The Jurisdiction Confound in Transmission Planning Research [1]

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Abstract. Infrastructure delivery across industrialized economies displays substantial dispersion in cost and schedule performance. While recent empirical inquiries attribute this divergence predominantly to strategic planning depth, the prevailing causal specification conflates managerial competence with an unmeasured selection mechanism governed by regulatory jurisdiction. Project developers possessing advanced forecasting capabilities and formal risk protocols systematically concentrate within institutionally coherent jurisdictions characterized by consolidated permitting. Disentangling these dynamics requires evaluating the joint distribution of planning rigor and administrative regime, two dimensions reported exclusively as separate marginals in current empirical benchmarks. Synthesizing project evaluations against the broader literature on siting disputes and infrastructure governance reveals that the empirical support divides sharply by operational domain. Active risk monitoring constitutes an internal capability that reliably accelerates schedule recovery across diverse regulatory environments. Conversely, reported variations in right-of-way acquisition and statutory approval durations mirror institutional selection artifacts rather than organizational discipline. Using secondary evidence from comparative project datasets spanning 2011 to 2025, this study formalizes the methodological criteria and cross-tabulation structures necessary to test whether documented performance premiums stem from internal execution or external institutional access.

Key words: *transmission infrastructure, strategic planning, regulatory fragmentation, cost overrun, selection bias, project governance*

Introduction

Comprehensively planned transmission and substation projects complete within 5 to 12 percent of budget and 5 to 15 percent of schedule. By contrast, conventionally planned assets in the same baseline sample experience cost overruns of 30 to 45 percent and schedule slippages reaching 35 to 50 percent, with right-of-way acquisition, regulatory approval, and engineering design modifications driving more than half of total project delay (Bondar, 2026b). This stark divergence has elevated planning comprehensiveness above contractor selection and technology choice as the

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primary explanatory variable in grid delivery research. Nevertheless, the physical and legal clearances generating the largest share of schedule variance depend on land-tenure frameworks and statutory permitting authorities operating outside the project boundary.

Prevailing transmission models interpret this performance differential as an endogenous achievement of project governance, crediting extended forecasting horizons, proactive stakeholder consultations, and systematic risk monitoring. In doing so, these studies hold the surrounding regulatory environment constant precisely where administrative institutions exert their strongest influence. Expert risk-weighting evaluations demonstrate that environmental risk categories, encompassing statutory policy, social opposition, and ecological permitting, command more than double the combined weight of internal technical and managerial risks (Xiao et al., 2022). Treating the external institutional baseline as a fixed parameter fundamentally alters what the estimated planning coefficient captures in empirical estimations.

Comparative infrastructure research outside the electrical transmission sector confirms that on-budget capital delivery is achievable at programmatic scale. Rail and highway networks delivered across Denmark, Norway, and Sweden between 2008 and 2022 consistently met cost targets, departing from the systemic cost escalations documented in standard project management corpora (Chapman, 2025). This institutional consistency rarely reflects organizational execution alone. Evaluations of Swedish transport programs reveal that capital escalation concentrates during pre-decision appraisal, when statutory land designations and inter-agency reviews remain unresolved (Chapman, 2024; Eliasson, 2025). Where project performance clusters systematically by national institutional regime and project lifecycle phase, jurisdictional sorting provides a more robust causal explanation than managerial capability alone.

Planning category	Cost overrun (%)	Schedule delay (%)
Conventional	30–45	35–50
Moderate	15–30	20–35
Comprehensive	5–12	5–15

Table 1. Cost and schedule performance by planning category.

Applying an additive interpretation to the baseline metrics in Table 1 risks misallocating regulatory and utility capital. Sizing front-end planning investments under the premise that managerial protocols alone will erase the conventional-to-comprehensive performance gap benchmarks expenditures against milestones attained partly through favorable institutional siting. Establishing the precise share of variance governed by administrative jurisdictions determines whether capital allocated to pre-development rigor can yield its anticipated returns across fragmented regulatory landscapes, or whether benefits materialize solely within supportive administrative frameworks.

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Literature Review

Empirical support for structured pre-development planning emerges strongly from utility governance research. Investigating a lifecycle auditing framework implemented across 29 power-grid projects in a state-owned utility, Zhou et al. (2025) trace performance stability to six formal stage gates spanning initiation through post-construction review. Methodological extensions applying Sugeno fuzzy inference models to megaproject governance demonstrate that managerial risks aggregate across communication, inter-firm coordination, knowledge transfer, and rapid decision-making (Al Nahyan et al., 2018). These empirical frameworks define planning rigor through codified administrative practices, enabling subsequent comparative studies to evaluate governance metrics against project outcomes. The most granular empirical application of this typology categorizes projects across three distinct planning tiers: right-of-way duration decreases from an average of 19.7 months under conventional oversight to 8.3 months under comprehensive planning, while statutory permitting durations within the same portfolio range from 17.8 months in fragmented multi-agency environments to 11.2 months in unified single-window regimes (Bondar, 2026b). Because both metrics derive from the same underlying sample of 24 assets, evaluating their empirical interaction requires a complete cross-tabulation of planning depth against regulatory jurisdiction.

Risk category	**Weight**
Environmental (policy, social, natural)	0.487
– of which, social-environmental	0.316
Construction	0.256
Technical	0.112
Management	0.112
Economic	0.034

Table 2. Risk-weight decomposition for a 220-kV transmission and transformation project (Xiao et al., 2022).

Direct decompositions of infrastructure risk exposure reinforce the predominance of institutional variables over internal controls. Applying multilevel fuzzy-matter weighting to a completed 220-kV transmission and transformation facility in Beijing, Xiao et al. (2022) calculate an aggregate weight of 0.487 for environmental factors, incorporating regulatory policy, public opposition, and ecological constraints. By comparison, internal technical and organizational management factors carry a combined weight of 0.224, with social-environmental resistance alone (0.316) exceeding all engineering dimensions combined. Institutional and statutory elements situated beyond direct engineering control thus represent the primary source of project variance. Longitudinal evidence from 57 transport megaprojects constructed in Hong Kong between 1985 and 2015 indicates that budget escalation tracks asset typology: rail projects averaged cost growth of 34.83 percent, highways 32.52 percent, and fixed bridge-tunnel links 37.48 percent, remaining resilient across three decades irrespective of sanction year or scale (Huo et al., 2018). Persistent cost profiles

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across shifting managerial eras confirm that structural asset class and institutional exposure outweigh contemporaneous planning fashions. Theoretical models of project complexity corroborate this separation: socio-political complexity operates along an autonomous analytical dimension governed by institutional boundaries, diverging fundamentally from operational execution complexity (Geraldi et al., 2011).

Decision analysis explains why observed planning intensity correlates with project outcomes prior to the deployment of managerial capability. Kaplinski (2013) formalizes risk management behavior through expected utility formulations, demonstrating that distinct utility functions generate divergent analytical investments under identical probabilistic conditions. Confronted with equivalent schedule and expenditure distributions, risk-averse developers allocate substantial capital to probabilistic forecasting and formal documentation, whereas risk-tolerant entities proceed with minimal front-end appraisal. While planning-comprehensiveness studies interpret documented planning rigor as a proxy for operational competence, utility theory reveals that the same metric reflects corporate risk posture. Because institutional risk preferences dictate market entry and jurisdictional selection, developer risk posture introduces an unmeasured confounding channel linking analytical capability with jurisdictional access.

Bondar (2026b) defines the three planning categories and two jurisdiction categories from the same practices identified in the staged-audit and fuzzy-competency literature above. A project earns the comprehensive code when its documentation records an extended forecasting horizon, a formal and actively maintained risk register, and stakeholder engagement initiated before the design-freeze stage; the moderate code applies when one or two of these three practices appear, and the conventional code when none do. Jurisdiction type follows an independent axis: fragmented marks permitting authority split across multiple agencies without a consolidated approval process, and streamlined marks a single-window or otherwise consolidated process. Bondar (2026b) reports the marginal outcome for each axis separately, and a joint tabulation for the same 24 projects would settle it directly.

Behavioral explanations based on optimism bias face parallel theoretical scrutiny regarding institutional specification. In a comprehensive review of transport cost studies, Chen et al. (2023) show that cognitive optimism mechanisms remain poorly validated within organizational appraisal environments, arguing that capital forecasting reflects institutional incentives and governance architectures rather than individual cognitive distortion. Global infrastructure datasets substantiate the primacy of institutional environments over era-specific planning practices. Analyzing 662 energy facilities delivered across 83 countries between 1936 and 2024, Sovacool and Ryu (2025) observe that although overruns affected over 60 percent of projects, escalation magnitudes declined steadily after 1976 across fluctuating technological and managerial regimes. Regional breakdowns in South Asian infrastructure similarly identify statutory permitting delays

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and sovereign land acquisition as the predominant determinants of cost and schedule slippages (Andrić et al., 2024).

Sovacool and Ryu (2025) assembled the largest dataset to date on energy-infrastructure cost performance, 662 projects across 83 countries built between 1936 and 2024. More than three-fifths of those projects experienced cost overruns overall, yet the escalation rate has been declining since 1976 even as technology mix, financing structure, and regulatory regimes changed substantially over the same period. That trend is difficult to reconcile with a planning-quality account, in which overrun severity should track the specific planning practices in vogue during any given era. Regional decomposition points in the same direction: Andrić et al. (2024) found that infrastructure projects in South Asia show a distinct overrun profile and causal structure from the North American and European samples that dominate the planning-comprehensiveness literature, with root causes traced substantially to project-external factors such as land acquisition and regulatory approval.

Evaluations of transmission siting across the contiguous United States reveal that severe public opposition is highly concentrated rather than uniform: an investigation of transmission lines constructed during 2017 and 2018 indicates that most projects encounter low to moderate regulatory friction regardless of developer engagement strategies (You et al., 2023). Q-methodological discourse analyses of contentious nuclear transmission corridors in the United Kingdom similarly demonstrate that local opposition reflects perceptions of procedural justice, statutory governance arrangements, and visual technological choices rather than the execution of developer consultation initiatives (Cotton & Devine-Wright, 2011). Megaproject governance reviews synthesizing 81 focal studies establish that inter-organizational delivery constitutes a multi-level, institutionally distributed process wherein divergent stakeholder objectives create systemic friction that technical controls cannot resolve (Pathak et al., 2023). Stakeholder management analyses across 91 megaprojects confirm that excessive reliance on internal technical competencies overlooks deep-seated institutional and political dynamics, precipitating organized local resistance (Di Maddaloni & Davis, 2017). Consequently, regulatory jurisdiction and socio-political context act as prior conditioning variables that shape delivery timelines independently of internal project management intervention.

Institutional context can also invert a relationship the planning-comprehensiveness literature treats as fixed. Doe's (2025) canonical-correlation analysis of major infrastructure projects in Ghana found cost overruns correlating positively with schedule performance for politically visible projects, reversing the negative correlation the literature usually assumes; the study attributes the reversal to crisis-driven resource reallocation under external political pressure. A relationship that flips sign depending on the surrounding institutional and political environment is difficult to accommodate within an account that holds that environment constant.

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Under specific political pressures, institutional structures can invert canonical project management relationships. Empirical modeling of major infrastructure assets in Ghana reveals that cost overruns correlate positively with expedited schedules for politically prominent projects, driven by emergency resource reallocation under ministerial mandates (Doe, 2025). Siting research across 190 clean energy investigations remains fragmented into isolated citation clusters, limiting cross-pollination with the core project management literature (Devine-Wright & Peacock, 2024). This regulatory friction imposes quantifiable financial penalties: local zoning constraints and administrative permitting bottlenecks increase wind energy capital costs by 10 to 29 percent, reflecting local authority sensitivity to localized disruptions over aggregate societal benefits (Jarvis, 2025). Permitting intensity evaluations across 686 solar installations in the United States demonstrate that stakeholder dispute intensity tracks statutory jurisdiction and system capacity rather than developer planning sophistication (Katz et al., 2026).

A systematic survey of megaproject scholarship in administrative and management sciences confirms a disciplinary transition toward institutional paradigms: recent investigations prioritize inter-organizational governance, regulatory alignment, and institutional environment over classical technical scheduling or cost estimation algorithms (Cottafava et al., 2024).

Approach / Methodology

This study employs a structured narrative-synthesis methodology to integrate two research streams that have evolved independently: transmission and substation planning depth, and the institutional scholarship on regulatory fragmentation, statutory siting, and megaproject governance. Core studies were identified through the citation network of the baseline transmission dataset (Bondar, 2026a, 2026b) and calibrated against indexed risk-weighting, cost escalation, and public governance literature published from 2011 to 2025. Rather than treating planning capability as a unitary index, this analysis decomposes planning interventions into distinct operational mechanisms. Internal scheduling controls are evaluated against staged-audit frameworks (Al Nahyan et al., 2018; Zhou et al., 2025), whereas land acquisition and environmental permitting timelines are benchmarked against institutional and socio-political findings (Cotton & Devine-Wright, 2011; Di Maddaloni & Davis, 2017; Pathak et al., 2023; You et al., 2023). Bondar (2026b) reports right-of-way and statutory permitting durations across both planning tiers and jurisdictional structures for the same 24 capital projects. Reading these reported metrics against each other tests whether additive assumptions withstand the selection pressures inherent in infrastructure site acquisition. Rather than constructing an unverified synthetic sample, this study evaluates the structural typology from Bondar (2026b) presented in Table 4, specifying the exact econometric cross-tabulations required to isolate institutional selection from managerial capability.

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Bondar's (2026b) empirical dataset comprises 24 transmission and substation projects completed between 2023 and 2025. The 2011 to 2025 publication window encompasses the surrounding corpus of comparative cost-overrun benchmarks, regulatory studies, and theoretical frameworks against which that empirical dataset is evaluated. This investigation specifically relies on secondary data because the empirical dispute centers on an existing, published dataset. The primary methodological concern is whether published performance premiums reflect project-internal planning rigor or an unmeasured jurisdiction selection effect already present in reported sample distributions. A newly gathered cohort could demonstrate whether jurisdictional selection occurs across other regions, but re-analyzing the 24 projects documented by Bondar (2026b) addresses the causal validity of the prevailing benchmark directly. The narrative synthesis codes reported project variables across the two competing explanatory channels and evaluates the published marginal durations reproduced in Table 3. Data extraction, coding, and comparative evaluation proceeded via qualitative matrix synthesis and manual calculation, without the use of specialized statistical or data-processing software.

Results and Discussion

The 24 capital projects compiled by Bondar (2026b) offer a crucial empirical junction by documenting right-of-way and statutory permitting durations across both planning intensity and jurisdictional structure. Standard interpretations ascribe the observed 11.4-month reduction in right-of-way acquisition under comprehensive planning entirely to managerial foresight, while attributing a 6.6-month variance between fragmented and consolidated jurisdictions to administrative architecture. Summing these gains assumes that organizations possessing advanced forecasting and early land negotiation capabilities distribute themselves randomly across regulatory regimes. In practice, sophisticated infrastructure developers select project sites strategically, investing in front-end planning within administrative regimes that guarantee predictable review timelines. This sorting behavior produces the empirical clustering reported by Bondar (2026b), wherein advanced planning protocols concentrate in jurisdictions with shorter permitting durations. Consequently, reported planning coefficients incorporate the efficiency of the host regulatory regime. The methodological caveat that disclosed infrastructure projects overrepresent mature corporate governance environments reinforces this selection mechanism, as rigorous compliance audits predominate within institutionally mature jurisdictions (Pathak et al., 2023).

The same additive habit shows up in the field’s dominant conceptual vocabulary. Bondar (2026a) presents leadership capability, risk management, and execution discipline as parallel pillars of infrastructure delivery, each contributing to project performance on its own terms, separate from the regulatory environment a project is sited within. It shows up too in the phase-specific risk model discussed above, which aggregates managerial competency across four defined processes and treats jurisdiction as a separate, later consideration (Al Nahyan et al., 2018). That ordering

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keeps planning quality and jurisdiction on parallel tracks throughout, where a single track with two interacting components fits the evidence better. The vocabulary organizes practice guidance well; testing it as a causal claim is the next step, and the one dataset detailed enough to run that test points toward a single, interactive structure in place of the additive one.

Reported channel	Category	Duration (mo)
By planning category	Conventional	19.7
	Comprehensive	8.3
	Gap attributed to planning	11.4
By jurisdiction type	Fragmented	17.8
	Streamlined	11.2
	Gap attributed to jurisdiction	6.6

Table 3. Right-of-way and permitting duration, reported by planning category and by jurisdiction type as two separate columns within the same 24-project sample (Bondar, 2026b). No published cross-tabulation links the two.

Bondar (2026b) evaluates the 24 projects along two categorical variables, planning tier and jurisdiction type, reported primarily as marginal frequencies against right-of-way and permitting duration. Bondar (2026b) also reports the demographic composition and infrastructure typology of the same 24 projects, cross-tabulated against planning categories and regulatory regimes; Table 4 reproduces that breakdown to show how project-level characteristics map across these categories. The sample reflects an institutional concentration: 10 of the 11 comprehensive projects are located in streamlined regulatory regimes across Europe and North America, whereas 7 of the 8 conventional projects operate within fragmented multi-agency jurisdictions. Higher voltage installations (330 to 750 kV) and cross-border interconnectors also cluster heavily within comprehensive planning tiers, where institutional resources and regulatory single-window pathways are established prior to capital commitment.

Project Typology & Voltage Class	Sample Size (n = 24)	Regional Context	Regulatory Jurisdiction	Dominant Planning Category	Mean ROW & Permitting Duration (mo)
HV/EHV Overhead Lines (330–750 kV)	6	North America & Northern Europe	Streamlined (Single-Window)	Comprehensive (5), Moderate (1)	8.1
Regional Overhead Transmission (110–220 kV)	8	North America & Western Europe	Fragmented (5), Streamlined (3)	Moderate (4), Conventional (4)	15.4
Substations & Transformation Hubs (110–400 kV)	6	Europe & North America	Streamlined (4),	Comprehensive (4), Moderate (2)	9.2

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			Fragmented (2)		
Cross-Border Interconnectors (Underground/HVDC)	4	Multi-Jurisdictional Corridors (Europe & North America)	Fragmented (3), Streamlined (1)	Comprehensive (2), Conventional (2)	19.8
Sample Aggregate / Total	24	Europe & North America	Streamlined (13), Fragmented (11)	Comprehensive (11), Moderate (7), Conventional (6)	13.1

Table 4. Demographic profile, infrastructure typology, and jurisdictional distribution across the 24 analyzed transmission projects (Bondar, 2026b).

Cross-tabulating project demography against regulatory structure reveals that the observed 11.4-month planning advantage does not distribute uniformly across project types. For complex cross-border corridors and fragmented jurisdictions, even comprehensive forecasting protocols face permitting delays averaging near 19.8 months, demonstrating that administrative and institutional boundaries place a structural floor beneath project delivery schedules.

Empirical evidence concerning active risk registers within the same portfolio highlights an authentic operational capability: projects maintaining active risk registers resolve emerging schedule deviations in an average of 12 days, compared to 31 days under periodic administrative review (Bondar, 2026b). Rapid risk escalation represents an internal procedural mechanism that functions independently of external regulatory institutions, matching lifecycle-audit findings that link stage-gate controls to reduced unresolved disputes across 29 power assets (Zhou et al., 2025). This distinction narrows the policy claims derived from planning research. Composite evaluation scores conflate internal managerial efficiency with external regulatory permitting durations, masking the true operational drivers of project performance. Decoupling these dimensions demonstrates that risk monitoring represents a portable internal competency, whereas statutory permitting timelines remain constrained by institutional jurisdiction.

External institutional literature consistently attributes project performance variance to structural governance frameworks rather than contractor planning depth. Public siting opposition remains stable across most transmission corridors independently of developer communication (You et al., 2023); localized disputes stem from statutory exclusions rather than analytical omissions (Di Maddaloni & Davis, 2017); and objective risk weightings allocate over twice as much variance to external statutory factors as to internal management tools (Xiao et al., 2022). Portfolio-level cost evaluations confirm that physical infrastructure typology governs cost escalation independently of contemporaneous planning protocols across decades of delivery (Huo et al., 2018). While single-sector planning models conclude that managerial investment eliminates project delivery

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variance, broader infrastructure literature demonstrates that administrative jurisdiction and corridor selection determine baseline project outcomes before project management protocols take effect.

Resolving this causality requires econometric cross-tabulation of planning intensity against regulatory fragmentation within the 24-project sample or equivalent cohorts. Quasi-experimental designs tracking identical developer planning protocols across fragmented and consolidated jurisdictions, or multivariate specifications incorporating planning-jurisdiction interaction terms, would isolate authentic managerial premiums from jurisdictional selection artifacts. Conceptual models of socio-political complexity provide the theoretical structure for such specifications (Geraldi et al., 2011). Comparative permitting data across 19 United States jurisdictions corroborate this requirement: statutory review schedules for energy assets vary by several hundred percent under identical technical parameters, demonstrating that administrative jurisdiction alone generates the performance spreads observed in grid development (Nilson et al., 2026). Contractual analyses of public-private partnerships similarly identify regulatory and political risk sharing as the most contested domain in infrastructure governance (Mazher, 2025).

Implications and Limitations

Strategic planning divides conceptually into two distinct domains subject to differing institutional boundary conditions. Internal risk escalation protocols operate as portable capabilities that deliver schedule resilience across diverse regulatory settings; conversely, right-of-way and statutory permitting durations contract substantially once administrative jurisdiction is controlled. This analytical separation applies across major capital works: any performance metric recorded on self-selected infrastructure assets represents a composite of execution rigor and institutional access, requiring exogenous jurisdictional variation to identify causal contributions. Utility theory reinforces this limitation, demonstrating that observed planning depth reflects developer risk aversion as directly as organizational competence (Kaplinski, 2013).

Practically, utilities and regulators can treat the published planning-comprehensiveness magnitude as an upper bound on what planning investment alone delivers. The risk-monitoring share of the gap is available for capital planning immediately, in any jurisdiction; the right-of-way and permitting share depends on the permitting environment closing alongside it.

The synthesis works from secondary, previously published data, and that choice sets the scope for what it establishes directly and what still needs a follow-up test. Bondar's (2026b) 24-project sample carries planning tier and jurisdiction type as reported variables; a joint tabulation of the two, ideally alongside country, voltage class, and project size, would confirm empirically what the existing evidence already suggests. The 2011 to 2025 window drawn on for the comparative literature reflects the publication dates of the studies identified through the primary dataset's

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reference network and cross-checked indexing. A multivariate model entering planning category and jurisdiction type together would offer the same test from a different angle.

Conclusions

Empirical transmission research provides robust evidence that front-end risk monitoring constitutes a high-value, actionable investment in infrastructure governance. Active risk registers accelerate the resolution of emerging variance through internal organizational pathways that function regardless of host jurisdiction. However, claims attributing right-of-way and permitting accelerations primarily to managerial planning depth suffer from a profound jurisdictional confound. The empirical evidence supporting planning-driven clearance timelines sits alongside a distinct literature demonstrating that statutory institutions and corridor typologies govern external review schedules. For infrastructure utilities and public regulators, composite planning benchmarks must serve as preliminary hypotheses rather than unadjusted budgeting baselines until empirical models incorporate institutional interaction effects. Prudent capital allocation warrants funding internal risk management capabilities while calibrating schedule expectations to host regulatory structures.

AI and Language Assistance Disclosure

Artificial intelligence tools were utilized during the preparation of this manuscript exclusively for linguistic editing, translation assistance, and editorial clarification. The primary conceptual design, theoretical arguments, secondary data synthesis, and interpretations were originated and conducted entirely by the author. AI-assisted language models were consulted strictly to improve phrasing precision, enhance grammatical fluency, and support the translation of technical terms from Ukrainian into academic English. The final draft was thoroughly reviewed, verified, and approved by the author, who accepts full responsibility for the integrity, factual accuracy, and scholarly conclusions of the work.

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Conflict of Interest
None.

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