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PROJECT MANAGEMENT CHALLENGES IN SOLAR PHOTOVOLTAIC ENERGY PROJECTS IN UZBEKISTAN: A MULTI-STAKEHOLDER QUALITATIVE STUDY

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Uzbekistan is moving faster than almost any other Central Asian country in building out its solar energy capacity — yet the day-to-day realities of managing these projects remain largely invisible in academic literature. This study draws on structured written interviews with five senior industry professionals, representing the developer, EPC contractor, HSE advisory, field engineering, and supply chain dimensions of project delivery. Six distinct challenge areas emerged from the analysis: meeting regulatory and ESMS requirements, navigating procurement and customs complications, bridging local workforce capability gaps, managing documentation under dual international and local standards, overcoming coordination breakdowns between project parties, and absorbing currency volatility. Together, these findings offer a grounded, practitioner-informed account of what solar PV project management actually looks like in an emerging Central Asian market — and what needs to change.

Keywords: project management, solar PV, Uzbekistan, EPC, renewable energy, Central Asia, qualitative research

1. INTRODUCTION

Behind every megawatt of solar capacity commissioned in Uzbekistan, there is a project team that navigated months of coordination challenges, regulatory hurdles, and supply chain complications that rarely make it into official reports. This study is about those teams — and specifically about the management challenges they encountered.

Uzbekistan has set itself an ambitious target: 8,000 megawatts of solar capacity by 2030 [1]. To pursue it, the country has opened its doors to major international developers and engineering contractors, creating a project landscape that is genuinely exciting but also genuinely demanding. The regulatory framework is still evolving, the local construction industry is building experience in real time, and the requirements of international lenders add layers of complexity that teams must absorb while keeping projects on track.

What is striking is how little of this experience has been captured in academic research. Studies of renewable energy project management tend to cluster around markets where the institutional infrastructure is already mature — where permitting is predictable, supply chains are reliable, and the workforce has decades of industry experience [2]. Uzbekistan is none of these things yet, and the practitioners working there deserve research that reflects their actual context.

This study asks a straightforward question: what are the key project management challenges that contractors and stakeholders encounter in solar PV projects in Uzbekistan? Sub-questions explore procurement and regulatory dynamics, local workforce and subcontractor capacity, coordination between project parties, and what practitioners themselves see as the most needed improvements.

2. LITERATURE REVIEW

Managing a large energy infrastructure project means holding many things together at once — scope, schedule, cost, quality, risk, stakeholder relationships, and information flows [3]. When the project involves new technology, complex financing arrangements, and an institutional environment that is still taking shape, the difficulty of holding all these things together increases substantially [4].

One of the most consistently documented challenges in EPC project management is the coordination problem built into the structure itself. When a developer engages a contractor who in turn relies on subcontractors, each layer of the relationship introduces the possibility of misaligned expectations, information gaps, and accountability questions [5]. The problem intensifies when the parties involved come from different countries, work in different languages, and operate according to different institutional norms — as is typically the case in international solar projects in Uzbekistan.

Supply chain management in emerging markets carries its own set of complications. Equipment that must be imported faces customs processes that are often slow and unpredictable. Supplier qualification is harder when the local vendor base is limited. Delivery timelines are difficult to guarantee when logistics infrastructure is still developing [6]. For solar PV projects that depend on imported modules, inverters, and electrical components, these vulnerabilities translate directly into schedule and cost risk.

The regulatory picture matters enormously. When the rules governing land acquisition, permitting, and grid connection are unclear or subject to change, project planning becomes an exercise in managing uncertainty rather than executing a defined plan [7]. Uzbekistan's energy sector has been in active reform since 2019, which has created real opportunities for developers but also real unpredictability for project teams [8]. On top of domestic regulation, projects financed by multilateral institutions must satisfy their own Environmental and Social Management System requirements — a substantial additional compliance burden that local subcontractors are often unprepared for [10].

Workforce capability is the fourth major theme in the literature. Construction industries in emerging markets often develop faster in terms of volume than in terms of skill depth — meaning there are more workers available than there are workers with the technical qualifications, procedural discipline, and HSE awareness that international projects demand [9]. This gap is not a criticism; it is a structural feature of rapid industrial development, and managing around it is simply part of the project management challenge.

3. METHODOLOGY

This study takes a qualitative approach, shaped by the belief that understanding management challenges requires engaging directly with the people who experience them. Numbers can tell us how many projects were delayed; practitioners can tell us why, and what it actually felt like to navigate those delays. That kind of knowledge is what qualitative research is designed to generate.

Primary data was gathered through structured written interviews with five industry professionals. The decision to use written rather than spoken interviews was practical: all five respondents hold senior positions with demanding schedules. Written questionnaires allowed them to respond thoughtfully at a time of their choosing, and the resulting answers were more considered and detailed than a rushed phone call might have produced. This approach is well-established in qualitative research practice [11].

The five respondents were chosen to represent the full breadth of the project delivery chain. One holds executive responsibility at the developer level, with deep experience in international solar project management. One served as project manager for a major solar EPC project in Uzbekistan, with direct accountability for delivery. One is a lead HSE advisor who has worked closely with local construction subcontractors. One is a senior electrical engineer and transmission line manager with field experience across multiple regions of Uzbekistan including remote areas. One is a supply chain specialist whose work centers on procurement and logistics for energy construction projects. Together, they offer perspectives that range from boardroom to construction site.

Responses were analyzed thematically. Recurring themes were identified, coded, and grouped into challenge categories. Where two or more respondents independently raised the same issue, that convergence was treated as meaningful evidence of a widespread challenge rather than an individual concern. The researcher's own background as a document controller on a large solar PV project in

Uzbekistan provides contextual grounding — and a degree of reflexive awareness that personal experience can both enrich and complicate interpretation.

4. RESULTS AND DISCUSSION

Six challenge categories emerged from the analysis. What is notable is not just the challenges themselves, but how consistently they surfaced across respondents with very different roles and organizational positions. A developer executive and a site engineer are unlikely to agree on much — but they agreed on these.

4.1 Regulatory Compliance and ESMS Requirements

For solar projects backed by multilateral lenders, compliance with Environmental and Social Management System requirements is not a side task — it is a continuous, resource-intensive management challenge. One executive-level respondent described full ESMS implementation as demanding dedicated personnel, reporting infrastructure, and procedural systems that most local subcontractors simply have not encountered before, let alone mastered.

The HSE respondent framed the underlying issue clearly: 'HSE challenges affect project timelines mainly when safety requirements are treated as a formality instead of being integrated into daily planning.' This observation points to something cultural as much as procedural — a gap between how international project standards conceptualize safety management and how it tends to be approached in local construction practice. Land acquisition and permitting processes added further schedule pressure, particularly in the early phases of projects.

4.2 Procurement, Customs, and Supply Chain

One finding stood out as particularly specific and underappreciated: the import tax exemptions that apply during the construction phase of solar projects in Uzbekistan do not carry over into the operations and maintenance phase. This means that when equipment needs to be replaced or spare parts sourced after project completion, the cost and customs burden is substantially higher than during construction — a complication that project financial models do not always anticipate.

More broadly, the procurement environment for solar projects in Uzbekistan is shaped by heavy reliance on imported equipment in a context where customs timelines are unpredictable and the local supplier base for specialized components remains limited. Vendor qualification is time-consuming, delivery schedules are difficult to guarantee, and any disruption in the import chain tends to cascade through the project schedule in ways that are hard to recover from.

4.3 Local Workforce and Subcontractor Capability

Every respondent touched on this challenge in some form, and the picture that emerged was consistent: there is a meaningful gap between what international EPC projects require from subcontractors and what is currently available in Uzbekistan's construction labor market. This is not a permanent condition — it is where the industry is right now, growing faster in volume than in depth.

The specific capability gaps identified were telling: difficulty managing design review processes, inconsistent quality control practices, variable HSE compliance, weak documentation management, and challenges maintaining stable workforce and equipment mobilization throughout project execution. One EPC respondent captured the coordination dynamic with subcontractors in a phrase that has stayed with the researcher: 'good promise, poor implementation.' The HSE respondent added texture to this: 'Local companies can comply with international HSE standards, but they need strong supervision, clear requirements, regular inspections, and strict enforcement from the project management team.' The capacity is there; the system to activate it consistently is not always in place.

4.4 Dual-Standard Documentation Management

This is perhaps the finding that is least visible in existing project management literature, and most visible to anyone who has actually worked on an internationally financed construction project in Uzbekistan. These projects must maintain two parallel sets of documentation: one that satisfies Uzbekistan's domestic regulatory requirements, and one that meets the standards of international lenders and the developer. These two sets of requirements do not always speak the same language — sometimes literally, sometimes procedurally.

One senior EPC respondent described the challenge in concrete terms: international-standard documentation must also be developed in a form that local regulatory authorities will accept. This creates what is effectively a three-way documentation burden — local compliance, international lender compliance, and local authority acceptance of international formats — that adds substantial administrative weight to project management and overwhelms subcontractors who are encountering it for the first time. The researcher's own experience managing this interface confirms that it is one of the most consistently demanding aspects of day-to-day project administration.

4.5 Inter-Party Coordination and Communication

Large solar EPC projects bring together parties who differ not just in organizational role but often in nationality, language, and professional culture. The coordination challenges this creates were evident at every level of the project structure described by respondents — between developers and EPC contractors, between EPC contractors and subcontractors, and between the project team and government bodies.

Language differences were a recurring complicating factor, particularly in projects where Chinese EPC contractors, Uzbek subcontractors, and English-speaking developers or lenders all needed to communicate accurately about technical and contractual matters. Misunderstandings in this context are not just frustrating — they can have real consequences for schedule, quality, and safety. Managing this complexity requires deliberate investment in communication infrastructure that is not always budgeted for.

4.6 Currency and Financial Risk

Large solar EPC contracts in Uzbekistan are typically structured in internationally traded currencies — US dollars, euros, or Chinese yuan — while a significant portion of actual project costs are incurred in Uzbek som. The exchange rate between these currencies is not static, and its movement during project execution creates financial planning uncertainty that is difficult to hedge fully. Respondents identified currency volatility as the most significant financial risk in their experience, with other regulatory financial factors having comparatively limited day-to-day impact.

5. CONCLUSION

The people building solar projects in Uzbekistan are doing something difficult — and doing it in conditions that most project management frameworks were not designed for. This study has tried to make their experience more visible, and to translate it into knowledge that can help future projects go better.

Six challenge areas emerged: regulatory and ESMS compliance, procurement and customs constraints, local workforce and subcontractor capability gaps, dual-standard documentation burdens, inter-party coordination failures, and currency risk. None of these are insurmountable. But all of them are real, and all of them are currently underrepresented in both academic literature and project planning practice.

The practical message for developers and EPC contractors entering this market is fairly specific: build ESMS compliance infrastructure before you need it, not after; design documentation systems that can handle dual-standard requirements from day one; budget for customs delays as a baseline assumption, not an exceptional event; invest in local subcontractor development before mobilization, not during construction; and treat inter-party coordination as a management discipline that requires dedicated attention and resources. Future research should test these findings across a larger sample of projects and extend the comparison to neighboring Central Asian markets where similar dynamics are emerging.

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