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FROM CONTRACTS TO SPRINTS: IMPLEMENTATIONAL BARRIERS OF AGILE METHODS IN PUBLIC VERSUS PRIVATE CONSTRUCTION PROJECTS IN ISLAMABAD, PAKISTAN

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Abstract

This research study explores how Agile Practice Maturity (APM) affects the performance of construction projects within the city of Islamabad, and whether the policy constraints imposed by the institution can explain the circumstances under which agile routines are effective and when they fail in practice. Although indicators of growing interest in agile-related notions are evident in the building industry, empirical data in emerging economies remain limited, particularly regarding the mechanisms of bureaucratic governance on the path linking the use of agile processes and project success (PS). Institutional Theory serves as the basis for the investigation, and the moderated mediation model (PROCESS Model 8) has been used. It hypothesizes that APM affects PS through Implementation Barriers (IB), and that the organizational factor Bureaucracy/Red Tape (BB) reinforces this mediation. The data were gathered through a cross-sectional survey administered to 390 structural professionals working on government and non-governmental projects in Islamabad. The questionnaire included psychometric measures: an APM practice-adoption index, an IB severity scale, a perceived red tape measure of BB, and a multidimensional PS measure. The results show that APM has a statistically significant positive direct impact on PS, thereby validating the potential of agile routines to improve project outcomes. Institutional Barriers (IB) are significantly improved by Bureaucracy/Red Tape (BB), which strengthens barriers and lengthens decision processes. IB also correlates positively with Perceived Success (PS), indicating complex ecosystems and stricter governance, reflecting managerial efforts. Moderated mediation shows that Agile Project Management (APM)'s indirect effect on PS via IB depends on BB's strength, highlighting the importance of the institutional environment in agile maturity. The study suggests that enhancing PS to achieve situational agility requires adopting agile practices and governance, and that success is also influenced by the broader context.

CHAPTER 01
INTRODUCTION

1.1 Background of the Study

Projects built in the Third World always face a high risk to project timelines and budgets, which results in reduced value for both government and market stakeholders. Protective reviews of the literature on construction have shown that "construction delays... hinder the time delivery, budget, and quality of construction projects," thus, "the most common, expensive, and risky problem associated with both private and public construction projects" (Fashina et al., 2021, p. 1). In Pakistan, the economy is underdeveloped and designed, with a lack of digital and collaborative approaches that increases the country's risk exposure. An example is a survey conducted in Sindh province, which found that only 11 % of respondents in the construction industry had adopted BIM (Bhatti et al., 2018). This observation implies that the lack of BIM implementation is a hindrance to improving the management of construction projects (Farooq et al., 2020). The absence of methodologies that strictly follow the principles of agile also contributes to risks in construction project management and creates additional problems.

In response to current conditions, the building industry has strongly embraced hybrid-agile methods such as short neighborhood planning cycles, morning stand-up sessions, and visual control boards to make the industry more responsive to ideas and operational contributions in architecture and construction. As a recent empirical study reveals, "applying the Agile methodology in the pre-construction phase may help enhance flexibility and collaboration," as the process is dynamic and requires alignment among various stakeholders (Moreno et al., 2024, p. 1). At the same time, the literature on Lean and the Last Planner System "aims to enhance planning reliability by reducing variability in construction processes" (Shehab et al., 2023, p. 9). The system contributes to reducing cognitive variability in procedural processes, the sole purpose of the Agile philosophy, by using iterative mechanisms to foster commitment and provide feedback promptly. Collectively, these findings indicate that adopting Agile practices in a modified, partly deconstructed form, rather than implementing the entire, unaltered Scrum, is a much better approach for increasing relational and temporal coupling, stabilizing the dynamic elements of the planning horizon, and reducing costly rework and feedback cycles on complex construction projects.

Agile approaches require a mix of organizational and institutional frameworks and extend beyond technical skills. Public projects face numerous procurement rules, extensive documentation, bureaucratic approval processes, and hierarchical structures that must be managed to support the iterative development typical of agile methods. Public administration studies indicate that various constraints accompany bureaucratic organizational structures, including behavioral and efficiency problems that these organizations face in their operations. In a recent extensive empirical study, it was established that "perceived red tape is positively associated with procrastination behavior," a cognitive shortcut in which perceived red tape increases delivery schedules by introducing procedural demands (Huang et al., 2022, p. 13). The support provided by public sector authorities in implementing agile practices is by far higher than the resistance recorded in the private sector. Unless sufficient changes are made to the governing and contractual structures, the adoption of agile practices in the public sector will likely be restricted.

Such problems are particularly acute in Islamabad, where several government agencies, as well as contractors, are working on the construction of city infrastructure, housing, and transport lines. The experience of other emerging areas indicates that high pressure is repeatedly placed on delays; there are often lengthy approval processes, scope redefinitions, financial reorganizations, and difficult interim divisions resulting from subcontracting, hindering progress. Such hindrances tend to be associated with ad hoc methods, such as minor projects, a disjointed approval process, a rigid scope for procurement projects, and a lack of necessary skills or equipment (Fashina et al., 2021). Thus, the paper at hand focuses on the gap between awarding and implementing contracts through the prism of

analysis, showing how organizational and bureaucratic stasis, as well as deep-rooted operational traditions, constitute and may become controversial barriers to agile approaches to large projects.

This study begins by examining interconnected issues. Evidence: This empirical observation shows that agile frameworks bring benefits in the construction industry, specifically with respect to the design and pre-construction phases and complex, iterative process organization, but such evidence is often limited in its geographical scope (Moreno et al., 2024). However, there are contextual variables that must be considered when proving these alleged benefits. The current research reports a fragmented discussion of the construction industry across governmental and non-governmental sectors in rapidly growing metropolitan areas, with conspicuous gaps in bureaucratic restraint, procurement practices, and organizational frameworks, factors that are assumed to moderate the nexus between agility and efficiency. In line with this, the current study will focus on the Islamabad Capital Territory in Pakistan, which will have a multiplicity of infrastructural and organizational systems under investigation. The strategy aims to fill perceived gaps in geographically specific scholarship. The goals include identifying the key barriers to implementation, estimating their effects on operational efficiency, and defining the specific intervention points. Some of the interventions suggested include delegating non-standard approvals, establishing agile-oriented contractual arrangements, and delivering customized training and technological assistance across the commercial and public spheres (Farooq et al., 2020). Conclusively, this study will provide stakeholders in the construction industry of Islamabad with a holistic understanding of the spatial and methodological aspects of agile programs, along with their merits and demerits, and will also outline a realistic plan for launching such interventions within the construction industry to achieve faster results.

Empirical testing will be conducted using SPSS through scale reliability/validity checks, group comparisons (public vs. private), and regression-based mediation and moderation analyses with bootstrapped confidence intervals.

1.2 Problem Statement

Construction projects in Pakistan continue to experience delays and overruns, mainly due to endemic factors such as long approval processes, limited financing options, an uncoordinated and disjointed subcontracting process, and irregular design requirements (Memon et al., 2023). Through agile-related planning and coordination approaches, including short planning horizons and frequent coordination, which are often promoted as rehabilitative strategies, they do not always succeed in the construction industry; rather, their success depends on contextual variables (Moreno et al., 2024). The situation in the Islamabad Capital Territory warrants niche consideration because it is a market where the government and private entities use the same infrastructure but are governed by different regulatory frameworks and procurement laws, thereby creating a level playing field.

The main problem lies in the lack of comparative empirical data on construction projects in developing economies, especially regarding the disparity in the effectiveness of agile methodologies used in government and non-governmental sector projects. Moreover, the study questions the governance obstacles and processes that underline these divergences. State strategies are constrained by procurement and administrative regulations that limit decision flexibility and increase compliance requirements. On the other hand, the initiatives of the authorities have fewer benefits in terms of autonomy of contracts and control over managers (Baxter et al., 2023; Neumann et al., 2024; Zubair & Temoor, 2019).

In this respect, the current study aims to fill an empirical gap by systematically comparing the application of agile methodologies, the challenges encountered in their application, bureaucratic barriers, and signs of project success in public and private ICT construction projects. The research will thus seek to produce substantive evidence to inform project-management jurisprudence, retune procurement and procedural architecture, and, in

an exclusive manner, develop competencies that will support high-quality delivery performance.

1.3 Research Gap

A growing body of literature points to the fact that the administrative environment domain has been the least developed among other industries. Available empirical studies have mainly applied agile structures in the construction business, which is supported by both theoretical and empirical findings. However, the literature has predominantly focused on government information technology and thus failed to consider this sector in developing countries, particularly in government construction and other infrastructure initiatives. This is especially vulnerable to the vagueness of traditional construction processes, which are usually caused by bureaucratic delays in the government systems. In line with this, there is very little empirical evidence of techniques to reduce such inefficiencies or to adopt agile practices in this respect. A good example of this lack is the Iraqi market, which has shown a slow pace in adopting modern project management strategies (Kazar et al., 2022). Similarly, there is a glaring lack of rapid-paced construction models in high-tech construction environments (Chathuranga et al., 2023). The current research aims to provide empirical evidence on the implementation of agile principles in both public and developmental projects and, therefore, addresses the disparity between project execution and the control exercised by the administrative body. By assessing efficiency measures, this study will build on current theory and offer practical suggestions grounded in the available literature, ultimately accelerating the application of knowledge in practice.

Altogether, the overview of the existing academic literature emphasizes the role of agile methodologies in the outcomes of construction projects and simultaneously outlines significant obstacles to their more widespread implementation in the construction sector, including bureaucratic stagnation and deep-rooted cultural customs. The literature review clearly outlines the purpose and aims of the present study and provides relevant information on the conceptual frameworks of institutional logic and pattern theories of organizational change. All of these sources support the use of agile methodologies in practice to improve efficiency and identify gaps in research on how these practices are applied across different organizational contexts. Few studies test, in one city/context, whether bureaucracy increases Implementational Barriers and whether those challenges transmit (mediate) agile's effects on efficiency, while simultaneously comparing public vs. private projects. Such a lacuna not only reaffirms the contribution that the present research study promises to make but also delineates with considerable precision the epistemological territory it will occupy.

1.4 Research Questions

1. What is the adoption/maturity of agile-derived practices in Islamabad's construction projects, and how does it differ between the public and private sectors?
2. Does bureaucracy/red tape moderate the relationship between agile practice maturity (APM) and Implementational Barriers (IB) in Islamabad construction projects?
3. Is the indirect effect of agile practice maturity on Project Success through Implementational Barriers (APM → IB → PS) conditional on the level of bureaucracy/red tape?
4. At low, average, and high levels of bureaucracy/red tape, how do the conditional effects of agile maturity on Project Success (direct and indirect) differ between public and private sector projects in Islamabad?

1.5 Research Objectives

1. Measure & compare the adoption/maturity of agile-derived practices across public and private projects in Islamabad.
2. Test whether bureaucracy/red tape strengthens or weakens the effect of agile practice maturity on Implementational Barriers (i.e., estimate the conditional APM → IB relationship under low, mean, and high bureaucracy).

3. Assess mediation by testing whether Implementational Barriers transmit the effect of agile use to Project Success.
4. Evaluate moderation by estimating how bureaucracy/red tape conditions the agile → efficiency relationship and compare the effect across sectors.

1.6 Significance of the Study

1.6.1 Practical Significance

Construction projects in Pakistan, especially in the mixed public-private market in Islamabad, are often delayed by schedule slip-ups, rising costs, and poor stakeholder satisfaction. In modern practice, agile methods are increasingly seen as a mechanism for improving coordination and responsiveness, but practitioners are often unclear about the prerequisites for such methods to be effective and about the ways governance limits make such practices difficult. This paper provides viable expressions for applying agile techniques using Institutional Theory and, in the process, explains how formal regulations, approval processes, procurement processes, auditing, and administrative rhythms limit the operational scope of project teams in real-life case scenarios.

Foremost, the research is valuable to clients, consultants, contractors, and government agencies by (i) providing comparative empirical data on the adoption of agile practices in the context of both the private and public projects in Islamabad; (ii) clarifying how institutional factors, specifically, bureaucratic red tape, hamper implementation by creating delays in decision-making, stringent documentation requirements, and limited discretionary adoption, and disjointed accountability structures; and (iii) linking the hindrances to some quantifiable success metrics of project success. The outcomes obtained can inform a more realistic project governance model and guide decision-makers in refining approval processes, restructuring reporting relationships, strengthening coordination points, and improving the capacity to implement suggested changes through focused training, equipment issuance, and the creation of explicit roles that do not add additional administrative pressure. Therefore, the study provides practical recommendations to reduce delivery delays and improve efficiency, cost-effectiveness, quality, and stakeholder satisfaction, as institutional obstacles are often the biggest hindrance to achieving these goals.

1.6.2 Theoretical Significance

The current study will contribute to existing academic research in construction project management by providing a case-specific account of agile practices in a less developed country, grounded solely in Institutional Theory. Instead of viewing agile adoption as a purely technical choice, the research sees its implementation as an institutional process shaped by normative pressures, compliance demands, and established organizational habits. In turn, the study claims that the effectiveness of agile practices is not limited to practices but also to institutional scaffolds for discretionary implementation.

Another contribution of the study is the empirical testing of a model grounded in mechanisms that examines the correlation between agile practice maturity and project success. It discusses the barriers to implementation and highlights bureaucracy or red tape as an institutional determinant of this relationship. This fills an existing gap in the academic literature: although, on the one hand, the principles of agile software are often discussed, and construction delays are analyzed separately, little research has examined how institutions contribute to agility and, therefore, efficiency within the same urban market. Based on the results of the empirical studies conducted in Islamabad among the general and individual structures of governance, the study promotes the implementation of the Institutional Theory in the project settings and offers a clearer interpretation as to why similar agile rituals may lead to different results regarding the outcome based on the friction of the institutions.

1.7 Supporting Theory

The current work is rooted in Institutional Theory, whose explanations are based on how organizational practices can be influenced or constrained by a system of rules and shared meanings common to the environments in which they are situated. Scott (2014) discusses

institutions which include "regulative, normative, and cultural-cognitive elements"; they are associated with activities and resources, and these components provide social life with stability and meaning (p. 56). As practiced in the construction industry within Islamabad, it is important to note that, other than technical efficiency, institutional pressures such as procurement systems, hierarchy approval systems, audit standards, standard operating procedures, and documentation standards all shape the normal construction of projects in the construction industry, which, in a way, define acceptable practices.

The institutional theory explains why organizational practices can seem to be embraced by organizations without producing the desired effects in terms of efficiency. Scott (2014) is of the view that institutional elements are the "central building blocks of institutional structures, providing the elastic fibers that guide behavior and resist change" (p. 57). In construction projects, especially those with high oversight, deviations from agile practices (iterative processes, continuous planning, and self-organized coordination) can be observed. However, these practices, applied to make quicker decisions and achieve better results, can be limited by flexible aspects, such as lengthy approval procedures or the inability of the contract to be flexible in its interpretation. As a result, the application of agile methodologies to the current study can be viewed as a technical choice and an institutional action grounded in compliance-based systems.

Importantly, Scott (2014) also notes that institutions are not just vehicles of constraint but also establish normative boundaries and organize efforts. "Institutions impose restrictions by defining legal, moral, and cultural boundaries" that clarify what acceptable and unacceptable behavior is, but "institutions also support and empower activities and actors" by providing resources such as "stimulus, guidelines, and resources" (Scott, 2014, p. 58). This conceptualization is the basis of the present analysis since it places bureaucracy or red tape as an institutional condition that could either (a) act or could act as a facilitator of coordinated service provision in clear regulations and legal authority, or (b) be a burden in the absence of coordination in situations where procedures are viewed as sluggish, cumbersome, and ineffective. They are therefore resolved by the Institutional Theory to provide a sound theoretical basis for examining how bureaucracies may become bottlenecks in the implementation process, as well as for explaining the mechanisms by which flexibility is solidified into inflexible, expensive overhead.

The institutional theory explains how organizations and projects align with institutional expectations set by institutional forces, including legal frameworks, professional guidelines, and culturally approved models of respectful behavior. Formal compliance is closely linked to legitimacy in the public-sector construction industry. With the regulative pillar, as postulated by Scott (2014), "the regulatory emphasis is on conformity to rules," thus, "legitimate organizations are those established by and operating in accordance with relevant legal or quasilegal requirements" (p. 74). This observation is directly related to the problem of honeypots in Islamabad, where approval processes are usually rather rigid, procurement requirements, and audit-based documentation procedures set the parameters for introducing the teams in place and determine how fast they can evolve.

This study applies Institutional Theory to justify focusing on bureaucracy, or red tape, as a primary explanatory factor rather than dismissing it as 'noise' or background. Because institutional systems "guide behavior and resist change," higher levels of red tape can raise the costs of iterative processes, such as longer decision cycles and increased demands on both documentation and discretionary authority (Scott, 2014, p. 57). These effects hinder the implementation of agile practices and influence whether they produce actual efficiency improvements or remain merely symbolic with limited operational impact. Therefore, Institutional Theory provides the conceptual foundation for the core logic of this research: (i) governance systems influence the feasibility of practice; (ii) institutional constraints serve as Implementational Barriers; and (iii) project outcomes are impacted not only by

technical execution but also by the institutional conditions under which the work is carried out.

1.8 Theoretical Framework / Research Model

This research employs the cross-sectional approach of Hayes' PROCESS Model 8 (moderated mediation) to explore the mediated relationships between agile-practices and project outcomes within institutional constraints. The model defines Agile Practice Maturity (APM) as the predictor (X), Implementational Barriers (IB) as the mediator (M), Project Success (PS) as the outcome (Y), and Bureaucracy/Red Tape (BB) as the moderator (W). Institutional Theory provides a rationale: formal rules, approval cycles, procurement discipline, and compliance routines influence what project teams can implement and how quickly they can adapt; therefore, BB is expected to influence the success of routines derived from agile.

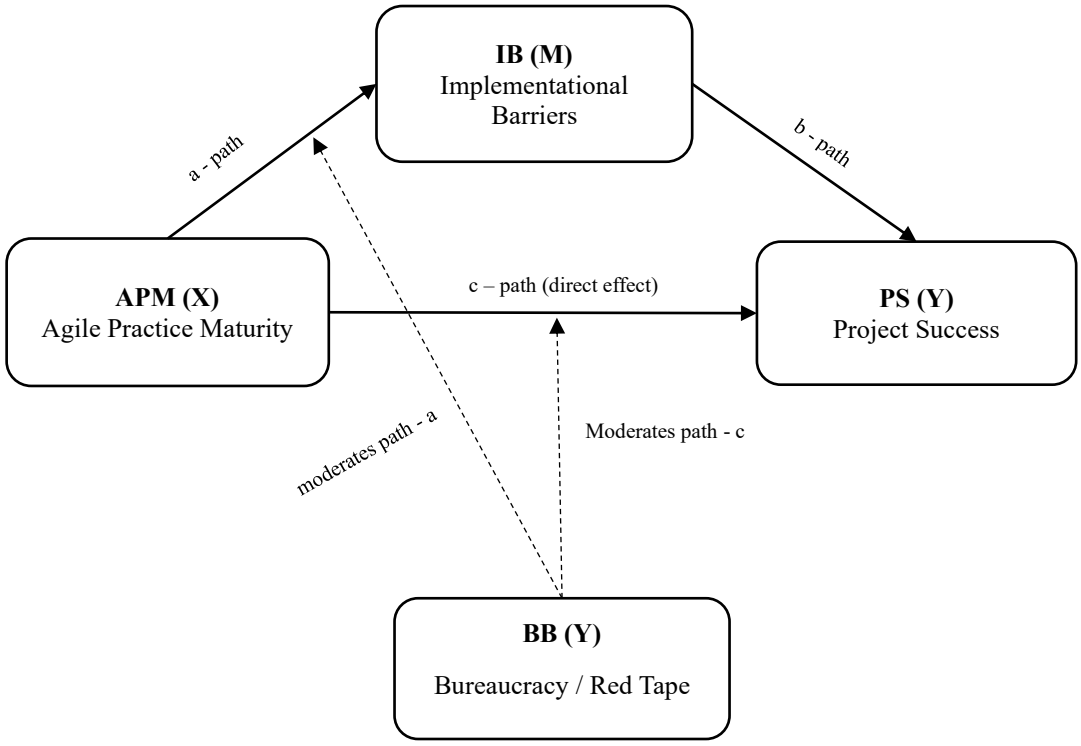

Figure 1.1: Moderated mediation research model (PROCESS Model 8): APM (X) is expected to influence PS (Y) directly and indirectly via IB (M); BB (W) is expected to moderate the APM → IB path and the APM → PS path.

CHAPTER 02
LITERATURE REVIEW

2.1 Agile in Construction

Over the last decade, scholars have argued that agile-aligned practices are applicable to value stream construction, particularly for early design and short-term planning when carefully tailored. For example, a multi-case pre-construction study contended that "applying the Agile methodology in the pre-construction phase may help enhance flexibility and collaboration" and that the breakeven pilots achieved "significant reductions in time and costs, emphasizing the value of Agile practices in construction project management" (Moreno et al., 2024, p. 1). Based on the same case, the authors argue that "implementing Agile techniques during the pre-construction stage of a project offers numerous advantages, including adaptability, teamwork, customer satisfaction, effective resource allocation, risk mitigation,

transparency, and cost savings", although a learning curve is involved (Moreno et al., 2024, p. 24). Thus, this study explicitly explores the contexts in which context-appropriate agile routines are most effective in Islamabad's projects and what, in practice, prevents their translation into consistent efficiency improvements.

The synoptic report by Pinto et al. (2023) highlights the pros and cons of using agile approaches in the building industry. The United States Construction Review lists the following benefits of adopting an agile approach as most common; the ability to respond better to changing project needs, "improved adaptability to changing project requirements, increased client satisfaction through enhanced collaboration and continuous feedback, and greater project transparency and visibility" of the project work, "more effective risk management and improved project delivery timelines" (Pinto et al., 2023, p. 11). In the developing world, survey data also indicate that "can be implemented precisely and could have positive impacts on the project and team efficiencys" and further suggest that ongoing issues such as "time delays, cost overruns, low quality, and productivity can be reduced or eliminated via agile methods" (Kazar et al., 2022, p. 72). Taken together, the compiled evidence confirms the need to develop an agile adoption plan for Islamabad's construction projects. Agile methodologies can range from a doctrine to a practical approach that enhances operational results in terms of cost, time, quality, and customer satisfaction.

There are cautions when transferring software uncritically to construction, which LPD/APM already highlights and states must be calculated in relation to overcoming adoption barriers and the 'sprints' that development and construction times create for LPD/APM adoption (Albuquerque et al., 2020). Taken together, the field suggests a selective adoption approach: agile ceremonies and artifacts can structure collaboration and feedback when scope is fluid; traditional controls remain useful when regulatory or contractual rigidity prevails.

Besides preliminary design testing, empirical studies are increasingly indicating that "it is difficult to fully integrate Agile Practice Maturity method[s] into construction projects," as reported in an Egyptian construction study (Gado & Elsayed, 2024, p. 6). Fully implementing Agile Practice Maturity in construction is nearly impossible within such layered methodologies characterized by fixed phases and reliance on dependencies. Therefore, they recommend adopting a "hybrid Agile-Waterfall approach" instead of using Agile alone (Gado & Elsayed, 2024, p. 7).

Another case study in the construction sector, conducted by Mohammed & Karri (2020), reveals that, despite agile concepts being characterized by flexibility and adaptability, they are highly versatile; hence, they require gradual implementation. This discussion indicates that the concept of agility is "not only applicable to IT industries but also applicable to construction management" (p. 476). Moreover, the literature reviewed indicates the significance of "scrum processes [which] enable(s) the organization to accept... the rapidly changing requirements to adjust smoothly" (p. 477).

Based on this view, studies on the effect of agility in the construction industry have found that it is a continuum rather than a binary concept. In particular, it is a range of multidirectional practices with diverse levels of flexibility and efficiency, influenced by organizational norms, leadership processes, advocacy processes, and governance systems.

2.2 Bureaucracy and Red Tape

It is also difficult to perform iterative processes in highly regulated, uncertain environments with publics that do not use agile practices. A recent defense program in digital technologies in the United Kingdom is one example of the complexity, as "flexible contracting and supportive induction training for staff" were identified as the primary factors driving positive results "within the budget," despite disruption from the COVID-19 pandemic (Baxter et al., 2023, p. 4). The authors argue that Agile methodologies were adopted and achieved success despite existing complexity and uncertainty. In construction engineering, Moreno et al. (2024) makes a similar point: the public sector adopts Agile systems within "more rigid regulatory frameworks," creating "new opportunities and challenges" that merit further

exploration (p. 3). The researchers used a bureaucratic model to assess the ability of Agile techniques applied in public-sector projects, including in Islamabad, to deliver long-term, measurable benefits compared to more adaptable ones in the private sector.

The suggested measures mean that the actual administrative authorities of Islamabad and in particular Capital Development Authority (CDA), National Highway Authority (NHA), Federal Government Ethics and Humanitarian Administration (FGEHA) should focus on the simplification of administrative procedures and the optimization of approval procedures, introducing more flexible solutions to the decision process and creating templates and forms more reflective of contract requirements. These policies are unavoidable in nurturing agility within the Islamic regulation system that oversees the city of Islamabad. Conversely, however, private-sector organizations may appear to be less tightly bound by formal restrictions but face informal ones, i.e., a strong focus on top-management supervision and the administrative overheads of audit procedures, similar to those of public bureaucracies.

The more recent studies on public administration have increased understanding of bureaucracy and red tape by clarifying how they have been understood and evaluated. For example, an important concept was operationalized when Borry (2016) asked participants to describe organizational regulations as "burdensome, unnecessary, and ineffective" (p. 577). Incidentally, van Loon et al. (2016) used to put forward a similar foundational argument that red tape is not only the product of rule proliferation but also exists "only when the rule fails to fully serve the purpose of accountability does it become red tape" (p. 664). This highlights the fact that red tape results from regulations, formalities that are not fully exploited, or unwarranted ones, and thus adds no value. As a result, engineers would describe the bureaucratic paperwork involved in public projects using these terms.

Engaging in numerous qualitative analyses demonstrates the importance of perception for efficiency. Meta-analysis by George et al. (2021) confirms that "red tape is harmful to both employee outcomes and organizational efficiency" (p. 11). This thesis definitively supports the stance that bureaucracy and red tape should be perceived not as mere administrative "noise," but rather as a socio-structural condition that amplifies impediments to operationalizing agile frameworks and thereby influences their operationalization, especially in regulation-heavy public organizations.

2.3 Implementational Barriers

Even documents sympathetic to the subject acknowledge the major hurdles. In the United States, the most frequent concerns are "resistance to change, inadequate stakeholder buy-in, difficulties in integrating Agile with traditional construction practices, and the need for skilled agile practitioners" (Pinto et al., 2023, p. 11). Complementary design-stage work stresses that adoption requires evidence on return (time/cost) and organizational change enablers (training, culture) to "break the obstacles here demonstrated" (Albuquerque et al., 2020, p. 146).

Interdisciplinary academic scholarship highlights many obstacles to the quick completion of projects. Soares et al. (2022) warns that many of these entities "apply one or another tool, without fully applying the concept," including specific methodologies such as a "scrum technique" (p. 10). These entities, influenced by these ideologies, often undermine the entire purpose. A recent systematic review similarly summarizes recurring adoption problems, listing "organizational resistance to change," lack of training, and lack of stakeholder involvement (Moreno et al., 2024; Setiawan & Sakapurnama, 2025, p. 29). All of these insights help explain why the "Implementational Barriers", the topics in this research work, are best viewed as a multidimensional combination, including contracts and procurement, approvals, culture and leadership, fragmentation in subcontracting, and tooling and training, rather than just a single, generalized barrier.

2.3.1 Procurement and Contracts

Iteration depends on the type of contracting used, which is governed by contracting logic. Evidence

from government programs shows that "flexible contracting" boosts the pace (Baxter et al., 2023, p. 4). Conversely, commentators suggest that standard EPC/FIDIC clauses favor milestone completion over the value-increment principle.

2.3.2 Approvals and Regulatory Compliance

The decision-making processes for public owners' mandates can be pretty complex and time-consuming. As Moreno et al. (2024) point out, applying Agile to "public sector projects, new opportunities and challenges arise" has led to the development of "more rigid regulatory frameworks" (p. 25), which, in turn, have created new opportunities and challenges. For Islamabad's public administration, this means securing numerous financial, technical, and audit approvals. The core idea is that with Agile's influence, approval delegation and decision SLAs with set time limits will be essential for this approach.

2.3.3 Culture and Leadership

Buy-in may decrease, but power dynamics are minimal in agile, cross-functional teams. The U.S. reviews highlight "resistance to change" and a lack of "stakeholder buy-in" as common obstacles (Pinto et al., 2023, p. 19). At the same time, preconstruction pilots focus on the "learning curve for applying the Agile" techniques and the "need for technical training and adaptation periods" (Moreno et al., 2024, pp. 24–25). In short, committed leadership and skill development are not optional; they are the foundation for any process change.

The roles of culture and leadership are evident in residential construction. Elseknidy et al. (2024) suggest that "cultural and organizational barriers" are among the main obstacles to adopting agile methodologies in residential construction (p. 3). These barriers are linked to deep-rooted organizational behavioral patterns, including "resistance to change rooted in long-held values and traditional power dynamics" (p. 3). These findings support the context of the Islamabad Capital Territory, where managers' tendency to relinquish control, the development of psychological safety, and collaboration among cross-disciplinary teams all influence the transition of agile methodologies from pilot projects to full adoption.

2.3.4 Subcontractor Fragmentation

An increase in subcontracting levels is accompanied by a corresponding rise in the likelihood of fragmentation, driven by disruptions in the flow of information and accountability during handoffs between trades and hierarchical levels. In developing countries, efficiency issues mainly stem from poorly coordinated sites, a dispersed workforce of skilled laborers, and a fragmented, poorly integrated supply chain (Kazar et al., 2022). The main challenges include short planning cycles, daily coordination huddles, and visual information boards, which are intended to eliminate information gaps and increase transparency. By using the lean methodologies, commitment is attained. The timing of other issues strongly points toward a hybrid model; therefore, the true hybrid model makes subcontractors feel like actors, not passive recipients of activities, thereby synchronizing their activities, even though perfect synchronization is not always possible (Moreno et al., 2024). In Islamabad, the most frequently listed problem involves coordination management. In line with these findings in other settings, the goal here is to minimize interface latency by involving stakeholders in the Sprint Planning sessions. This strategy offers overall benefits in time, cost, and quality due to the elimination of interface delays.

The very content of the construction work defined by the contractual framework imposes specific limitations on the construction's agility. Recently, there has been an empirical study that looks at those projects where "comprehensive utilization of outsourcing services" has been widely implemented, namely "subcontracting and staff contracts," and argues that these forms of outsourcing activity significantly act as "a barrier" to agile methodology adoption (Elseknidy et al., 2024, pp. 6–7). In the case of Islamabad, it indicates that subcontractor fragmentation will be problematic, especially in large, multi-tier projects, where there is a real chance that trade partners will not be included in short-term plans and that negotiations will be subject to quick changes.

2.3.5 Tooling and Training

Most pilots have raised concerns about tooling and training needs. Moreno emphasizes that adaptation phases and technical training are essential to a construction project and that sprinting use only "redu[ces] the time required" after teams have crossed the learning curve (Moreno et al., 2024, p. 24). The practical implication for Islamabad firms is a simple toolset (visual boards, backlog systems) and concise, focused training that matches site rhythms.

2.4 Project Success

Although there is plenty of evidence on the effects of a particular phenomenon, context can still be a very important factor. For example, in Pakistan, controlled and quasi-experimental studies show that the costs and time spent on management are much lower with the Agile management system than with traditional management methods (Raza Siddiqui et al., 2022). In some cross-national studies, the Agile approach appears effective at improving project and team efficiency, especially when efficiency issues arise (Kazar et al., 2022).

In similar instances, a 2024 survey published in the Frontiers in Built Environment journal examined the CSFs of residential construction (PLS-SEM; n=120) and identified "the dynamic project optimization element had the most significant impact on the model" (Kineber et al., 2024, p. 1). This suggested that, among the model's constituent parts, this was the most important. Signifying that agile routines working on high-value tasks with rapid feedback cycles affect delivery efficiency. The same applies to the analysis demonstrating the adoption of APM for CSF-dominated costs and to the model that integrated cost-time efficiency into efficiency sustainability (Kineber et al., 2024). All in all, the optimization-oriented mechanism offers unique levers, such as task prioritization, flow visibility, and short-cycle replanning, which can be universalized across publicly and privately owned projects in Islamabad to address the effectiveness gaps identified.

Other complexities can be added to case studies that will start during the pre-construction stage. The purposeful postponement of changes and the simplification of decision-making accelerate the completion of the design. This means that time is saved, "transparency and accountability" are improved, delays are eliminated, and cost changes are prevented (Moreno et al., 2024, p. 25). The synthesis based on the United States case study also indicates greater alignment with the schedule, which is explained by intensified "enhanced collaboration and continuous feedback" processes, in which the quality of the application appears to be a crucial determinant (Pinto et al., 2023, p. 11). As a result, the least amount of conjecture that can be made based on the available evidence is that the benefits of applying agile practices are realized only when they align with the project's governance structure and context. In the context of agile methodologies, unremitting complexity, high design coordination uncertainty, and short-term planning led to high delivery of value. Conversely, the least perceived value was associated with situations with fixed scope, a high compliance focus, and the integration of safety-critical construction activities.

Other national opinions, such as Rwanda's, are integrated to explain the phenomenon's complexity. According to Bigirumwami et al. (2023), argued that "regression results revealed a significant relationship between Agile Practice Maturity and project success" (p. 118). The result aligns with the current scholarly literature on project management, which distinguishes between model effectiveness and success. Serrador & Turner (2015) goes on to note that the project's success depends on its results and that efficiency (and hence success) depends on resources, time constraints, and money. All these studies, together, support the idea that project management dimensions are multifaceted and that Agile Practice Maturity programs facilitate the achievement of acceptable project outcomes and provide key stakeholders with an appropriate level of satisfaction, despite differences in cost and timeline.

2.5 Public vs. Private Contrasts

Both advantages and disadvantages appear in public initiatives. In the U.K. case, Agile, combined with flexible contracting, enabled more

innovative approaches in highly complex environments (Baxter et al., 2023). At the same time, literature reminds us that public projects are often entangled in much more complex regulatory systems (Moreno et al., 2024).

Regarding the public sector, recent comparative evidence suggests that government agencies do not adopt a single, 'pure' agile approach, but instead adapt it to suit bureaucratic environments. In a multi-case study of 19 administrations, the authors identify "three translation modes: agile stripped down to a cultural concept, agile as governance to foster cross-functional collaboration, and agile as methodology," that closely adhere to the original principles (Neumann et al., 2024, p. 3692). The same study also indirectly describes rule-bound administrations as extreme cases and notes that highly formal, line-organized bureaucracies require substantial restructuring of structures, decision rights, and routines to enable agile work. Consequently, public agencies often only adopt the cultural or governance aspects. Private sector companies, on the other hand, tend to implement these methods more comprehensively (Neumann et al., 2024). In contrast, private contractors are freer to implement changes, indicating a cultural shift. This explains why the study compared it with Islamabad: the use of Agile will most likely encounter some resistance, with varying levels of bureaucratic constraints across CDA/NHA/FGEHA versus the contractor/consultant offices.

2.6 Agile-Compatible Enablers in Design (BIM & LPS)

The differences between the public and private sectors go beyond just barriers; they also include enablers of agility, especially in design and scheduling. The two main components of the Last Planner System, Lean and Design Management, along with BIM-enabled digital collaboration, work very well together.

At the design stage, the second phase and countermeasure by the LPS to variability and loss of coordination is constructive. One design-focused study states that the LPS "aims to enhance planning reliability by reducing variability in construction processes" and then extends this logic to architectural design, utilizing planning and implementation models (Shehab et al., 2023, p. 1). These metrics can be measured, empirically tested, and implemented. LPS expands the design to be collaborative rather than entirely top-down, dividing it into four levels for collaboration: at the master/phase, look-ahead, and weekly work planning stages, with planning occurring at the 'ready, shield production, and release' phases. Scheduling handoffs for construction parts is simple. These features are important in Islamabad, where governance issues, delays, and redesigns frequently occur during the pre-construction phases.

Second, Building Information Modeling (BIM) is the basis of digital infrastructures supporting agile coordination frameworks. The BIM adoption in Pakistan is at a developmental stage. A national survey revealed that only 11% of the surveyed supported that they have a heightened intention towards BIM uptake, despite them acknowledging that it will decrease time spent on it, minimize costs, and improve communication between stakeholders (Farooq et al., 2020). The same information also indicated that the communicative and collaborative benefits of BIM were quite high (74%) and the potential savings in time and costs were substantial (57%). Such benefits include practical ones like clash avoidance, more explicit compartmentalization, and faster review cycles to maintain short planning horizons. Accordingly, the major conclusion is that the incorporation of the Lean Production System (LPS) protocols and BIM workspaces has the potential to change the elements of the LPS value-stream mapping workshops, approval scheduling, and design iterations that are usually based on informal agreements to be transparently documented commitments based on the previously established inputs and expected outputs.

Third, theoretical and practical studies highlight the proven benefits of agile approaches in design teams, especially through the following mechanisms that are interdependent: sprints, a visible backlog, and daily cross-functional meetings. Empirical data regarding building design shows that the divide and conquer approach to design work facilitates transparency and accountability,

further allowing the teams to track the status of the planned work, the completed work, and the pending work in the daily business operations of the BIM process (Chathuranga et al., 2023). These practices also support earlier feedback from mechanical, electrical, and plumbing (MEP) specialists, architects, construction engineers, and cost/legal professionals. As a result, engaging in these interdisciplinary inputs early helps make timely adjustments to improve the success of agile construction design management.

Ultimately, this enables resonance with empirically recorded delay drivers in Pakistan. An analysis using PLS-SEM identifies the main time wastes as the information and communication sectors, with contract management ranking second, both of which are directly addressed by LPS (commitment planning, ready-work screening) and BIM (shared, version-controlled information) (Memon et al., 2023). An LPS-on-BIM toolkit offers Islamabad's public authorities and private contractors a practical solution: streamlining the design workflow, reducing decision-making time, and identifying administrative delays early enough to turn them into systematized structural improvements to overcome constraints.

2.7 Research Hypotheses

H_1: Agile Practice Maturity (APM) is expected to positively impact Project Success (PS).

H_2: Implementational Barriers (IB) are expected to negatively impact Project Success (PS).

H_3: Bureaucracy/Red Tape (BB) is expected to positively impact Implementational Barriers (IB) by increasing procedural burden and slowing decision cycles.

H_4: Bureaucracy/Red Tape (BB) is expected to strengthen the impact of APM on Implementational Barriers (APM → IB), such that when BB is higher, agile implementation is expected to trigger greater implementation difficulty (i.e., the APM → IB effect becomes more adverse under higher BB).

H_5: Bureaucracy/Red Tape (BB) is expected to weaken the positive impact of APM on Project Success (APM → PS), such that agile-derived practices are expected to deliver smaller efficiency gains when BB is higher.

H_6: The indirect impact of APM on PS through Implementational Barriers (APM → IB → PS) is expected to vary across levels of BB, such that the overall indirect effect becomes more negative when BB is higher.

CHAPTER 03
RESEARCH METHODOLOGY

3.1 Research Design

This study adopts a cross-sectional, quantitative, comparative design to evaluate a moderated mediation model (PROCESS Model 8) investigating the influence of Agile Practice Maturity (APM) on Project Success (PS), with direct and indirect effects mediated by Implementational Barriers (IB). Consistent with Institutional Theory, the research conceptualizes Bureaucracy/Red Tape (BB) as an institutional constraint that may affect the efficacy of agile-derived practices and the translation of their results into enhanced efficiency. Specifically, the variable BB is hypothesized as a moderator on (i) the APM-IB trajectory (first-stage moderation) and (ii) the direct APM-PS linkage, thus allowing for the indirect effect of APM on PS through IB to vary in terms of the degree of institutional constraint.

This study employs a deductive research design, in which hypotheses guide the research direction and constructs are measured using validated questionnaires. Quantitative analyses will be conducted in SPSS, including regression analyses and conditional process models. The research is conducted in the Islamabad Capital Territory (ICT), which provides an appropriate empirical context because it includes both public and private projects operating in a common local market but at different levels of bureaucratic governance.

3.1.1 Type of the Study

This is an explanatory quantitative study that aims at quantifying the direct, indirect, and conditional effects among the aforementioned constructs using SPSS and Hayes' PROCESS macro (Model 8). The analysis of this research study focuses on:

(i) the direct impact of APM on PS;

(ii) the indirect impact of APM on PS through IB (mediation); and

(iii) the extent to which BB conditions the APM → IB path and the APM → PS path (moderation), producing a conditional indirect effect (moderated mediation).

In addition to the model evaluation, the study includes descriptive comparisons between the public and private sectors (to address RQ1/RO1) and to understand possible differential adoption of agile practices and levels of barriers in the two sectors. All statistical tests are given using standardized coefficients, p-values, and, where necessary, bootstrapped confidence intervals to make the findings of the necessary analysis more robust (Field, 2018; Hayes, 2013).

3.1.2 Research Philosophy

The positivist epistemological perspective of research suggests that social phenomena can be quantitatively and systematically characterized and then subjected to statistical analysis to assess propositions based on the theory (Creswell & Creswell, 2018). Constructs APM, IB, BB, and PS are operationalized as observables using specific measurement indicators, and the relationships among these constructs are examined using probabilistic models. Therefore, methodological inclination is well-suited for testing hypotheses and approximating the size and direction of effects in a moderated mediation framework.

3.1.3 Study Setting

The field survey is to be arranged jointly with career experts specializing in construction activities in the Islamabad Capital Territory (ICT). The study sites include both public-sector entities (i.e., Capital Development Authority (CDA), National Highway Authority (NHA), and Federal Government Employees Housing Authority (FGEHA) and private-sector contractor and consultant offices (i.e., ZKB, MCC and NESPAK). By grounding the enquiry in a single metropolitan jurisdiction, contextual comparability of procurement practices, labor markets, and regulatory exposure becomes easier while maintaining sectoral differentiation.

3.1.4 Unit of Analysis

This research study mainly focuses on the professional staff members working in relation to every project, such as project managers, resident/site/section engineer, planners, quantity surveyor, quality assurance and quality control personnel, consultant staff, and others working on any project in Islamabad, regardless of the geographic location where the head office is located.

3.1.5 Time Horizon

The study used a cross-sectional time-frame design. Data collection was conducted at one time for respondents currently running projects in Islamabad. Such a methodological option allows for effective cross-sector comparisons and for estimating conditional relationships, but it does not deny that causal inferences are less affirmative than those from a longitudinal design would have been.

3.2 Population and Sample

3.2.1 Population

The target population comprises project professionals in the ICT sector who deal with the construction and infrastructure works in the public and private sectors.

3.2.2 Sampling Frame and Technique

The pragmatic framework assumes the presence of (i) correspondence with the CDA, NHA, and FGEHA, as well as with private enterprises mentioned above; (ii) networks comprising of departmental affiliates and alumni associations and the PECA; (iii) professional, where networks are provided via LinkedIn and WhatsApp; and (iv) site gatekeeper which includes resident engineers and PMOs. Given the limited accessibility and research area of the city, a non-probability, stratified purposive sampling strategy has been used to maintain sectoral balance, with about 40 to 50 respondents per sector. The stratified purposive approach is especially appropriate for contrasting two contexts in sectors within one metropolitan area. In addition, an equal distribution of representation across sectors is essential for further comparisons of SPSS groups

and regression analyses that yield meaningful, statistically reliable outcomes.

3.2.3 Sample Size and Power

The final sample size, n = 390, offers strong statistical power for regression-based conditional process analysis. Since the model includes APM, IB, BB, and interaction terms (APM x BB), a larger sample is necessary to obtain stable estimates of moderation and moderated mediation effects. Based on typical power standards for multiple regression (α = .05, power = .80, medium effect size), a minimum sample size of about 120 observations is usually considered adequate for a model with 10-12 predictors (Cohen, 1992; Faul et al., 2009). The actual sample of 390 well exceeds this minimum, enabling more reliable estimation of conditional effects and more precise hypothesis testing (Hayes, 2013).

3.2.4 Inclusion/Exclusion Criteria

Including only respondents who (a) hold an owner, authority, contractor, or consultant role, (b) are currently engaged in a project based in Islamabad, and (c) have at least 6 months of tenure on their current project. Exclude interns, trainees, or any non-project corporate staff.

3.2.5 Data-Collection Procedure

After obtaining organizational permission, a cover letter was drafted to explain the purpose, voluntary participation, confidentiality, and the use of survey data. The survey was distributed via paper forms to be filled out manually at the site office, as well as through online portals that are not encrypted (but contain the same components) (Podsakoff et al., 2003). To reduce common method bias (CMB), the order of survey questions will be randomized, along with the scaling and psychological separation of questions on the same topic.

3.2.6 Handling of Questionnaires and Missing Data

Submitted questionnaires will have their answers evaluated for completeness. For individual responses with randomly missing values, item-mean imputation will be applied (no more than 5%); otherwise, listwise deletion will be applied. Before testing the hypotheses, data screening procedures will be conducted in SPSS. Missing values will be described by item and by case. When the missing data is small, it is handled using expectation-maximization or multiple imputations. If missing data is substantial, cases will be removed to maintain data interpretability. Outliers and influential cases will be identified using standardized residuals, leverage values, Cook's distance, and Mahalanobis distance during multivariate screening. Linear regression assumptions will be checked with diagnostic plots and VIF/tolerance statistics. These assumptions include linearity, homoscedasticity, normality of residuals, and multicollinearity (Field, 2018).

3.3 Sample Characteristics (Planned Reporting)

In the planned reporting of the sample characteristics for this study, descriptive tables will display the distributions of gender, education, age, and experience, as well as role (owner/authority vs. contractor vs. consultant), project type (building vs. infrastructure), and delivery method (DBB/DB/EPC). This aligns with the control variables and the later multi-group analysis.

3.4 Instrumentation

3.4.1 Scale Design and Response Format

All study constructs were operationalized using validated instruments, and responses were recorded through standardized formats. Each variable was coded and analyzed on a 5-point scale, consistent with SPSS standards. If an original, validated tool used a different response range (e.g., a 7-point scale), the values were systematically rescaled to a 5-point equivalent during coding, while keeping the questionnaire wording and anchoring unchanged to preserve content validity. Composite scores for each construct were obtained by averaging the individual items, ensuring comparability across constructs and supporting regression analysis.

3.4.2 Agile Practices / APM Maturity (Independent Variable)

Agile Practice Maturity (APM) was evaluated using the Conforto et al. (2014) APM operationalization list. The instrument includes six indicators of

practices: for each one, respondents answer "Yes" if the practice has been used in the focal project and "No" if not: (1) use of a "product vision;" (2) use of minimal or simple planning communication tools and processes; (3) use of iterative planning; (4) development of activities through self-managed or self-directed teams; (5) use of self-managed or self-directed teams for monitoring and updating activities; and (6) frequent monitoring and updating of plans.

In SPSS, responses were coded as Yes = 1 and No = 0. The maturity of APM was operationalized as the total of affirmative responses (range: 0-6) and then scaled to a 5-point metric to maintain consistency across analyses (higher scores indicate greater APM maturity). Additionally, consistent with the survey protocol, participants who answered No to all six items (sum = 0) were considered ineligible for subsequent segments and were excluded from the main hypothesis-testing dataset through filtering.

3.4.3 Implementational Barriers (Mediator)

Implementational Barriers are assessed using the barriers questionnaire section reported by Elseknidy et al. (2024) (Table 1). Respondents rate each barrier to APM on a severity scale from 1 to 5, where 1 equals None or very low, 2 equals Low, 3 equals Moderate, 4 equals High, and 5 equals Extremely high. Barriers include culture, change during construction, control, planning, project size, barriers within the client culture, client expectations, and resistance. In SPSS, Implementation Barriers are represented by higher scores on each of the 20 items, and the average or total score is calculated.

3.4.4 Bureaucracy / Red Tape (Moderator)

The researcher uses the Three-Item Red Tape (TIRT) Scale prescribed by Borry (2016) to measure bureaucracy or red tape in the semantic differential format. Respondents are asked, "How would you describe policies and procedures in your work division between the following opposite characteristics?" For each of the three attributes, they choose between two opposing characteristics, resulting in options such as Burdensome (not burdensome to burdensome), Unnecessary (necessary to unnecessary), and Ineffective (effective to ineffective). The SPSS coding aligns answers from (1) to (5), with higher numbers indicating greater red tape, and measures red tape as the average of the three factors.

3.4.5 Project Success (Dependent Variable)

The measurement of Project Success (PS) was based on the precise survey items and anchors developed by Serrador & Turner (2015). The project success was measured according to a seven-point linear scale that included the following dimensions: (1) fulfillment of planned project objectives, (2) meeting of budget objectives, (3) compliance with scope and specifications of requirements, (4) project evaluation by the project sponsor, (5) project team satisfaction, (6) client satisfaction, (7) end-user satisfaction, and (8) overall project success, which was determined in the tool structure. Original anchor points were used; that is, a score of 1 was associated with Not at all successful, and a score of 7 with Extremely successful.

To achieve comparability across constructs and retain a homogeneous scale for regression analysis, PS items were coded in SPSS using a five-point Likert scale via linear rescaling (i.e., Not at all successful = 1 and Extremely successful = 5). The resulting PS score, used as the dependent variable in the regression models, was calculated as the average of the rescaled items, with higher scores indicating greater overall project success.

3.5 Questionnaire Development and Pilot Testing

3.5.1 Content Validity and Expert Review

Before arduous field deployment, all assembled item pools will undergo stringent validation against the definition. The integration of short, iterative cycles, backlog focus, stakeholder walkthroughs, and visual management is useful for pursuing Agile practices and APM. Some challenges that might occur during implementation include procurement and contractual inflexibility, lengthy approval procedures, cultural rigidity, subcontractor subdivision, and a lack of tools and training. Bureaucracy and red tape could involve perceived

compliance burdens and a lack of functional benefits. Project Success will be evaluated based on time, cost, quality, and client and stakeholder satisfaction. A panel of 3 to 5 experts, comprising two academics in project management and construction, along with 2 to 3 senior practitioners from the owner/authority and contractor/consultant sides based in Islamabad, will review content coverage, clarity, and local relevance on a 4-point scale.

In alignment with Lynn (1986) Framework, we shall compute I-CVI as the percentage of experts who rate an item as 3 or 4, and the S-CVI/Ave across all items. I-CVI < .78 for a 3–5 panel will be reworded, removed, or rephrased as necessary, and the theoretical meaning of the constructs will be customized to the appropriate Islamabad procurement and approval terminology. This review will also consider respondent burden (aiming for an approximate completion time of 10–12 minutes), alignment of items with hypothetical paths to avoid measurement bias of later diagnostics, and balance across constructs to avoid content under- or overrepresentation.

3.5.2 Cognitive Pretest

After conducting an expert review, the next stage of the methodology will involve recording "think-aloud" interviews with 6 to 8 respondents from diverse roles in the construction shipbuilding industry, including project managers, construction engineers, and project planners. During the interviews, participants who are reviewing the draft questionnaires will be asked to explain their thought process for each item and scale anchor, and to clarify any terms that are vague, culturally loaded, or in need of simplification. The focus will be to probe their phenomenological experience of comprehension ("Box 5: What does this item mean to you?"), retrieval ("What project episode do you think of when answering this question?"), judgment processes ("How do you decide on the rating?"), Moreover, the response mapping ("How does the rating fit your judgment?"). Problematic lexical units, double-barreled terminology, and socially desirable response constructs will be addressed through note-taking. These interviews will then be followed by revising the items to ensure they are clear and concise. Definitions and examples will be included where needed, and the order will be reorganized to minimize priming, following Dillman et al. (2014). Subsequently, items will be proofread to ensure consistency in tense, perspective (team versus project), and reference period.

3.5.3 Pilot Survey and Reliability

A pilot survey (n ≈ 30–40) will be conducted with a convenience subsample from the same population frame, but will not be used in the primary analysis. The purpose of the pilot is to assess the internal consistency and preliminary factor structure of each scale. The pilot will evaluate internal consistency with Cronbach's alpha (aiming for ≥ .70) and corrected item–total correlations. When appropriate, exploratory factor analysis (EFA) will serve as a diagnostic tool to assess the factor structure, using KMO and Bartlett's tests; factor loadings will be reviewed for clarity, and cross-loadings will be examined to confirm that items perform reliably in the local Islamabad context (Field, 2018; Kline, 2015). We will also examine item–total correlations, descriptive distributions (means, SDs, floor and ceiling effects, and score distributions), completion time, and respondents' comments about complex or confusing items. To reduce demand characteristics, we will avoid using closely paraphrased, short, direct quotes from well-known agile or lean literature in the item stems and strive to remain as neutral as possible. The pilot will also serve as a dress rehearsal for data-handling procedures (such as coding and missing-data rules), testing the procedures described in 'Section 3.2.6' to ensure they are followed in the main deployment.

3.6 Data Analysis Plan

The data analysis will be carried out using SPSS, following a thoroughly designed procedure that addresses the updated research questions and hypotheses. The first actions will involve filtering out missing data, outliers, and violations of critical regression assumptions, such as linearity, homoscedasticity, normality of residuals, and multicollinearity. Afterward, we will calculate descriptive statistics for the respondents and the

study, with special attention to central-tendency and variability measures for the variables under consideration.

This will be done after data acquisition, whereby composite indicators will be created using each latent variable. The operationalization of the construct of Agile Practices/APM Maturity will be based on dichotomous coding (Yes=1, No=0), and a cumulative score will be obtained from the six items that compose it. Consistent with the logical structure of the questionnaire, the participants who will provide their agreement to all six APM items (i.e., APM sum = 0) will be considered ineligible to proceed further and will not be included in the main hypothesis testing sample. Construct, Implementation Barriers, and Bureaucracy/Red Tape are the variables that will be measured on a five-point ordinal scale. Items assessing Project Success that were initially based on a seven-point linear continuum will be re-based on a five-point scale to enable comparability in regression analysis. The success measure for the entire project will be calculated as the average score of the rescored efficiency items, with higher scores indicating greater efficiency.

To answer RQ1, comparative analyses by sector (public and private) will be conducted using independent samples t-tests. When necessary, effect sizes and cross-tabulation summaries of categorical project characteristics will also be presented. To test the hypothesis, the researcher will perform a regression-based conditional process analysis in SPSS using the Hayes PROCESS macro (Hayes, 2013). Specifically, PROCESS Model 8 will be applied to estimate: (i) the direct effect of APM on Project Success; (ii) the indirect effect of APM on Project Success through Implementational Barriers; and (iii) conditional effects where the Bureaucracy/Red tape moderates the APM → Implementational Barriers (first-stage moderation) and APM → Project Success (direct-effect moderation) paths. The confidence intervals for the direct and conditional indirect effects will be generated via bootstrapping. The results will be reported as coefficients, standard errors, p-values, and bootstrapped confidence intervals (Hayes, 2013). The perceptions will be grounded in Institutional Theory, which also considers how institutional restrictions (bureaucracy and red tape) influence implementation difficulty and, consequently, efficiency outcomes.

3.6.1 Robustness and Sensitivity

To enhance confidence in the findings and results, the analysis below will include robustness and sensitivity tests in SPSS. The research study will first examine alternative scoring specifications, e.g., whether a summed-unlike-means composite index performs better than the mean specification, to ensure that the conclusions do not depend on the adopted measurement specification. The main PROCESS Model 8 findings will then be validated in the presence and absence of the key control variables (if included), and this will determine whether the directionality and statistical significance of the focal effects are not driven by crude project structural differences. Lastly, diagnostic methods, such as analyzing standardized residuals and leverage flags, will also be used to detect influential cases and outliers, and the stability of the estimates will be assessed in cases where the preconditions of the statistical models are checked (Field, 2018).

Additionally, a scale-harmonization sensitivity analysis will be performed to verify that converting 7-point project-efficiency responses to a 5-point scale does not significantly affect the study's conclusions. If necessary, subgroup analysis (e.g., public and private institutions) will be conducted to further confirm that the observed pattern of moderated mediation is not dependent on any specific subgroup. Overall, these tests reinforce the validity of the conclusions obtained from the regression-based conditional process analysis (Field, 2018; Hayes, 2013).

3.7 Ethical Considerations

The researcher will first seek institutional approval for the research and, where necessary, permission from any prospective organizations. A brief overview of the study will be provided to each potential participant, who will be required to sign an informed consent form only after reading and understanding the information presented. Data collection will be carried out in strict confidentiality, and once the part is completed,

the data will be stored on an encrypted system allocated to the study. Some information might be truncated or kept in different places, but the integrity of institutional and personal records will remain intact in all records. Ethical issues involved in survey design include limiting the scope of personal data collection to only what is required, allowing respondents to skip questions they do not want to answer, and providing the option to quit the survey at any stage.

3.8 Chapter Summary and Link to Analysis

The chapter describes the methodology used to explore how agile practices translate into project success in the Islamabad construction industry, a location with an institutional constraint. It explains the research design, contextual placement, sampling protocols, instrumentation, data coding processes, counseling data routines in SPSS, screening data reliability tests, descriptive data tests, and hypothesis testing. In addition, the chapter identifies the analytical methodology, the application of PROCESS Model 8 to determine the exact effects of the Agile Practice Maturity construct on Project Success, the mediating role of Implementational Barriers, and the moderating effect of bureaucratic red tape on the relations between APM → Implementational Barriers (IB), on the one hand, and APM → efficiency (PS) path on the other (Hayes, 2013). The next chapter will present the empirical results from these analyses and explain them in terms of the Institutional Theory, thereby clarifying how these institutional limitations affect the state of implementation reality and the efficiency outcomes.

CHAPTER 04
DATA ANALYSIS AND DISCUSSION

4.1 Introduction

The chapter is strict in its assessment of the research's empirical results, placing them in the context of the developed research model (PROCESS Model 8: moderated mediation) and the Institutional Theory's context. It serves two main key purposes: the first one consists of describing the statistical outcomes in a clear and systematic way, and the second one is to explain the effects of the outcomes of these outcomes through the examination of the working forces of agile practices in the construction sector of Islamabad, specifically through various scales of institutional constraints.

The results are provided in a systematic format that follows the preestablished analytical framework. To start with, the chapter outlines the steps used in data screening and coding, including the most important recoding procedures and the criteria used to qualify the data before model estimation. It then provides an account of the respondents' and projects' features, including descriptive statistics and reliability coefficients that clarify the distributional features of the constructs and the similarity of the measurement tools. Subsequently, correlation analysis structures and comparisons across sectors are analyzed to answer RQ1, with the purpose of identifying differences between the public and private sectors in the application of Agile Project Management (APM) practices. Lastly, RQ2-RQ4 are tested empirically using the formulated, refined hypotheses derived from the Institutional Theory (H1-H6) with the PROCESS Model 8 by Hayes (2013). This analysis determines the direct impact of APM on efficiency (H1), the direct impact of Institutional Bias on efficiency (H2), the direct impact of Bureaucratic Barrier on Institutional Bias (H3) and the moderating effect of the intensity of bureaucracy or red tape on the association between APM and Institutional Bias (H4) and between APM and Post-Implementation Satisfaction (H5). Robust inferences are drawn using bootstrapped intervals (Field, 2018; Hayes, 2013).

4.2 Data Screening and Preparation

The dataset collected for this research included 390 complete responses. The data was examined in terms of missing data, outliers, and compliance with the fundamental regression requirements, including linearity, homoscedasticity, normality, and multicollinearity using traditional SPSS requirements, and subsequently hypothesis testing (Field, 2018). For the APM scale, affirmative responses were coded as 1, and negative responses as 0; APM maturity was measured as a summed score of 6 items (APM_sum, range 0–6). Participants with an APM_sum of 0 (i.e., "No" on all six APM items) were deemed ineligible to

continue to the later sections of the questionnaire and were excluded from analysis in Model 8, removing all zero scores from both the public and private sectors. For the Project Success scale, the original seven-point scale was rescaled to a five-point scale via linear transformation ("Not at all successful" = 1 and "Extremely successful" = 5) during coding, and the scores were averaged to produce PS_mean5. As a result, the final sample for PROCESS Model 8 is N = 390 (Public = 126; Private = 264), with the full sample demographics remaining N = 390.

4.3 Demographics

This subsection offers a brief overview of the demographic and project-specific characteristics of the respondents in this study (N = 390). These pieces of information can be used to clarify the origin of the information, including participants' sectoral affiliations and professional abilities, as well as the nature of the projects under investigation. This includes differences across diverse types of building construction in terms of structure and facilities, as well as the means of delivery. The said contextual material cannot be ignored in construction research because the success of initiatives and the feasibility of implementing management systems, especially agile ones, often depend on prevailing governance systems, proposal plans, and organizational environments between the government and industry.

Table 4.1

Demographic Characteristics of Respondents (n = 390)

Variable	Category	n	%
Sector	Public (CDA/NHA/FGEHA/other)	126	32.3
	Private (contractor/consultant)	264	67.7
Organization & role	Project Manager	151	38.7
	Consultant	89	22.8
	Planner	60	15.4
	QA/QC	47	12.1
	Site/Section Engineer	35	9.0
Project type	Building	237	60.8
	Infrastructure	153	39.2
Delivery method	Design–Build (DB)	119	30.5
	Design–Bid–Build (DBB)	72	18.5
	EPC	73	18.7
	Other	126	32.3
Islamabad ICT confirmation	Yes	309	79.2
	No	81	20.8

Note. The percentages were calculated with reference to the entire sample (n = 390). The code within bracket terms is consistent with the SPSS coding scheme for the corresponding category.

4.3.1 Sector

The sector is a salient contextual variable in the current study, in which the processes through which the government focuses on public and private construction projects interfere, based on the different accountability mechanisms, project approval, and decision-making frameworks, which further may mediate the way the agile practices are implemented and under which the project outcomes are achieved. In the overall dataset (N = 390), 126 respondents (32.3%) indicated they were involved in the public sector project, whilst 264 respondents (67.7%) indicated they actively participated in the private sector projects. The distribution provides a statistically sound comparison of public and private space in the

Islamabad market and therefore offers a robust empirical case for examining sector-specific variations in the implementation of agile practices, the challenges faced in its application, and the efficient results reported.

4.3.2 Organizational Affiliation

The respondents were grouped by organizational position, as this can influence how professionals handle project routines, especially in areas such as approvals, documentation, coordination, planning, discipline, and change management. The largest group in the sample (N=390) was Project Managers (n=151; 38.7%), followed by Consultants (n=89; 22.8%) and Planners (n=60; 15.4%). The remaining respondents included QA/QC staff (n=47; 12.1%), Site/Section Engineers (n=35; 9.0%), and Quantity Surveyors (n=8; 2.1%). Overall, the observed distribution suggests that the data are representative of both managerial and technical positions, rather than a specific one, thereby increasing the contextual relevance of the findings.

4.3.3 Project Type

The project type category was required due to differences between building and infrastructure projects in terms of complexity, stakeholder participation, contract structure, and coordination needs. All these variables will affect the willingness to embrace agile-based practices and the level of implementation obstacles encountered. The sample (N = 390) included 237 respondents (60.8%) who reported participating in building projects and 153 (39.2%) who reported participating in infrastructure projects. The investigation's scope widens the research's contextual domain, as the findings are based on a diverse set of project cultures in Islamabad rather than being limited to a single project typology.

4.3.4 Project Delivery Method

The integration of the project delivery approach within the analysis framework is justified, as it outlines the arrangement of contracting procedures, the planning of roles, coordination patterns, and the authority to make decisions. In the overall sample (n = 390), the most common delivery type reported was Other (n = 126; 32.3%), followed by Design-Build (n = 119; 30.5%). The number of Engineering, Procurement, and Construction cases was n=73 (18.7%), and the number of Design–Bid–Build (DBB) cases was n=72 (18.5%). This distribution of delivery methods shows that the dataset is not limited to a particular approach to contracting, which increases the likelihood of generalizing the study to those factors that contribute to the adoption of agile practices and their possible effectiveness in achieving the expected results.

4.3.5 Work Location

The recording of the workplace of the respective respondents assumed that proximity to existing site activities could influence perceptions of coordination levels, the speed of reaching a solution, and the significance of implementation issues. In the dataset (N = 390), all respondents indicated that their focal projects are located in the Islamabad Capital Territory. As a result, almost all the answers are rooted in projects that started in the city of Islamabad, thereby justifying the study's geographical area and facilitating the interpretation of empirical results on the implementation of agile practices, bureaucratic barriers, and efficiency in the context of the ICT environment.

4.4 Descriptive Statistics

Table 4.2 presents the descriptive statistics for the main variables in the research, based on the final analytic sample (N=384) after applying the eligibility criterion for Agile Practice Maturity (APM). This criterion excluded respondents who answered "No" to all 6 APM items (APM_sum = 0), allowing only those who had reached maturity to participate in hypothesis testing. The operationalization of APM maturity was based on a summed-value index (APM_sum, range 0–6) of six binary practice indicators. Implementational Barriers (IB_mean) and Bureaucracy/Red Tape (BB_mean) variables were obtained as mean scores on 1–5 scales. The coding involved Project Success in a rescaled format, that is, from the known 7-point scale to a five-point scale, and the index of

efficiency (PS_mean5) was calculated as the average of the rescaled items.

Table 4.2

Descriptive statistics for study variables (PROCESS sample; N = 390)

Variable	N	Min	Max	Mean	SD
APM_sum	384	3.00	6.00	5.354	0.945
IB_mean	384	1.85	5.00	3.311	0.597
BB_mean	384	1.00	4.00	2.877	0.700
PS_mean5	384	2.00	5.00	3.525	0.776

Note. APM_sum = sum of six binary agile practice items (Yes = 1, No = 0). IB_mean = mean of 20 barrier items (1 = none/very low to 5 = extremely high). BB_mean = mean of three red tape items (1–5). PS_mean5 = mean of eight efficiency items recoded from a 7-point to a 5-point metric.

4.5 Reliability Analysis

The Cronbach's alpha (α) was used to evaluate the internal consistency reliability of the multi-item measures (Field, 2018). The Implementational Barriers (IB) and Project Success (PS) scales showed strong reliability, as indicated in Table 4.3. Internal consistency was lower on the Bureaucracy/Red Tape scale, which is typical for such short, semantically different red-tape scales where the items reflect similar but distinct perceptions. The APM measure is a binary practice adoption index (presence/absence of practices) rather than a reflective scale; therefore, alpha should be interpreted with caution.

Table 4.3

Reliability statistics

Scale	Cronbach's Alpha	N of Items
APM (binary practice index)	0.626	6
Implementational Barriers (IB)	0.907	20
Project Success (PS; 5-point coded)	0.926	8
Bureaucracy/Red Tape (BB)	0.447	3

Note. APM is a practice checklist/index (Yes/No), so alpha is reported for completeness but treated cautiously. BB uses three short red-tape descriptors; lower alpha can occur with brief semantic measures.

4.6 Sector-Based Comparisons

To answer RQ1 (and RO1), differences across sectors were analyzed using independent samples t-tests for the public and private project categories. The sector variable was coded dichotomously: Public indicated a project affiliated with the CDA, NHA, FGEHA, or any other public organization, and Private indicated a project contracted by or based on consultations with contractors or consultants. The major comparative analysis focused on APM (APM_sum) adoption across the entire dataset (N = 390). Additional sectoral comparisons were made to provide descriptive background (e.g., IB_mean). The Welch t-test was used when unequal variances were identified to ensure the strength of the inference statements.

Table 4.4

Group statistics by sector

Variable	Sector	N	Mean	SD
APM_sum	Public	126	5.365	1.366
	Private	264	5.227	1.025
IB_mean	Public	126	3.451	0.722
	Private	264	3.237	0.592

Table 4.5
Independent-samples t-tests (Public vs. Private; N = 390)

Variable	t	df (Welch)	Sig. (2-tailed)	Mean Difference (Public−Private)	Cohen's d
APM_sum	1.005	194.556	0.316	0.138	0.120
IB_mean	2.893	207.936	0.004	0.214	0.336

Interpretation: There was no statistically significant difference between public-sector and private-sector projects regarding the use of the Agile Practice Maturity (APM_sum) ($p = .316$). Conversely, Implementational Barriers (IB_mean) were considerably more severe in public projects ($p = .004$), supporting the hypothesis that stricter institutional requirements in public sector governance increase implementation friction.

4.7 Hypothesis Testing

In the current section, the hypotheses of the research (H1–H6) are tested empirically, and research questions RQ2-RQ4 are addressed using Hayes' PROCESS Model 8 (Hayes, 2013). In Model 8, Agile Practice Maturity (APM; X) influences Project Success (PS; Y) directly and indirectly through Implementational Barriers (IB; M). Bureaucracy/Red Tape (BB; W) is modeled as moderating the APM → IB path and the APM → PS direct path. All key estimates, such as unstandardized coefficients (B), standard errors (SE), t-statistics, and p-values, are provided, along with bootstrapped confidence intervals for the indirect and conditional effects (Field, 2018; Hayes, 2013).

4.7.1 Preliminary Correlations

Table 4.6 summarizes the relationships among the study's key variables. There is a small to moderate positive correlation between APM and PS, and a strong correlation between IB and PS. BB has a moderately positive correlation with IB but a near-zero correlation with PS. These results suggest that, although there is a relationship between bureaucratic burden and high reported Implementational Barriers, the linkage with efficiency is better explained by IB and APM.

Table 4.6
Pearson correlations among study variables

APM	BB	IB	PS
1.000	0.118	0.110	0.208

Note. APM = Agile Practice Maturity (proportion endorsed across six practices). IB = Implementational Barriers mean. BB = Bureaucracy/Red Tape mean. PS = Project Success mean (7-point items linearly recoded to 5-point).

The research study has estimated two regression equations under Hayes' PROCESS Model 8.

1. Mediator model: IB predicted by APM, BB, and APM×BB
2. Outcome model: PS predicted by APM, BB, APM×BB, and IB

Table 4.7
PROCESS Model 8 regression results

Panel A: Mediator model (DV = IB)

Predictor	B	SE	t	p
Constant	3.318	0.030	111.019	< .001
APM (X, centered)	0.217	0.158	1.377	.169
BB (W, centered)	0.216	0.042	5.175	< .001
APM × BB	-0.770	0.134	-5.737	< .001

Model fit: R^2 = .170, F(3, 386) = 26.392, p < .001

Table 4.8

PROCESS Model 8 regression results

Panel B: Outcome model (DV = PS)

Predictor	B	SE	t	p
Constant	0.825	0.178	4.644	< .001
APM (X, centered)	0.672	0.164	4.100	< .001
BB (W, centered)	-0.259	0.045	-5.781	< .001
APM × BB	0.191	0.145	1.317	.189
IB (M)	0.810	0.053	15.355	< .001

Model fit: R^2 = .417, F(4, 385) = 68.972, p < .001

4.7.2 Hypothesis Decisions

H1: Supported. APM has a statistically significant positive direct effect on PS (B = 0.672, p < .001).

H2: Not supported. IB shows a significant positive effect on PS (B = 0.810, p < .001), in the opposite direction of the expected effect.

H3: Supported. BB significantly increases IB (B = 0.216, p < .001).

H4: Partially supported, but the direction differs from the expected. The interaction between APM and BB shows significant moderation (B = -0.770, p < .001), confirming the relationship exists but with a negative sign. This means that as bureaucracy increases, the relationship between APM and IB becomes less favourable. Therefore, an increase in bureaucracy appears to reverse the relationship's direction, supporting the so-called more adverse hypothesis.

H5: Not supported. The APM×BB term in the PS equation is not significant (p = .189), indicating no reliable moderation of the direct APM → PS effect.

H6: Supported. The conditional indirect effect changes across BB levels, becoming negative at high BB, and the index of moderated mediation is significant.

4.8 Results Based on Research Questions

RQ2. Does bureaucracy/red tape moderate the relationship between agile practice maturity (APM) and Implementational Barriers (IB) in construction projects in Islamabad?

To answer RQ2 directly, the analysis interprets the statistically significant interaction terms involving APM × BB in the mediator equation (Panel A). The BB term not only increases IB (main effect), but also influences the relationship between APM and IB. Since the interaction is negative, APM has a negative effect on IB when the interaction with BB is stronger. This observation aligns with the idea of an institutional environment in which formal regularities and procedural "constrain and regularize behavior" (Scott, 2014, p. 59). With increased bureaucracy, the routines of a project become more controlled, reducing the extent to which 'agile maturity' results in excessive reporting, as it does in environments with lower levels of bureaucracy; therefore, the relationship's strength becomes weaker.

RQ3. Is the indirect effect of agile practice maturity on Project Success through Implementational Barriers

(APM → I → PS) conditional on the level of bureaucracy/red tape?

RQ3 is tested using the conditional indirect effect and the index of moderated mediation (Hayes, 2013). Table 4.9 reports direct and indirect effects of APM on PS at Low (−1 SD), Mean, and High (+1 SD) values of BB.

Table 4.9

Conditional direct and indirect effects of APM on PS at BB levels

BB mean = 2.876; SD = 0.731

Low BB = 2.145; Mean BB = 2.876; High BB = 3.607

BB level	Direct effect c′	95% Boot CI	Indirect effect (a × b)	95% Boot CI
Low (−1 SD)	0.532	[0.071, 0.837]	0.632	[0.247, 0.890]
Mean	0.672	[0.356, 0.953]	0.176	[−0.061, 0.423]
High (+1 SD)	0.811	[0.467, 1.143]	−0.280	[−0.482, 0.072]

Index of moderated mediation: −0.624, 95% Boot CI: [−0.758, −0.307]. Thus, the indirect effect varies by BB level and becomes increasingly negative as BB increases, consistent with H6. The index CI excludes zero, supporting the moderated mediation hypothesis.

RQ4. At low, average, and high levels of bureaucracy/red tape, how do the conditional effects of agile maturity on Project Success (direct and indirect) differ between public and private sector projects in Islamabad?

To address the final research question of this study, the Model 8 structure was estimated in both the public and private subsamples, and conditional effects were tested at the same baseline values (Low/Mean/High, as shown in the full sample). Table 4.10 displays the sector's conditional direct and indirect effects.

Table 4.10

Sector-specific conditional effects of APM on PS at BB levels (Bootstrapped CIs)

Sector	BB level	Direct c′	95% Boot CI	Indirect a×b	95% Boot CI
Public	Low	0.878	[0.236, 1.310]	1.024	[0.754, 1.432]
Public	Mean	0.795	[0.278, 1.105]	0.506	[0.307, 1.070]
Public	High	0.712	[0.356, 1.109]	−0.011	[−0.241, 0.824]
Private	Low	0.160	[−0.360, 0.687]	−0.124	[−0.636, 0.467]
Private	Mean	0.589	[0.180, 1.069]	0.036	[−0.250, 0.349]
Private	High	1.018	[0.280, 1.930]	0.196	[−0.223, 0.668]

From the above findings (Table 4.10), it is evident that the direct influence of APM on PS shows a positive correlation in both sectors. However, this effect is much stronger and more consistently statistically significant in the public sample across all BB concentrations, whereas in the private sample, it is significant only at the mean and high BB concentrations. The indirect effect mediated by IB displays a clear positive value in the population sample at low to medium levels of the BB, but diminishes to an insignificant or uncertain level at high BB levels. Conversely, in the private sample, the magnitude and statistical significance of the indirect effect are generally weak and not reliable compared to zero.

4.9 Discussions and Findings

The parts in this section explain the key findings of Model 8 and relate them to Institutional Theory and, more specifically, to the reviewed literature. Scott (2014) notes that institutions are "regulative, normative, and cultural-cognitive element" which "provide stability and meaning to social life" and "constrain and regularize behavior" (pp. 56–59). These theoretical understandings form the basis for interpreting how Agile Practice Maturity (APM) and Implementational Barriers (IB) tend to influence different behavioral patterns across various procedural contexts.

The research model's results reveal a subtle pattern of support: H1 and H3 are confirmed, while H2 and H5 are not; H4 is supported in a moderation context with an inverse relationship, and H6 is supported through moderated mediation. These findings suggest that organizational barriers not only hinder the adoption of agile practices but also influence perceptions of agile maturity, both in terms of perceived difficulty and efficiency, and through indirect processes that underlie these effects.

4.9.1 Why Bureaucracy Increases Implementational Barriers

The empirical data support the hypothesis H3 and prove that the variable BB has a statistically significant impact on IB improvement. The results align with the assumptions of Institutional Theory, which holds that organizations' actions are framed within the limits of organizational behavior. Scott makes it clear that "Institutions impose restrictions by defining legal, moral, and cultural boundaries" (p. 58), thereby distinguishing appropriate from inappropriate actions. Greater bureaucratic processes in the construction sector extend approval times, increase the size of administrative paperwork and compliance requirements, and all play a further role in the frequency of reported Implementation Barriers. These findings support the idea that red tape (which, in its current definition, refers to burdensome, superfluous, or inefficient processes) exists, as well as existing research on the topic of public -management interaction that views red tape as an experienced constraint.

4.9.2 Why Agile Practice Maturity Positively Impacts Efficiency

The findings support hypothesis H1, which posits that high agile practice maturity (APM) has a positive influence on perceived efficiency (PS). Such findings are consistent with the available literature on construction-agile practices, which suggests that time-based planning, systematic monitoring, and a well-defined product vision are effective in improving coordination and responsiveness (Conforto et al., 2014; Moreno et al., 2024). Practically, adopting agile routines will improve information flow, clarify task understanding, and enable short-term coordination, leading to fewer rework incidents and greater perceived success. It is important to note that the Institutional Theory does not claim institutions are always a barrier to efficiency; according to Scott (2014), institutions are not only constraints but also support and enhance efficiency by providing "stimulus, guidelines, and resources for acting" in order to "support and empower activities and actors" (p. 58). In some cases, agile routines can coexist with institutional controls under certain governance arrangements and still support successful project delivery.

4.9.3 Why IB showed a Positive Effect on Efficiency

Hypothesis 2 predicted that expected difficulties would negatively impact efficiency, but the empirical data show they have a strongly positive effect. This outcome should not be taken to mean that barriers enhance efficiency. A reasonable assumption is that IB reflects a combination of barriers, project complexity, and governance levels. Teams working on high-visibility projects are more likely to face greater compliance and coordination costs, report higher barrier levels, and receive increased managerial attention and resources, enabling them to achieve successful results. This corresponds to a holistic notion of project success, which takes not efficiency as the sole factor, but also the satisfaction of stakeholders and the general results (Serrador & Turner, 2015). In essence, the more inherently challenging the

projects are, the more successful they can be, especially as managerial effort increases.

4.9.4 Moderation on APM → IB

Hypothesis 4 assumes that an increase in the bureaucratic load (BB) will make the implementation of the APM more deleterious to the IB, and this will hold true. The moderating effect exists, but the interaction coefficient is negative: as BB increases, the relationship between APM → IB slope decreases. On an institutional level, this tendency occurs when very standardized behavior is subjected to rigorous procedural frameworks, and thus it becomes institutionalized as either well-established routines or conventions symbolically followed. The perceived challenges in agile maturity differ across institutions; therefore, this institutionalization helps minimize this variance. This observation is supported by the fact that, when people are in institutions, institutions tend to institutionalize behavior, as Scott (2014) proposed. This means that, to the extent procedural control is high, individual differences in agile routines are not apt to be observed in the form they are perceived as problematic.

4.9.5 Direct moderation on APM → PS

H5 demonstrated the positive impact of APM → PS by eliminating the BB. The interaction term in the PS regression was not significant, indicating that the direct effect of APM on efficiency is not consistently dependent on BB in the immediate context. Another potential institutional insight is that the value of agile-inspired coordination routines persists across different governance structures, even in highly bureaucratic environments, as teams can utilize micro-level routines such as structured planning cycles, ongoing monitoring, and coordinated visibility to sustain efficiency.

4.9.6 Moderated mediation: Why the indirect mechanism changes with BB

Results showed that hypothesis H6 was accepted: the index of moderated mediation was negative, the confidence interval did not include zero, and the conditional indirect effect was not positive at high levels of BB. These findings highlight an effective institutional mechanism: bureaucratic schemes shift maturity transfer from practice to experience in the face of challenges, and the relationship between IB and PS changes indirectly as BB increases. Scott (2014) points out that "regulatory emphasis is on conformity to rules" and that organizational legitimacy relies on organizing in accordance with legal or quasi-legal requirements (p. 74). With an increase in BB, heightened institutional pressure to conform can alter the utility of agile routines and, in turn, generate altered challenge-efficiency relationships.

4.9.7 Sector Differences in Conditional Effects

Findings based on RQ4 reveal that trends differ between the public and private sectors in the indirect channel. In the public sector, the impact of indirect effects is strong at low to moderate levels of the BB and diminishes at higher levels; in contrast, the private sector shows weak indirect effects. These results support a key institutional principle: institutional structures and legitimacy pressures vary across industries, and uniform indicators like practice can still lead to different implementation experiences and outcomes.

4.9 Chapter Summary

This chapter tested the revised Institutional Theory model using PROCESS Model 8 (moderated mediation) and evaluated hypotheses H1–H6. These findings demonstrate that Agile Practice Maturity has a positive impact on Project Success (supporting H1), and Bureaucracy/Red Tape increases Implementational Barriers (supporting H3). The moderation of the APM → IB relationship was significant (partial support for H4), but not the direct relation between APM → PS (H5 not supported). The Implementational Barriers were associated with efficiency in a strong positive manner (H2 not supported), suggesting that IB is not only captured by dysfunctional impediments, but also by high governance intensity. The moderated mediation index was statistically significant (supporting H6), indicating that the indirect effect varies across levels of bureaucracy. Overall, this supports the Institutional Theory view that firmness and legitimacy are granted by institutions, while at the

same time establishing boundaries on what can be done and which channels project practices are transformed into outputs (Scott, 2014). Based on this, the results indicate that practices rooted in agile methodologies can influence perceptions of project success. However, the adoption of these practices, as well as their indirect consequences, is deeply influenced by institutional factors, bureaucratic dynamics, and regulatory issues. These observations are later synthesized into the concluding findings in subsequent chapters, and recommendations are made to change governance structures, taking into account institutional and contextual sensitivities. This kind of alignment is said to maximize the effectiveness of agile processes and, consequently, deliver tangible benefits in terms of deliverability and operational efficiency.

CHAPTER 05
CONCLUSIONS

5.1 Introduction

This chapter concludes the research by summarizing and situating the main empirical results of Chapter 4 within the context of an advanced moderated-mediation model (PROCESS Model 8) and Institutional Theory. The article discusses the consequences of its findings for agile-based activities in construction projects and highlights their impact on theory and practice. It also recognizes the study's inherent limitations and suggests feasible avenues for future research. Finally, the chapter provides a coherent synthesis and offers a final statement that summarizes the research questions (RQ1–RQ4) and hypothesis (H1–H6) into a single conclusion.

5.2 Study Overview and Concluding Reflection

The current study tested the direct and indirect effects of Agile Practice Maturity (APM) on Project Success (PS), with the Implementational Barriers (IB) construct mediating these effects. It also examined the directional relationship between these two variables at different levels of Bureaucracy/Red Tape (BB). The authors used the PROCESS Model 8 developed by Hayes (2013) to identify four research questions and test six hypotheses, which helped explain the relations between practices derived from agile methods and organizational efficiency, as well as the mechanisms that, under specific contextual conditions, drive these relations.

The results support the key assumption of Institutional Theory, namely that the consequences of efficiency, in addition to the practices themselves, depend on how they are used within an institutional context that defines decision rights, compliance norms, approval procedures, and control systems (Scott, 2014). Hypothesis H1 was supported by an empirical evaluation of Agile Project Management (APM), which showed a significant positive direct association between APM and Project Success (PS). Moreover, it was also determined that the presence of Bureaucratic Barriers (BB) enhanced Implementation Barriers (IB) as expected by hypothesis H3. In contrast to the hypothesis that IB is a negative determinant only in relation to barriers, the analysis revealed a strong positive relationship between IB and PS; thus, value H2 was rejected. This implies that the IB metric could be capturing the project's complexity and the strength of its governing mechanisms, not just project implementation friction. In addition, the indirect effects (APM → IB → PS) showed a substantial difference in BB levels, thus supporting hypothesis H6. These results indicate that bureaucratic structures may moderate the relationship between agile maturity and efficiency, mediated by implementation difficulty. Overall, the evidence shows that agile-based practices may be beneficial; it is the organizational context that mediates the mechanisms by which these benefits are realized.

5.3 Theoretical Contributions

To start, the study advances the agile-in-construction and project governance literature by using a systematic, empirical approach to analyze a moderated-mediation framework rather than assuming a universal best-practice effect of agility on efficiency. While many studies view adopting agile as merely a prerequisite for success, the current findings show that institutional factors are influenced not only by outcomes but also by the processes used to achieve them.

Secondly, the current research extends the relevance of Institutional Theory in project management by empirically supporting the dual role of institutions: promoting harmonization and stability, while also limiting flexibility through bureaucratic conformity and decision cycle restrictions (Scott, 2014). The positive correlation between BB → IB is strong, providing empirical evidence to support the suggestion that administrative regulations and controls increase perceived implementation burdens and influence the teams involved in change initiatives.

Third, the current study clarifies an advanced theoretical framework of implementation. The fact that the IB correlates positively with PS is surprisingly consistent, suggesting that IB contains more than efficiency-inserting barriers. In more complex project environments, which are marked by higher formal controls, stricter reporting, and greater coordination pressures, the challenge of projects can, counterintuitively, be linked with increased efficiency, which can be attributed to increased oversight, mobilization of resources, and more strategically coordinated coordination that are brought about by complexity levels. This view aligns with the Institutional Theory, which assumes that strengthening governance may resiliently enhance the importance of implementation and develop the ability to provide coordinated services in systems that rest on legitimacy.

Lastly, the empirical evidence supports another, more subtle argument: that the effectiveness of agile practices does not depend on simple adoption, but rather on context-specific agility. This means that agile practices are adjusted to align with the governance logic of the environment, rather than implementing an exemplary, universal template.

5.4 Practical Implications

The results have significant practical implications for policymakers, government regulatory agencies, corporate organizations, and project managers aiming to increase delivery efficiency. Strong empirical evidence indicating that BB enhances IB at both the policy and governance levels suggests that any initiative intended to improve practices should lead to reduced procedural load and an accelerated decision-making process. The possible reforms include simplifying approval lines, clarifying decision-making authority, digitizing documentation, and developing procurement and audit procedures that deliver credible results without unnecessary duplication. Under the Institutional Theory paradigm, the goal is not to do away with regulatory norms but to arrange governance systems that grant legitimacy without imposing excessive limitations on responsive action.

This correlation exists at the level of organization as a part of the Agile Practice Maturity framework, where the positive correlation with project success (APM → PS) shows that practices based on the agile approach, such as thorough planning cycles, regular monitoring, clear task coordination, and clear product vision, can be beneficial even in well-organized construction settings. However, because of the disjunctive routes created at different levels of bureaucratic load, working managers should learn to view bureaucracy as a contextual variable and implement an agile variant that combines preventive and reactive styles. They are recommended to maintain compliance checkpoints when required, facilitate agile cycles within the work package scope, and formalize escalation processes to protect iterations in cases of unclear authority.

The IB score may not necessarily indicate project failure or dysfunction, even at the project level. Instead, project leaders can reinterpret the high IB score as an indication of greater complexity and stricter governance, which justifies implementing coordination mechanisms in the form of more refined interface controls, more elaborate communication ties, more robust risk appraisal, and active stakeholder interaction. This helps discourage the misinterpretation of institutional complexity as resistance, allowing the structuring of the managerial response in line with the current situational environment.

5.5 Limitations of the Study

There are several limitations to consider when interpreting the findings.

1. Some of the constructs, especially those with an abbreviated scale, might inherently possess

lower internal consistency, thus weakening the accuracy of interrelationships that can be reported.

2. The present research study is limited to a certain geographic area and an industrial setting, thus adding some contextual plausibility but at the same time limiting the extent to which the results of the study can be applied to other areas or industries.

3. Instead of it being a continuous reflective scale, APM was operationalized as an index of maturity or the adoption levels. Though such methodological decisions are consistent with the current adoption frameworks used in the preceding studies, they may lead to less sensitivity to subtle differences in agile capability.

5.7 Future Research Suggestions and Recommendations

Future improvements and extensions to this study could include the following approaches.

1. A longitudinal design would be used to derive more elaborate time-sequences, such as that of the systematic observation of projects accompanying their different developmental stages, and that systematically complete the derivation of the gradually emerging dynamics between bureaucratic systems and the development of these systems over time.

2. Furthermore, mixed methods, combining quantitative surveys, qualitative interviews, analysis of documents, or field observations, would provide subtle information on why implementation issues are linked to efficiency, and whether the linkages come about due to adaptive coordination mechanisms, reporting intensity, or governance legacies based on legitimacy.

3. The researchers should make measurements further refined by recognizing (a) dysfunctions on the barriers, e.g., rework, delay in approval, and inelasticity of contractual interpretation, and (b) the complexities or degree of governance in measurement, e.g., stakeholder density, reporting requirements, and risk profiles. This difference would help determine whether IB is a constraint variable, a complexity variable, or both. Furthermore, other moderators, including the type of contract, the scale of the project, the complexity of project stakeholders, digital skills, and the leadership style, could be included in future studies and could be used to create a more universal contingency framework, which will be aligned with the institutional theory as well as with the fit-with-context model.

4. The multidimensional efficiency measures (client records, temporal, and cost), external evaluations, and cross-metropolitan/ cross- geographical studies would complement the strength and external validity of the results.

5.8 Final Takeaway

The main conclusion of this research study is that agile-based practices can improve Project Success, but not consistently, because they are embedded within an institutional context that shapes what is possible, legitimate, and actionable. Bureaucratic obstacles and red tape increase implementation difficulties and alter the indirect way in which agile maturity influences efficiency outcomes. This supports the view of Institutional Theory that organizations are sources of stability and barriers to flexible action. The underlying practical impact is clear-cut: agile practices cannot be implemented as a standardized or general practice. Instead, organizations should seek 'contextually appropriate agility' by aligning these practices with governance realities and reorganizing processes to ensure that the potential efficiency gains of agile practices are not inhibited by institutional inertia.

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