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Heuristic Decision-Making Under Urgency: Managerial Cognition in Saudi Vision 2030 Giga-Projects

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ABSTRACT

Vision 2030 compresses timelines for Saudi giga-projects, forcing managers to decide quickly under uncertainty. This study explains how they do so safely and accountably. We analyze fifteen critical-incident interviews across multiple sectors, using cognitive mapping and an inductive Gioia approach to trace cues, fast rules, and checks. Managers apply a simple lexicographic logic—fix one non-negotiable (time, cost/viability, experience/brand, or safety/compliance)—and flex the rest. They bound risk with five lightweight guardrails: rapid tests, short approvals (often with immediate audits), targeted evidence sweeps, tight cadence with named owners, and escalation for long-lived downside. Saudi-specific conditions—regulatory tempo, hierarchical expectations, and public visibility—tune both what is fixed and how stringent verification must be. The paper offers a practical menu that helps sponsors, PMOs, and regulators deliver speed with credibility, and provides a portable model for other high-pressure programs.

Keywords: Project Cognition, Heuristic decision-making, Saudi Vision 2030, Decision Speed, Project Governance

INTRODUCTION

Projects have become a dominant mode of organizing work in contemporary economies. This proliferation, often described as the "projectification of society" (Schoper & Ingason, 2024), reflects how temporary initiatives extend beyond construction or engineering into domains such as healthcare (Pemsel & Söderlund, 2024), technology (Colli et al., 2022), culture (Lingard & Turner, 2022), and urban transformation (Vermeulen et al., 2025). Early scholarship conceptualized projects as temporary systems (Goodman & Goodman, 1976) or temporary organizations (Lundin & Söderholm, 1995). More recently, however, research has highlighted that projects are not only technical undertakings but also cognitive arenas where managers interpret cues, frame problems, and make decisions under uncertainty (Martinsuo, 2023; Stingl & Geraldi, 2021). For practitioners,

this means that sponsors, project management offices (PMOs), and regulators face a dual imperative: they must demonstrate progress at speed while safeguarding accountability to political and public audiences (Carboni et al., 2024).

Although interest in project cognition has expanded, most empirical work remains grounded in Western settings and relatively stable environments (Stingl et al., 2025). Studies frequently rely on retrospective accounts or simulated decision tasks, leaving limited evidence on how urgent, high-stakes decisions unfold in real time within major transformation programs (Drury-Grogan, 2021). This omission creates a theoretical blind spot: the paradox of speed versus credibility. On the one hand, urgency requires managers to rely on heuristics and intuition (Flyvbjerg, 2024); on the other hand, political, institutional, and societal expectations demand that choices remain accountable and auditable (Ferrer et al., 2021). This tension resonates with broader scholarship that frames organizational behavior through dualities and paradoxes—such as stability and change, exploration and exploitation, or efficiency and legitimacy (Geraldi, 2025; Schulte, 2022).

This paradox is especially acute in Saudi Arabia's Vision 2030 initiative, one of the world's most ambitious transformation programs. Giga-projects such as NEOM's The Line, the Red Sea Project, and Qiddiya illustrate its scale and ambition. With compressed timelines, multi-billion-dollar budgets, and intense political visibility, these projects create decision environments characterized by ambiguity, scrutiny, and truncated deliberation windows (Alwafi, 2025; Filippi & Mazzetto, 2024; Islam & Ali, 2024; Yusuf & Abdulmohsen, 2023). Managers must act quickly to meet immovable deadlines, yet the risks of missteps are magnified by reputational and regulatory consequences. These conditions challenge the adequacy of traditional project management approaches and heighten the salience of cognitive processes in explaining how decisions are made under pressure (Nowińska & Pedersen, 2024). Indeed, decisions made with partial or contested information are prone to systematic biases such as optimism bias, anchoring, or escalation of commitment (Flyvbjerg, 2021; Love et al., 2025).

This paradox is both institutional and cultural. In Saudi Arabia, hierarchical authority and collectivist norms reduce open dissent and elevate reliance on senior leaders' judgments (Ali et al., 2025). At the same time, regulatory frameworks impose procedural bottlenecks—such as procurement rules and permitting processes—that provide legitimacy but delay action (Alshihri et al., 2022; Makki & Alqahtani, 2022). Managers thus operate in contexts where urgency collides with institutional requirements, and where heuristics are simultaneously necessary and risky (Flyvbjerg, 2021). Comparable dynamics have been noted in other Gulf projects (Mashali et al., 2023; Omar & Mahdjoubi, 2023), yet empirical research on how cognition unfolds under such conditions remains scarce.

Taken together, these dynamics crystallize three unresolved tensions in project scholarship. First, real-time cognition under urgency: projects demand rapid judgments, but speed amplifies the risk of bias. Second, institutional and cultural moderation: rules and hierarchies confer legitimacy, yet they restrict flexibility in decision-making. Third, behavioral translation: heuristics enable visible progress and symbolic delivery milestones, but if left unchecked, they can undermine governance. These tensions mirror ongoing theoretical debates in management studies around paradoxes such as short-term delivery versus long-term value (Geraldi, 2025; Schulte, 2022).

To address these tensions, we investigate urgent decision episodes within Saudi Vision 2030 giga-projects. We conceptualize these projects as institutional laboratories where urgency, scale, and visibility converge to intensify cognitive demands. Dual-process theory provides the primary lens, distinguishing between fast, intuitive System 1 reasoning and slower, analytical System 2 reasoning (Cantarelli, 2025; Kahneman, 2011). Recent research shows that these processes are often co-activated rather than sequential, with managers embedding intuitive judgments within lightweight analytical checks (De Neys, 2023; Luoma & Martela, 2021). This insight aligns with ecological rationality and fast-and-frugal heuristics, which highlight the adaptive value of simple rules when matched to structured environments (Gigerenzer & Gaissmaier, 2011; Hertwig et al., 2022), while bounded rationality underscores how limited time and attention constrain such adaptations (Simon, 1990).

While these perspectives have advanced understanding of decision-making, they leave two questions unresolved: how heuristics are structured in urgent, politically visible project contexts, and how intuition is disciplined to preserve both speed and accountability. By addressing these gaps, our study develops a contextualized governance model of urgent project cognition—what we formally term a heuristic governance

model for urgent project decisions, and more simply refer to as a model of fast thinking in fast projects. This model extends dual-process theory beyond its sequential framing, situates heuristics within a governance logic, and demonstrates how lightweight guardrails reconcile the paradox of speed with credibility.

Accordingly, this paper examines how Saudi project managers describe the heuristics they employ under acute temporal pressure, how these heuristics translate into project behaviors and outcomes, and how institutional and cultural conditions shape their deployment. In addressing these questions, the paper makes three contributions. First, it advances project-cognition theory by clarifying how heuristics are structured through a lexicographic logic that anchors urgent decisions on a single fixed priority. Second, it extends dual-process models by demonstrating how intuitive judgments are disciplined through lightweight guardrails that render decisions auditable and, where necessary, reversible. Third, it enriches contextual understanding in project studies by showing how regulatory tempo, cultural hierarchy, sector optics, and executive scrutiny tune both what is fixed and how verification is enacted. Collectively, these contributions move beyond Western, retrospective accounts to propose a heuristic governance model for urgent project decisions—a contextualized framework of fast thinking in fast projects that advances theory while equipping practitioners and policymakers with strategies for delivering giga-projects at pace without undermining credibility.

LITERATURE REVIEW

Project Cognition: Current State of the Field

Project cognition has become a central theme in project management research, referring to the mental processes by which individuals and teams perceive, interpret, and respond to complex and uncertain environments. It encompasses attention, memory, heuristics, mental models, and sensemaking—mechanisms that allow project actors to identify problems, focus on relevant information, and adapt behavior to achieve objectives (Flyvbjerg, 2021; Martinsuo, 2023; Stingl & Geraldi, 2021). Recent definitions describe project cognition as the internal psychological processes that enable individuals to comprehend dynamic project environments and translate understanding into action (Stingl et al., 2025).

Early project management scholarship emphasized rational planning and linear progression, relying on detailed upfront plans and control systems (Lalmi et al., 2025; Thesing et al., 2021). Simon's (1990) notion of bounded rationality shifted attention to cognitive limits and adaptive strategies in unpredictable contexts. Later, agile and hybrid methodologies further underscored flexibility, sensemaking, and responsiveness to change (Drury-Grogan, 2021; Sankaran et al., 2021). This trajectory shows why cognition—rather than purely procedural control—has become essential for understanding how managers handle complexity and uncertainty in projects.

Specific cognitive mechanisms illustrate this point. Attention and framing determine which information is recognized or ignored, directly influencing decision outcomes. Agile approaches, for instance, help teams maintain focus on immediate goals and adapt priorities rapidly (Koch et al., 2023). Conflicting temporal frames in megaprojects, by contrast, can create misalignment across stakeholders (Clegg & Biygautane, 2025). Memory and experience also guide cognition, as practitioners rely on prior knowledge to detect patterns; in construction projects, experiential learning reduces rework and improves performance (Yap & Shavarebi, 2022). Sensemaking integrates these processes, enabling collective interpretation of ambiguous events. Research on digital government projects shows that iterative negotiation and shared visual tools sustain stakeholder engagement (Luna-Reyes et al., 2021). Yet sensemaking may also be misapplied strategically, reframing information to secure approval even when plans are unrealistic, blurring the boundary between adaptive cognition and manipulation (Flyvbjerg, 2021).

Taken together, this body of work confirms the importance of cognition in navigating uncertainty, but it remains theoretically and empirically limited. Most studies remain rooted in stable Western contexts and rely on retrospective accounts or simulations (Lawani et al., 2023), highlighting the need for more naturalistic, real-time research on project decision behavior (Stingl & Geraldi, 2021). Little is known about cognitive processes in urgent, high-stakes projects where cultural norms, institutional dynamics, and political expectations intersect. Among these mechanisms, heuristics are particularly salient in urgent projects because they enable speed but

risk bias if left unchecked. This recognition motivates our focus on dual-process theory as the guiding framework for examining heuristics in high-pressure project environments, which is elaborated in the next subsection.

Dual-Process Theory and Heuristics

Dual-process theory provides a foundational lens for understanding decision-making under uncertainty in project settings. Originating in psychology (Kahneman, 2011), it distinguishes between two cognitive systems: System 1, which is rapid, intuitive, and reliant on heuristics and pattern recognition, and System 2, which is slower, analytical, and resource-intensive. In practice, managers frequently shift between these modes, combining instinctive judgments with reflective analysis depending on situational demands (Cantarelli, 2025; Luoma & Martela, 2021).

Empirical studies show that System 1 tends to dominate under urgency, ambiguity, and information overload—conditions typical of volatile, uncertain, complex, and ambiguous (VUCA) project environments (Bennett & Lemoine, 2014; de Andrade et al., 2021). For instance, in humanitarian crisis simulations, managers relied primarily on experiential intuition, often forgoing systematic analysis to enable rapid action (Fattoum et al., 2024). Similarly, real estate developers reported instinct-based investment decisions during narrow market windows (Robson & Greenhalgh, 2023). In construction and oil and gas projects, incomplete or contradictory information further constrained System 2 engagement, leading managers to depend heavily on heuristic judgment (Cantarelli, 2025; Lawani et al., 2023).

While intuitive judgments provide speed and adaptability, they also introduce predictable biases. These include optimism bias, anchoring, availability effects, and escalation of commitment, all of which distort cost, risk, and schedule evaluations in project settings (Flyvbjerg, 2021; Love et al., 2024). For example, persistent underestimation of megaproject budgets illustrates anchoring, while COVID-19–era construction projects highlighted availability bias, as health risks were overweighted due to salience (Liang et al., 2022). Escalation of commitment, or sunk-cost bias, shows how prior investments can drive continuation of failing projects (Perignat & Fleming, 2022). Collectively, these findings underline the risks of unbounded System 1 reliance in high-stakes environments.

Recent research, however, challenges the strict dichotomy between Systems 1 and 2. De Neys (2023) argues that intuition does not necessarily yield error, nor does deliberation guarantee accuracy. Instead, both systems can produce valid or biased outcomes depending on context. Managers often activate both modes concurrently, embedding intuitive "first rules" within minimal but targeted analysis, rather than alternating between them (Luoma & Martela, 2021). This co-activation perspective highlights the need to examine how intuition and verification interact in practice.

This perspective aligns with the concept of fast-and-frugal heuristics, which offer simple, task-specific strategies capable of producing accurate decisions under time and information constraints (Gigerenzer & Gaissmaier, 2011; Hertwig et al., 2022). Within the ecological rationality framework, heuristics are adaptive when they fit the structure of the environment. For example, Love et al. (2024) show that heuristics outperformed probabilistic models in early cost estimation under uncertainty. Yet heuristics can also become maladaptive when applied in mismatched contexts or when environmental cues shift unpredictably (Annfeldt et al., 2025; Hertwig et al., 2022).

Taken together, the literature demonstrates that heuristics embody a double-edged quality: they enhance agility when conditions demand speed but risk systematic error when left unchecked. What remains underexplored is how managers in urgent project environments discipline heuristics through lightweight checks and guardrails, and how institutional and cultural conditions shape their use. Addressing this gap advances dual-process theory by showing how intuition and analysis co-activate under extreme urgency, while extending ecological rationality by situating heuristics in a non-Western, high-stakes project environment.

Saudi Contextual Factors

Saudi Arabia's Vision 2030 represents a major national transformation aimed at diversifying the economy, fostering technological innovation, and enhancing global competitiveness (Islam & Ali, 2024; Yusuf &

Abdulmohsen, 2023). Giga-projects such as NEOM's The Line, the Red Sea Project, and Qiddiya exemplify the scale and ambition of this strategy, combining stringent timelines with substantial investments. These initiatives create a high-pressure institutional environment where political imperatives, public expectations, and international scrutiny converge, heightening the stakes for project managers who must balance urgency with sustainable and credible outcomes (Alwafi, 2025; Filippi & Mazzetto, 2024). In such contexts, decision-making is inevitably accelerated, and heuristics become an essential tool for coping with competing demands.

The deadlines associated with Vision 2030 exert strong pressures on decision-making across ministries and private entities. While critics warn that such urgency may compromise regulatory integrity and sustainability objectives (Selim & Alshareef, 2025), others argue that it has accelerated reforms and broken through bureaucratic inertia (Al-Gahtani, 2024). This duality illustrates the tension between transformation momentum and the risks of hasty implementation, a tension that often compels managers to rely on heuristics to make rapid choices under urgency.

Cultural norms reinforce these institutional pressures. High power distance establishes hierarchical relationships where questioning superiors is discouraged, constraining feedback loops that are essential for adaptive project management (H. S. Alotaibi & Campbell, 2022). Collectivism prioritizes harmony and loyalty, which can suppress dissent and delay the reporting of risks (Yahiaoui et al., 2021). Tribal and family networks, while facilitating trust and resource mobilization, may also reduce transparency and complicate decision accountability (Ali et al., 2025). These dynamics legitimize intuitive judgments from senior leaders, amplify conformity pressures, and limit the space for extended deliberation—conditions under which heuristics become the dominant decision tool.

Regulatory frameworks further shape decision-making practices. In construction, procurement systems emphasizing lowest-price bidding frequently generate disputes and overruns (Alshamrani et al., 2023). In ICT, bureaucratic inertia and cybersecurity concerns continue to slow digital adoption (Makki & Alqahtani, 2022). In healthcare, Saudization policies have created persistent shortages of skilled professionals, constraining timely facility expansion (Alnowibet et al., 2021). Collectively, these sectoral constraints prolong approvals and increase uncertainty in already time-sensitive initiatives, incentivizing reliance on heuristics as shortcuts to navigate procedural bottlenecks.

Beyond these systemic factors, sector optics and national prestige play a central role. Public-facing and iconic projects, such as those in tourism, heritage, and media, attract both domestic and international scrutiny. As a result, managers often elevate brand integrity and guest experience above cost or efficiency, even accepting cost premiums or schedule impacts to protect reputation (Yaghi, 2024). These optics heighten the salience of heuristics that privilege visibility and symbolic delivery milestones, shaping decisions that may diverge from purely economic or technical logic.

A final contextual factor is executive visibility and scrutiny. Vision 2030 projects operate under intense oversight, with senior leaders frequently imposing compressed timelines or reprioritizing work at short notice (Saeedi et al., 2023). Managers respond by accelerating action to meet executive expectations, often relying on lightweight approvals, conditional audits, or delegation structures to legitimize rapid progress (Irfan et al., 2023). This dynamic compresses deliberation windows while simultaneously increasing the need for verification mechanisms that translate intuition into credible, auditable action.

Taken together, institutional timelines, hierarchical and collectivist cultural norms, regulatory frictions, sector optics, and executive visibility create an environment where heuristics are both indispensable and risky. These dynamics explain why managers in Vision 2030 projects often default to intuitive judgments yet must discipline them through lightweight guardrails. This context directly motivates our investigation of how heuristics are deployed, verified, and adapted under extreme urgency.

METHODOLOGY

Research Design

This study adopts an interpretivist, qualitative design to investigate how project managers make high-stakes decisions under acute time pressure in Saudi Arabia's Vision 2030 giga-projects. A qualitative approach is

appropriate because the focal phenomenon—situated cognition and heuristic use under urgency—remains underexplored outside Western contexts and requires context-rich accounts rather than variable-centered measures. The research is multi-sector and incident-centered, with the unit of analysis being the decision episode, elicited through semi-structured, critical-incident interviews. This approach anchors accounts in concrete urgent decisions rather than generalized retrospection. To make reasoning explicit, each interview incorporated in-session cognitive mapping, which externalized the cues noticed, rules applied, and trade-offs made, while highlighting relevant sectoral, cultural, and regulatory conditions.

Analytically, the study follows the Gioia methodology, progressing from first-order informant-centric concepts to second-order themes and aggregate dimensions (Gioia et al., 2012). This design directly addresses the research questions by examining which heuristics and biases managers rely on under temporal pressure, how these heuristics translate into project behaviors and outcomes, and how Saudi-specific institutional and cultural conditions shape heuristic selection and use.

Data Collection and Sampling

Data were collected between 25 June and 16 August 2025 through semi-structured, critical-incident interviews with managers actively delivering Saudi Arabia's Vision 2030 giga-projects, including NEOM's The Line, the Red Sea Project, and Qiddiya among others. Each interview began with brief context setting and then focused on a recent high-stakes decision episode marked by urgency, ambiguity, or elevated visibility. Probing explored the cues noticed, rules applied, trade-offs made, verification steps taken, and perceived outcomes. To reduce retrospection bias and make reasoning explicit, participants co-created cognitive maps during interviews. These maps were digitally captured and analyzed alongside transcripts to externalize decision flows and surface contextual influences (Creswell & Poth, 2023; Flanagan, 1954). The full interview guide, including exemplar probes and a block-to-research-question crosswalk, is provided in Appendix A to demonstrate how data collection was systematically aligned with the study's aims.

Sampling followed a purposive, maximum-variation strategy (Patton, 2015) to capture diverse urgent decision-making episodes. Inclusion criteria required participants to (i) hold responsibility for consequential project or operational choices, (ii) be actively engaged in giga-project delivery at the time of fieldwork, and (iii) recount a recent decision made under acute time pressure. Recruitment drew on multiple professional and organizational channels to ensure balanced coverage across the major Vision 2030 sectors. The final corpus comprised 15 interviews (I01–I15) across six sector families central to Vision 2030: built environment and design, digital and cloud, retail and commercial services, health, public sector and communications, and safety and defense operations. This spread ensured variation in delivery tempos, procurement logics, compliance burdens, and external visibility, providing a robust basis for addressing the research questions. One participant—a senior operations supervisor without a university degree—was included because of extensive experiential knowledge, reflecting Vision 2030's emphasis on integrating seasoned practitioners alongside formally credentialed managers. An overview of participant demographics and sector representation is provided in Table 1.

Sample size was guided by thematic sufficiency rather than statistical power (Guest et al., 2006). Saturation was reached after 13 interviews, with two additional cases confirming theme stability. This combination of sectoral diversity and saturation ensured sufficient variation to address the research questions while preserving analytic depth. All recruitment, consent, and data management procedures complied with institutional ethical approval (see Subsection 3.4).

Data Analysis

Data analysis followed an inductive, multi-cycle procedure consistent with the Gioia methodology (Gioia et al., 2012). Verbatim transcripts—including Arabic interviews that were translated and back-translated prior to coding (Temple & Young, 2004)—and the cognitive maps co-produced during interviews were imported into NVivo for systematic analysis. The maps were treated as supplementary artifacts that supported recall and triangulated participants' accounts. The unit of analysis was the focal decision episode.

In the first cycle, open coding was conducted line by line to capture first-order concepts in participants' own terms, focusing on cues noticed, heuristics applied, verification steps, contextual pressures, and perceived outcomes. In the second cycle, conceptually similar codes were clustered through constant comparison within and across cases to derive second-order themes. A third integrative cycle assembled these themes into four aggregate dimensions that structure the findings.

Table 1. Sample characteristics

Gender	**Frequency**	**Percentage**
Male	9	60 %
Female	6	40 %
Age	**Frequency**	**Percentage**
18-24	1	06.67 %
25-34	5	33.33 %
35-44	4	26.67 %
45-54	3	20.00 %
55 nd above	2	13.33 %
Education Level	**Frequency**	**Percentage**
High School or lower	1	06.67 %
Bachelor's degree	7	46.67 %
Master's degree	5	33.33 %
PhD	2	13.33 %
Sector Family	**Frequency**	**Percentage**
Built environment and design	4	26.67 %
Digital and Technology	2	13.33 %
Retail and commercial services	3	20.00 %
Health	2	13.33 %
Public sector and communications	2	13.33
Safety and defense operations	2	13.33 %

Analysis combined within-episode reconstruction with cross-episode comparison. Within episodes, transcript extracts were aligned with cognitive maps to trace how managers moved from triggers through cues, heuristics, verification steps, and reported outcomes. Across episodes, patterns were examined by sector, fixed priority under urgency, and type of guardrail. Negative cases were deliberately sought, and episodes in which the same heuristic produced divergent outcomes under different contextual moderators were compared to test the robustness of emerging interpretations.

Numerical counts were used descriptively to indicate typical versus idiosyncratic patterns, not for statistical inference (Guest et al., 2006). To guard against over-aggregation, key comparisons were re-run with sector subgroups disaggregated, yielding consistent interpretations. Throughout the process, analytic decisions were documented in an audit trail, and reflexive memos were maintained to surface assumptions and potential biases. This iterative approach provided a transparent chain of evidence from raw talk to interpretation, ensuring that the analysis remained tightly aligned with the study's three research questions.

Trustworthiness, Reflexivity, and Ethics

Multiple strategies were employed to ensure the quality and integrity of the study. Credibility was enhanced through member checking with a subset of participants: sector-specific summaries with de-identified quotations were returned for verification, and feedback informed minor refinements to theme labels. Negative cases were deliberately retained to reflect divergent perspectives. Dependability was supported by an audit trail that documented interview metadata, codebook iterations, and analytic decisions, supplemented by contemporaneous analytic and reflexive memos. Independent double-coding of a stratified subset of transcripts confirmed the stability of the codebook, which was then applied consistently across all transcripts. Confirmability was strengthened through investigator triangulation and internal peer debriefs, where a rotating "devil's advocate" challenged emerging interpretations. Transferability was addressed through thick description of institutional settings, enabling readers to judge applicability to comparable high-pressure environments. Reflexivity was maintained throughout: researchers prepared positionality statements outlining prior exposure

to Saudi projects, and reflexive memos written before and after interviews were used to surface assumptions, adjust interview prompts, and mitigate bias during coding.

Ethical safeguards were reviewed and approved by the University of Business and Technology Ethical Research Committee. Participants received information sheets and gave written informed consent, including consent for audio recording and the use of anonymized quotations. Given the sensitivity of Vision 2030 giga-projects, transcripts were pseudonymized, identifiers removed, and sector-level tags substituted for organizational names. Cognitive maps produced during interviews were used to aid recall and triangulate accounts but are not reproduced here, as their contextual detail could risk compromising anonymity. Data were stored on encrypted drives with restricted access, and identifiable materials will be destroyed five years after publication. These safeguards reassured participants and encouraged openness in recounting sensitive decision episodes.

RESULTS

The analysis produced a structured data display that links informant-centric first-order concepts to researcher-centric second-order themes and, ultimately, to four aggregate dimensions (see Figure 1). These dimensions organize the findings and correspond directly to the study's research questions. Specifically, the results are presented around: (A) urgency-driven lexicographic rules, or which project dimension managers treat as non-negotiable under time pressure; (B) lightweight verification guardrails that bound fast judgments; (C) Saudi/Vision 2030 contextual moderators that shape heuristic selection; and (D) recurrent biases and the debiasing routines used to contain them.

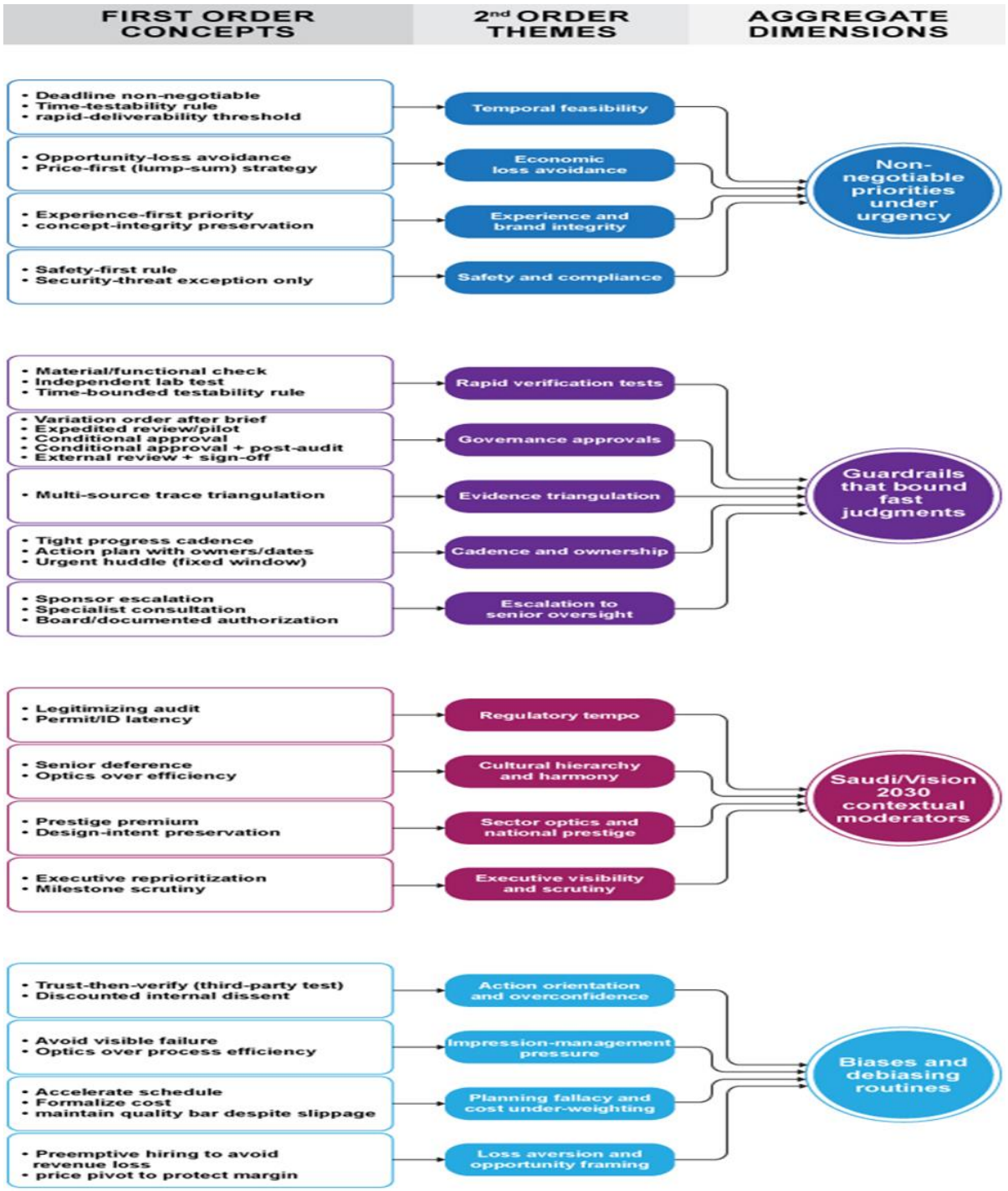

Figure. 1 Data Structure

Fixed Priorities Under Urgency

Across the fifteen decision episodes, managers delivering Saudi Arabia's Vision 2030 giga-projects consistently anchored their choices on a single lexicographic priority—often described as a "first rule"—and flexed other considerations around it. Four recurrent configurations emerged.

The first was temporal feasibility, where immovable deadlines tied to giga-project milestones shaped decision logic. In the healthcare expansion within a new mega-facility, a manager justified substituting a local supplier because "delivery within days was essential," provided the materials passed independent testing (I08). In a media production tied to a national event, the lead insisted that "missing a deadline is not an option" (I12), approving an expedited adjustment despite additional cost. Similarly, in aviation and public-sector programs linked to Vision 2030 timelines, managers described reprioritizing work to deliver within hours (I11) or protecting schedules through limited pilots and expedited reviews (I06).

The second configuration involved economic loss avoidance, where the commercial scale of giga-project operations magnified revenue risks. An airport retail supervisor overseeing a flagship terminal explained, "idle labor was better than opening the store understaffed" (I09). In a competitive tender linked to a giga-project supply chain, a team admitted, "we changed the approach 100%," pivoting to price and lump-sum services to remain commercially viable (I13).

The third priority reflected experience and brand integrity, critical in projects under global scrutiny. A heritage-tourism manager working on a giga-project site recalled reallocating staff during a VIP visit because "guest experience is most important, especially when the whole world is watching" (I07). Likewise, a showroom renovation in a high-profile giga-development accepted delays to preserve the approved concept, with the PM noting, "we took a multi-week impact to maintain standards" (I14).

Fourth, in safety-critical giga-project domains, safety and compliance anchored decisions. In a regulated IT transition, one lead summarized the guiding principle as: "do not delay unless there is a direct security threat" (I10), proceeding only under conditional approval with mandatory audits. In defense systems integral to Vision 2030, another participant stated bluntly, "safety always drives the decision" (I15), reflecting a zero-defects baseline despite intense release pressure.

Taken together, these configurations show how giga-project managers fixed one non-negotiable priority—time, revenue, experience, or safety—and flexed other factors around it. Crucially, these priorities were not arbitrary: they were patterned by the scale, visibility, and institutional pressures of Vision 2030 giga-projects. Each fixed priority was disciplined through lightweight verification guardrails—such as rapid tests, conditional approvals, or cadence routines—that bounded risk while enabling urgent delivery. These findings directly address RQ1, illustrating how heuristics operate under urgency in giga-project contexts where the stakes are unusually high.

Guardrails That Bound Fast Judgments

Managers working in Vision 2030 giga-projects rarely left urgent, intuition-led judgments unbounded. Across interviews, they consistently described pairing rapid calls with lightweight verification guardrails that varied in timing (pre- vs. post-decision), footprint (minutes to hours), and formality (ad hoc checks to documented approvals). Five recurrent guardrails emerged.

The first were rapid verification tests calibrated to the immediacy of giga-project delivery. In construction (I02), a project lead authorized work after a quick material check and document review, framing it as "enough to keep the schedule alive." In software triage for a critical public service (I04), a time-bounded testability rule applied: "If we cannot prove the fix works within hours, we don't ship it." In healthcare expansion (I08), substitution of a local supplier proceeded only after an independent lab test and on-site inspection, showing how minimal yet credible indicators enabled fast but defensible choices.

The second were governance approvals that converted private judgments into shared accountability—essential under the scrutiny surrounding giga-projects. In a retail fit-out (I01), the manager documented the decision and secured a variation order after briefing sponsors, remarking that "it becomes a decision of the program, not just mine." In aviation maintenance (I06), an expedited committee review legitimized a workaround before limited piloting. In a regulated cloud migration (I10), progress depended on conditional approval that embedded an immediate post-deployment audit. Similarly, in a showroom renovation (I14), feasibility checks were followed by external design review and sign-off before execution.

A third guardrail was evidence triangulation, particularly important in politically visible contexts. In retail operations (I03), the manager cross-checked stakeholder testimony with CCTV and point-of-sale data to

distinguish misconduct from process failure. He explained: "We didn't need every answer, just enough credible proof that multiple audiences would accept."

The fourth was cadence and ownership, translating decisions into disciplined execution. In software fixes (I04), the team used rapid update cycles to keep leadership aligned. In airport operations (I09), the manager assigned named owners and dates to an accelerated hiring plan, ensuring visibility of trade-offs. In the public sector (I11), a CEO's urgent request was executed within a four-hour sprint after a quick huddle, demonstrating how rhythm and accountability stabilized delivery under pressure.

Finally, escalation to senior oversight ensured managers did not carry systemic risks alone. In aviation (I06), the PM sought senior sign-off before piloting a workaround. In retail fit-out (I01), a board-level variation order secured legitimacy. In the showroom renovation (I14), the PM consulted an external structural engineer after initial calculations suggested feasibility. Escalation was often framed as "not optional when the downside lives longer than the deadline."

These guardrails were not interchangeable but co-varied with what was fixed under urgency. Where timelines were immovable, managers leaned on rapid tests and cadence. Where brand integrity was paramount, external approvals and design reviews dominated. In safety-critical systems, conditional approvals with post-audits were standard. In revenue-exposed contexts, action plans with ownership and dates disciplined execution costs.

Saudi/Vision 2030 Contextual Moderators

The selection of heuristics and guardrails in Vision 2030 giga-projects was consistently shaped by the unique institutional and cultural environment of Saudi Arabia. Across the 15 decision episodes, managers highlighted four recurrent contextual moderators: regulatory tempo, cultural hierarchy and harmony, sector optics and national prestige, and executive visibility and scrutiny. These moderators influenced both which priority was fixed under urgency and which guardrails were deemed legitimate.

Regulatory tempo imposed "hard clocks" on decisions. Managers repeatedly described how permitting regimes, compliance rules, and procurement pre-qualification dictated not only what could be prioritized but also how quickly action could proceed. For example, in a healthcare expansion (I08), the PM emphasized: "We could not wait for central approval; the only way was to test the supplier immediately and move." Similarly, in cloud migration (I10), progress was conditional on regulatory sign-off, forcing reliance on temporary workarounds with mandatory post-deployment audits. In airside operations (I09), delays in ID and permit issuance led managers to bring forward staffing decisions: "The paperwork itself was a bottleneck, so we hired early and absorbed the idle cost." These cases illustrate how regulatory tempo redirected attention toward compliance-first heuristics and formalized guardrails.

Cultural hierarchy and harmony also shaped fast decisions. In the public sector (I11), a manager recounted: "When the CEO called, everything else stopped. It wasn't a question—we delivered within hours." Such deference to authority accelerated execution but also compressed deliberation. In heritage tourism (I07), protecting harmony and client satisfaction overrode efficiency concerns: "For the VIP visit, experience mattered more than cost—we reassigned staff instantly to avoid embarrassment." By contrast, managers in safety-critical or engineering-driven contexts (I14, I15) described codes and methods as non-negotiable, with culture functioning more as background rather than the primary driver.

Sector optics and national prestige intensified attention to visibility and reputation. In media production (I12), one manager explained: "If we miss the launch, the whole country sees it. Paying a premium is nothing compared to that." Similarly, in a high-profile showroom renovation (I14), the PM insisted on preserving design intent despite added delays: "This project represents the brand of Vision itself—you cannot cut corners." These episodes reveal how the symbolic weight of giga-projects elevates experience and brand integrity as fixed priorities, legitimizing cost or time concessions.

Finally, executive visibility and scrutiny amplified both speed and formalization. In airport operations (I09), the manager described a deadline culture in which "milestones must be met," pushing teams toward early hiring and strict ownership structures. In IT (I10), fear of visible failure before top executives drove reliance on conditional approvals and post-action audits: "We moved fast, but every step had a signature and an audit

attached." The dual effect was striking—while executives compressed decision windows, they also demanded stronger documentation to legitimize the speed.

Taken together, these contextual moderators explain cross-case variation in both lexicographic priorities and guardrail use. Regulatory tempo nudged managers toward compliance-first heuristics and approvals; cultural hierarchy accelerated senior-driven reprioritizations; sector optics and national prestige legitimized trade-offs in favor of guest experience and brand integrity; and executive visibility intensified both urgency and formalization.

Under Urgency and Debiasing Routines

Managers working on Saudi Arabia's Vision 2030 giga-projects recognized that urgent decisions carried predictable cognitive pressures, yet they described pragmatic routines that kept these errors within acceptable bounds. Across sectors, action orientation and overconfidence emerged as the most common tendencies. A software lead in a digital infrastructure program (I04) admitted feeling pressure to "push code forward to show progress," but the team countered this by applying a time-testability rule: items that could not be demonstrated within a fixed window were deferred. Similarly, a manager overseeing a regulated cloud migration (I10) acknowledged that he "almost ignored internal pushback to avoid delay," but made the decision conditional on an immediate post-deployment audit. In public-facing initiatives, such as heritage tourism and media launches (I07, I12), managers emphasized that "missing a deadline is not an option," favoring visible action while pairing it with compensating checks like staff reallocation, quality controls, or transparent stakeholder communication. These examples show how giga-project leaders bound overconfidence by embedding lightweight verification steps, directly addressing RQ1 (heuristics under urgency) and RQ2 (how heuristics translated into observable behaviors).

The planning fallacy and cost underweighting were also evident. In construction-supply episodes (I02, I08), managers trusted experiential judgment when selecting suppliers but then deliberately introduced independent lab tests to limit risk. In a fast retail fit-out (I01), a manager advanced the schedule despite budget strain, but formalized the trade-off through a sponsor-approved variation order. In a high-profile showroom renovation (I14), the project lead acknowledged that his "quick hand calculation" was insufficient, so he sought an external engineering review before proceeding. These accounts highlight how giga-project managers tempered bias through targeted governance approvals and third-party checks—mechanisms that made fast judgments auditable and legitimate.

A third pattern reflected loss aversion and opportunity framing. At an international airport retail operation (I09), a manager authorized early hiring despite idle time risks, citing "opportunity loss from opening under capacity." In a competitive tender (I13), a project team "changed the approach 100%" by pivoting toward price and lump-sum contracting to avoid losing the bid outright. These heuristics were disciplined through dated action plans and ownership assignments, ensuring execution discipline. In each case, managers translated intuitive, loss-averse decisions into structured action, balancing urgency with credibility.

Taken together, these routines demonstrate that biases were not eliminated but bounded. Across giga-project contexts, corrective practices included rapid verification tests, governance approvals with post-audits, targeted evidence triangulation, cadence and ownership, and escalation to senior oversight when long-lived risks were at stake. Several managers also tracked outcomes through checklists or KPIs, such as quality metrics in defense systems (I15) or rework rates in retail launches (I12). These practices highlight how Saudi giga-project managers disciplined intuition through "light but reliable" guardrails.

DISCUSSION

Theoretical Contributions

This study advances theory on project cognition by showing how managers in Saudi giga-projects make urgent decisions under Vision 2030 conditions. Addressing RQ1, we demonstrate that managers rely on a lexicographic logic: they fix a single non-negotiable priority—temporal feasibility, economic loss avoidance, experience and brand integrity, or safety and compliance—while flexing other dimensions around it. This

clarifies the heuristics applied under acute temporal pressure, adding precision to prior research that has often treated intuition as diffuse or unstructured (Flyvbjerg, 2021; Stingl & Geraldi, 2021).

Extending RQ2, our findings show that heuristics are not deployed in isolation but are disciplined through lightweight guardrails such as rapid verification tests, conditional approvals, evidence triangulation, short cadence cycles, and escalation protocols. This process perspective contributes to the literature on optimism bias and planning fallacy by identifying the micro-level mechanisms—"thin checks" and "near-term verifications"—through which organizations bound predictable errors while sustaining delivery speed (Love et al., 2024; Martinsuo, 2023).

With regard to RQ3, the study enriches dual-process theory by illustrating co-activation of System 1 and System 2 processes in urgent decision-making. Managers act on intuitive "first rules" but simultaneously embed analytical inserts in the form of micro-tests, approvals, or audits. This challenges the strict dichotomy between intuition and deliberation (De Neys, 2023) and aligns with ecological rationality, which emphasizes the fit between heuristics and task environments (Gigerenzer & Gaissmaier, 2011). In giga-project contexts, where regulatory tempo, cultural hierarchy, and political visibility heighten pressures, guardrails become crucial contextual adaptations that make heuristics reliable rather than risky.

Overall, this study contributes a contextualized governance model of "fast thinking in fast projects." It specifies how heuristics are structured (lexicographic priorities), how they are disciplined (guardrails), and how these mechanisms are shaped by Saudi-specific institutional and cultural conditions. In doing so, the paper extends project-cognition theory beyond Western contexts and enriches dual-process models with an account of how intuition and analysis co-activate under the extraordinary demands of giga-project delivery.

Practical Implications

The findings have direct implications for the governance and management of giga-projects under Vision 2030. They suggest a pragmatic operating model: identify the non-negotiable priority in each urgent decision episode and pair it with an appropriate set of lightweight guardrails. This approach allows managers to preserve speed while making decisions auditable, reversible, and credible to regulators, sponsors, and external stakeholders.

When temporal feasibility is fixed, organizations should institutionalize a time-testability norm—advance options only if their critical feature can be demonstrated within a predefined window, while deferring others to subsequent cycles. To protect immovable milestones without creating bureaucratic drag, project management offices (PMOs) could pre-authorize modest premium thresholds for expediting critical items, coupled with post-action audits. Dashboards should emphasize outcome signals such as milestone adherence, rework rates, and audit closure times, rather than activity counts.

Where economic loss avoidance dominates, urgent decisions should be tied to explicit opportunity-loss calculations (e.g., revenue or margin at risk per day). Mechanisms such as standby staffing pools or pre-cleared contracts can mitigate the risks of idle resources. Governance should remain light but visible: dated action plans with named owners and brief cash-flow checks at follow-up intervals (T+7, T+30).

When experience and brand integrity is paramount, speed must be coupled with concise external review and documented sign-off. One-page design-intent preservation checks or VIP-event protocols can authorize temporary reallocations while protecting brand standards. Post-event, managers should verify that accelerated delivery did not degrade outcomes through customer satisfaction or defect indicators.

For safety and compliance, urgent calls must embed legitimacy from the outset. Conditional approvals with immediate audits, pre-cleared vendor lists, and clear override criteria help managers act quickly without compromising safety standards. Key indicators should track non-conformities identified during audits and time-to-resolution for conditional approvals.

At the program and policy level, these routines point to a governance model in which PMOs codify a menu of guardrails tied to the four priority logics. Templates for expedited approvals, short checklists for evidence sweeps, and pre-set escalation triggers reduce the transaction costs of urgency. Regulators can further enable speed-with-accountability by streamlining procurement and permitting processes, while still embedding mandatory post-audit requirements.

Ultimately, this approach equips giga-project managers to reconcile political timelines and public visibility with the accountability expected by regulators, sponsors, and citizens. By embedding lightweight but reliable verification, Vision 2030 organizations can deliver at pace without undermining credibility or long-term value.

Limitations and Future Research

This study has several limitations that also create avenues for future research. First, the evidence is self-reported and episode-centered. Although cognitive mapping and probing anchored narratives in concrete decisions, participants may have reconstructed events selectively or emphasized favorable aspects. The findings should therefore be interpreted as analytically, not statistically, generalizable.

Second, the sample is purposive and relatively small, with 15 managers spanning six Vision 2030 sectors. While thematic sufficiency was reached and cross-sector variation was evident, broader populations may reveal additional heuristics or guardrail combinations. Future research could extend coverage across a larger pool of giga-projects, or compare Saudi cases with parallel transformation programs in other GCC or emerging economies.

Third, the bilingual nature of the fieldwork introduces translation risk. Despite back-translation and reconciliation procedures, subtle connotations may have shifted between Arabic and English. Replication by bilingual teams or the integration of ethnographic shadowing could reduce such risks and provide richer insights into decision processes.

Fourth, outcomes reported in this study (e.g., "protected schedule," "defended brand integrity") were participant-assessed rather than independently verified. Mixed-methods designs that combine interviews with operational traces (e.g., audit logs, delivery metrics, or customer satisfaction data) could help assess whether lightweight guardrails systematically improve project performance.

Finally, scope conditions apply. The study focused on urgent, high-stakes decision episodes in giga-project contexts. Routine planning or low-stakes settings may not exhibit the same lexicographic prioritization or reliance on minimal verification. Future research should therefore examine the portability of the "fixed-priority-plus-guardrails" model across sectors, geographies, and decision types. Simulation experiments or field studies could test whether specific heuristics (e.g., time-testability rules, conditional approvals) outperform heavier stage-gates under varying levels of urgency, uncertainty, and institutional pressure.

Taken together, these limitations highlight the need for longitudinal, comparative, and mixed-method studies to deepen understanding of how heuristics and guardrails shape giga-project delivery. Extending this line of inquiry will clarify not only the conditions under which lightweight verification succeeds but also its potential costs, trade-offs, and transferability to global megaproject governance.

1. Conclusion

This study explored how managers in Saudi Arabia's Vision 2030 giga-projects make high-stakes decisions under acute time pressure. Drawing on 15 critical-incident interviews across six sectors, we found a consistent decision pattern: managers anchor on a single non-negotiable priority—temporal feasibility, economic loss avoidance, experience and brand integrity, or safety and compliance—and then discipline speed through a compact set of lightweight verification guardrails. These guardrails include rapid tests, governance approvals (often conditional with post-deployment audits), evidence triangulation, short cadence with named ownership, and escalation to senior oversight. Together, they translate fast, intuitive judgments into auditable and, where necessary, reversible actions.

The analysis advances project-cognition research in three ways. First, it specifies how heuristics are operationalized under urgency, showing that fast thinking is not free intuition but a structured process combining lexicographic priorities with thin, purposive checks. Second, it extends dual-process theory by evidencing co-activation of intuitive and analytical reasoning, as managers embed intuition within minimal analytical routines suited to the task environment. Third, it contextualizes these mechanisms within Saudi Arabia's institutional setting, highlighting how regulatory tempo, cultural hierarchy, sector optics, and executive visibility tune both what is fixed under urgency and how stringent verification must be.

Practically, the study proposes a governance model for giga-projects: identify the non-negotiable early, then pair it with a small menu of standardized guardrails matched to the context. This approach reconciles the speed

demanded by political timelines and public visibility with the accountability required by regulators, sponsors, and stakeholders.

While the study's evidence is episode-based and purposively sampled, its findings provide actionable guidance for program management offices, regulators, and sponsors tasked with delivering under extreme urgency. Future work should test the portability of this governance model across geographies, sectors, and decision types, and assess its long-term performance implications.

In sum, the research contributes a contextualized model of "fast thinking in giga-projects"—where heuristics are disciplined, not dismissed, and where urgency is managed through lightweight but reliable guardrails. This model both enriches project-cognition theory and offers practical strategies for navigating the unprecedented demands of Saudi Arabia's Vision 2030 transformation.

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Appendix A. Interview Instrument and RQ Crosswalk

Table A1. Interview Blocks and Exemplar Probes

Block	Focus	Primary RQs	Secondary RQs	Example prompt
A	Project context & role	RQ3	RQ1	"Briefly describe your program/role and delivery pressures."
B	Critical incident (recent, high-stakes)	RQ1	RQ3	"Tell me about a recent decision made under acute time pressure."
C	Cues noticed & heuristics used	RQ1	RQ2	"What did you notice first? What rules of thumb did you use?"
D	Verification & governance ("guardrails") + behaviors	RQ2	RQ1	"What checks/approvals bounded your fast judgment?"
E	Vision 2030/regulatory/cultural moderators	RQ3	RQ1–RQ2	"How did Vision 2030 timelines, regulations, or norms shape the decision?"
F	Outcomes, learning, bias recognition & debiasing	RQ2, RQ1	RQ3	"What happened after? What would you keep/change next time?"

Table A2. Block–To–Research-Question Crosswalk

Research question	What it asks	Primary blocks	Secondary blocks	Typical evidence captured
RQ1. Heuristics and biases under acute temporal pressure	How managers describe the rules of thumb and biases they rely on when deciding fast.	C (cues & heuristics), D (guardrails), F (bias recognition)	B (episode set-up), E (moderators)	First-order concepts in informant terms (e.g., "six-hour testability," "deadline non-negotiable," "don't decide alone"), exemplar quotations (I01–I15), cognitive-map notations of cue use; mentions of action bias, planning fallacy, loss aversion, impression/face pressure.
RQ2. From heuristics to behaviors and outcomes	How heuristics translate into project behaviors and perceived outcomes.	D (verification/cadence/escalation), F (outcomes & learning)	B–C (episode details; heuristic choice)	Descriptions of micro-tests, pilots, variation orders/committee gates, cadence & ownership; escalation decisions; reported outcomes (time saved/slipped, cost effects, safety/compliance, reputational signals).
RQ3. Saudi-specific contextual influences	How Vision 2030 priorities, regulatory frameworks, cultural norms, sector practices shape heuristic selection/deployment.	E (contextual moderators)	B–D (episode; heuristics; guardrails)	References to regulatory clocks (deadlines/penalties), procurement/permit frictions, client-first norms and power distance, sector optics/national prestige, organizational visibility/CEO requests; contrasts across sector families.