than to all sources of economic volatility. The interviews ranged from approximately 25 to 45 minutes and were conducted by phone or Zoom. Field notes were taken and expanded immediately after each interview. The interview data were captured through detailed note-taking and reflective memos during and after each participant interaction.

Data analysis proceeded iteratively and concurrently with data collection, following the staged coding process central to Charmaz's approach. First, initial coding, conducted line-by-line, privileged gerund-based coding to remain close to participants' actions and decisions. Second, focused coding condensed the initial codes into more conceptual patterns that occurred frequently across the interviews. Throughout the process, reflective memo writing was used to capture analytic understanding, document the evolving interpretation of meaning, and compare new data against emerging concepts. Finally, theoretical coding connected the focused codes into a conceptual model that explains how contractors respond to tariff-driven uncertainty. Constant comparison guided analysis across time, participants, and evolving categories. This iterative process showed a dominant process pattern that explained participants' overarching strategy for dealing with tariff volatility. The theory that emerged from this study does not claim objectivity; rather, it represents a co-constructed understanding between researcher and participants of how the construction industry manages unpredictable pricing conditions.

The sample size in this study is methodologically appropriate and consistent with Charmaz's (2014) Constructivist Grounded Theory (CGT). Unlike quantitative research, which prioritizes numerical representation, CGT uses theoretical sampling, intentionally selecting participants who can best elaborate emerging concepts, and concludes data collection when theoretical saturation is reached. The aim is depth of conceptual understanding, not sample size. Grounded theory founders Glaser and Strauss (1967) define saturation as the point at which "no new properties of the pattern emerge," meaning that additional interviews generate redundancy rather than new insight. Consistent with this guidance, analysis in this study occurred concurrently with data collection. After the seventh interview, no new codes, strategies, or variations in contractors' tariff-response behaviors emerged, and three additional interviews were conducted to confirm saturation and ensure analytic completeness. This sample size is fully supported by saturation research in qualitative methodology: Guest et al. (2006) found that studies with homogenous participant groups commonly reach saturation

within 6–12 interviews. Morse (2015) and Hennink and Kaiser (2022) also state that studies with a narrowly defined phenomenon often reach saturation with 9–17 interviews.

Results and Discussion

Table 1 below shows the profile of respondents that were interviewed for this study.

Table 1. Respondent Profiles

Position	Years of Experience	Firm Type	Typical Projects	Delivery/Contract Methods
Regional Director	27 years	Temp Control / Self-performing	Public works, school projects	Public bid, then negotiated
Owner / President	25 years	Commercial Plumbing	Apartments, HVAC piping, plant expansion	Supplier-delivered or crew pickup
Project Director	20+ years	Mechanical Contractor	Semiconductor, pharmaceutical, industrial	Lump sum, client-directed contracting
President	20 years	Mechanical / HVAC / Plumbing service	Life science labs, facility upgrades, bathroom renovations	Lump sum; hourly service; 50% VDC integration
President	27 years	General Contractor	Private education, healthcare, entertainment	CM at risk, general contracting, design-build
Chief Estimator	26 years	General Contractor	Industrial construction	Design–Bid–Build
Service Manager	44 years	Controls / Systems Contractor	Plan & spec construction, service contracts	Design–Build
Project Manager	9 years	GC / CM Services	Commercial projects	Lump sum
Owner	12 years	Residential	Kitchen remodels, bathrooms	Design–Bid–Build
Vice President	15 years	General Contractor	Carpentry, masonry, ironwork	Design–Bid–Build

Core Category: Manufacturing Stability in Volatile Markets

The central theoretical theme that appeared from the data is that contractors engage in proactive risk containment as their dominant response to tariff-driven cost volatility. Rather than waiting for pricing impacts to materialize, contractors assume that pricing will change and work aggressively to contain exposure before it occurs. As one chief estimator explained, “We would rather lose a job than lose money.” This quote captures a powerful shift: contractors have moved from attempting to predict volatility to strategically blocking its financial impact.

Tariffs did not simply raise prices; they destabilized the predictability of pricing itself. Participants repeatedly emphasized that the threat was not the tariff amount—it was the uncertainty and timing of pricing changes. One executive stated, “The price could change tomorrow. We get new pricing every time we estimate.” Rather than treating pricing as fixed until procurement, firms now treat pricing as

unstable until actively locked in. Through theoretical integration, four interrelated analytic categories emerged that explain how firms operationalize proactive risk containment.

Category 1: Accelerated Procurement and Price Locking: The first category captures a consistent behavioral shift toward accelerating purchasing decisions. Contractors increasingly initiate procurement activities earlier in the process, sometimes before design completion or even before final contract execution. One contractor explained, "We order materials early in the project… when the price is low." Contractors do not wait for normal project milestones; they move purchasing forward on the timeline to capture favorable pricing before tariffs impact costs. Several participants described stockpiling and early purchasing as new standard practice. As one owner noted, "We buy in bulk. It gives us pricing advantages, and we don't have to worry when prices jump." Early procurement becomes a financial hedge against volatility. Through purchasing materials before tariff price increases are applied, firms shift from reacting to market changes to beating market changes.

Category 2: Contractual Transfer of Cost Exposure: The second category captures the contractual mechanisms firms now use to shift financial responsibility for tariff-driven cost increases. Instead of absorbing pricing risk, contractors rewrite proposals and contracts to limit price guarantees and redefine who carries cost exposure. One participant stated, "Our proposals reserve the right to change the price at any time." Another explained the strategy more bluntly: "If the owner delays, we requote. We don't honor old pricing." Participants described shortening bid-validity periods from thirty days to as little as seven days. Subcontractors are explicitly excluding tariff-related increases from their proposals. A vice president shared, "Subs are coming out and saying their price is not subject to future tariff changes." The contract language shifts price ownership away from contractors and toward owners or subcontractors, redefining risk distribution in the project delivery process.

Category 3: Material Sensitivity and Strategic Substitution: The third category reflects how tariffs have led contractors to evaluate materials based on vulnerability to pricing volatility. Electrical gear, aluminum window systems, steel assemblies, and certain wood and plywood products were repeatedly described as tariff-sensitive materials. One estimator explained, "Electrical gear is going to be the most affected. Not lead time, but price." A commercial contractor reported supplier warnings: "Exotic woods and plywood will have a ten to twenty-five percent increase."

Instead of simply accepting pricing, contractors now make strategic substitutions—changing materials, suppliers, or even specifications—to offset tariff exposure. One participant described the logic: "We offer the owner a similar product with a shorter lead time or lower price." Another noted that subcontracting work transfers exposure: "We sub work out to transfer risk. If the price changes, it's on them." Material substitution becomes a tool of resilience.

Category 4: Relationship-Driven Market Intelligence: The final category underscores the relational component of tariff mitigation. Contractors rely heavily on transparent communication with suppliers and owners to navigate pricing uncertainty. Several participants used nearly identical language to describe this process: "Early and often discussions keep everyone on the same page." Supplier relationships function as an early warning system when pricing is about to shift. Participants described receiving calls from suppliers before official price changes are announced, allowing them to adjust procurement timing. Trust emerged as a crucial currency. A vice president described it succinctly: "Without trust, everything becomes irrelevant." Transparent communication is not an administrative function; it is a risk-management strategy.

Figure 1 visualizes the core grounded theory developed in this study.

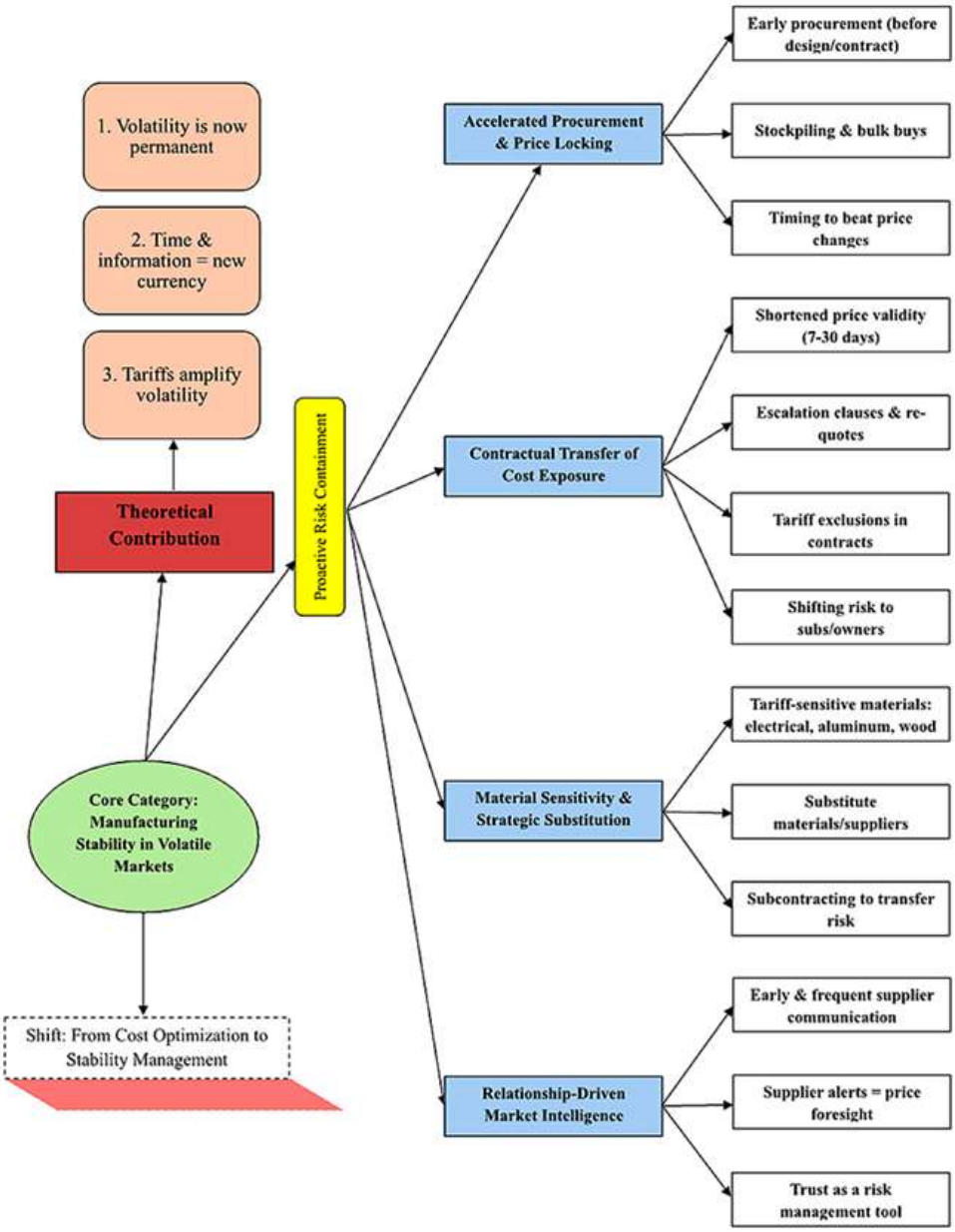

Figure 1. Grounded Theory Model: Proactive Risk Containment Under Tariff Volatility

Discussion of Findings

This study identifies a fundamental shift in how contractors make decisions under tariff-driven volatility: firms are no longer competing on lowest price but on stability management. The grounded theory developed, contractors manufacture stability by converting uncertainty into controlled risk through time compression, relational information flow, and contractual risk transfer. This illustrates a behavioral and strategic transformation in construction procurement.

Existing research has shown that material escalation, pandemics, and macroeconomic disruptions increase prices and strain supply chains. However, prior studies have examined these issues at aggregate or contractual levels rather than exploring how contractors adapt in real time. The findings of this study extend that knowledge by showing that volatility itself—not the magnitude of price increases—is what forces strategic change. Contractors no longer react to price escalation once it occurs; instead, they front-load decisions and work to control exposure before volatility can materialize.

The interview data demonstrate that firms now engage in proactive risk containment through three interconnected mechanisms. First, contractors compress time by accelerating purchasing decisions, stockpiling tariff-sensitive materials, and locking in prices as early as possible to avoid future market swings. Second, they transfer exposure by restructuring proposals and contracts—shortening bid-validity periods, limiting price guarantees, and shifting tariff-related cost responsibility to owners or subcontractors. Third, they increase information flow by relying on close supplier relationships and continuous communication to anticipate pricing changes and strategically time procurement. These practices show that contractors are no longer reacting to volatility, but they are deliberately removing uncertainty from the decision process. These behaviors go beyond typical cost optimization approaches documented in previous research. Whereas earlier studies focused on predicting escalation or creating contractual tools to handle it after the fact, the contractors in this study attempt to remove the volatility from the decision space entirely. Rather than forecasting price changes, they operate as if uncertainty is constant and permanent. This differs from prior escalation practices, which were typically reactive and temporary, because contractors now treat uncertainty as a default condition and embed these actions into standard procurement and contracting routines. Participants also drew a clear distinction between pandemic-induced disruptions and tariff impacts. The pandemic created shortages—a logistical problem—whereas the tariffs create pricing instability—a financial problem. In response, contractors shifted from operational workarounds to strategic and contractual adaptation.

Three theoretical contributions emerge: (1) volatility has become a permanent operating condition, not an exception. (2) time and information have replaced competitive pricing as new forms of currency, (3) tariffs function as volatility accelerants, forcing firms to prioritize predictability over cost minimization. While prior literature has emphasized escalation clauses, probabilistic modeling, and procurement planning, those works assume that contractors optimize around price. The findings of this study show a different paradigm: contractors now optimize around predictability. They stabilize margins by redesigning decision processes, compressing procurement timelines, and restructuring relationships. Therefore, tariffs do not merely increase costs; they reshape how contractors decide. They change organizational routines, risk culture, and the sequencing of procurement activities. The industry's competitive advantage now lies in manufacturing stability, not forecasting volatility.
These new developments carry implications for practice and education. Construction management curricula and industry training need to expand beyond procurement and estimation to include uncertainty navigation, contract strategy, and stability design. Firms that develop capabilities to shorten decision cycles, secure timely information, and clearly allocate risk will be better positioned to maintain profitability in environments defined by policy-driven volatility.

Conclusion

This study advances a grounded theoretical explanation of how U.S. contractors are responding to tariff-driven price volatility. Using Charmaz's Constructivist Grounded Theory, we identified a core process: contractors manufacture stability by converting uncertainty into controlled risk. Rather than competing on lowest bid, firms compete on stability management, locking prices earlier, accelerating

procurement, and structuring contracts to limit exposure before volatility materializes. The theory is expressed in four integrated strategies: accelerating procurement and price locking; transferring cost exposure contractually; substituting or re-scoping tariff-sensitive materials; and relying on relationship-based market intelligence from suppliers. These behaviors all show a shift from trying to predict market volatility to actively removing market influence from the decision process.

The central contribution of this study is demonstrating that pricing uncertainty, not price amount, drives strategic change. Contractors are redesigning procurement timing, decision logic, and contract language to contain risk at its source. Participants distinguished tariffs from COVID-19 disruptions: pandemic shortages created logistical uncertainty, while tariffs create financial uncertainty, requiring contractual and strategic, not operational, adaptation. Practically, organizations should invest in capabilities that compress decision time, improve information reliability, and standardize contract protections. These capabilities enable firms to "price stability," safeguarding margins and improving predictability for owners. While based on 10 interviews, theoretical saturation was reached, though broader sampling across sectors and delivery methods could refine the model.

We can conclude that tariffs are reconfiguring not only what projects cost but how construction firms decide. By casting light on the routines through which contractors manufacture stability—compressing time, sharpening information, and reallocating risk—this study provides a theoretical and practical scaffold for managing projects in a policy environment where volatility is durable, and stability is a competitive advantage. Future work may explore quantitative validation or performance outcomes of early-buy and escalation-clause strategies.

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