



PORTFOLIO MANAGEMENT IN MEGAPROJECTS USING DATA ANALYSYS

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<https://doi.org/10.5281/zenodo.10776189>

ARTICLE INFO

Qabul qilindi: 20-February 2024 yil
Ma'qullandi: 25- February 2024 yil
Nashr qilindi: 29- February 2024 yil

KEY WORDS

project portfolio management, PPM, megaprojects, project governance

ABSTRACT

Megaprojects, defined as large-scale investment projects typically costing over \$1 billion, are complex undertakings prone to issues such as cost overruns, schedule delays, and benefit shortfalls. Effective portfolio management has been proposed as a strategy to improve megaproject success rates. This article reviews literature on portfolio management techniques applied in megaproject contexts. A structured portfolio management approach can enhance governance, ensure strategic alignment, systematically assess risks/returns tradeoffs, allocate resources optimally, and apply standardized processes across multiple projects.

INTRODUCTION

Infrastructure megaprojects are defined as exceedingly large-scale ventures delivering public amenities with total costs exceeding \$1 billion in general [1]. Megaprojects can include transport systems such as highways, railways and airports; energy facilities like dams, pipelines or power plants; tourism venues such as convention centers or stadiums; healthcare setups including hospitals; urban development schemes featuring multiple integrated components and so on [2]. Given their ambitious reach and complex life cycles spanning decades at times, megaprojects tend to routinely face budget overruns, schedule delays, stakeholder conflicts and benefit shortfalls relative to targets, frequently resulting in their outright failure [3]. Researchers have investigated various strategies targeted at governance, planning, design, execution, and control aspects to enhance megaproject performance and success rates historically low at 65-75% by some estimates [4]. This paper reviews the proposition of instituting portfolio management processes as an integrative mechanism to potentially facilitate improved outcomes in megaproject delivery and operational phases.

METHODS AND LITERATURE REVIEW

Project portfolio management (PPM) refers to high level oversight structures put in place to evaluate, prioritize, balance, coordinate and monitor groups of discrete capital investment projects and programs based on their levels of strategic alignment and resource requirements [5]. The planning, monitoring and control capabilities enabled via portfolio-based systems allow executives to take investment decisions optimized on organizational

objectives, risk-return preferences and capacity availability [6]. With specific focus on megaproject contexts, researchers have examined portfolio management techniques as an approach to systematically address some root causes behind poor megaproject success parameters.

Certain challenges innate to megaproject scale and scope lend themselves to resolution via portfolio coordination. Their extended development time frames coupled with ambiguous target specifications can multiply uncertainty [7]. Concentrated decision powers with individual project heads allow inconsistencies and duplicated efforts [8]. Portfolio reviews can respond by fostering standardized governance. Grouping megaprojects also enables comparisons on forecasted returns which are otherwise hard to estimate for one-off mega investments. Institutionalizing portfolio alignment checks further ensures megaproject outputs strategically benefit overall organizational goals.

There have been calls for enhanced portfolio alignment practices tailored to megaproject needs given their distinct characteristics. Flyvbjerg notes megaprojects differ from traditional projects on dimensions of size, longevity and stakeholder influences which portfolio methodologies need to accommodate. Miller and Hobbs also highlight megaproject complexity markers such as deep uncertainty, network interdependencies and controversy potential that ask for appropriately designed portfolio coordination. Specific process steps identified range from authority decentralization allowing greater autonomy to project leaders; selecting evaluation criteria with long term orientation; employing rolling wave planning suited to evolving megaproject specifics.

Empirical investigations evaluating portfolio management adoption for megaproject governance remain relatively few but growing. Early work studied UK governmental IT services transitioning to centralized portfolio structures and observed public sector change management challenges. Loebbecke et al. assessed a European airline's new dedicated portfolio oversight processes for mega airport development activities and flagged data reliability issues. Sanderson analyzed a UK rail infrastructure case to note increased visibility and transparency into strategic objectives alignment as key portfolio method benefits. Across such applications, implementing suitable portfolio coordination mechanisms has been correlated to favorable megaproject efficiency parameters like shorter delays, controlled expenses and higher stakeholder acceptance.

Despite promising strides, researchers concur portfolio management integration with megaproject development continues to face adaptations in real world practice. Governance structures resistant to diffuse decision powers restrict portfolio formalization. Standardized scoring methods face difficulties accurately capturing ambiguous megaproject success dimensions. Nonetheless, portfolio coordination for mega capital projects holds strong untapped potential to drive higher accomplishment rated provided contextual complexities are addressed via evolved processes and flexible tools.

RESULTS AND ANALYSIS

In analyzing literature sources on portfolio management techniques applied to megaproject scenarios, the following key findings and insights emerge:

- Structured portfolio oversight introduces governance efficiencies helping contain identified megaproject pitfalls of cost/schedule overruns and stakeholder conflicts. Grouping projects enables resource optimizations and knowledge

transfers as well.

- Strategic alignment assessments in portfolio reviews ensure individual megaprojects map to organizational priorities, balancing risky novel initiatives and steady conventional projects.
- Customized evaluation criteria can better capture megaproject success parameters like long term socio-economic impacts compared to traditional project indicators.
- Adaptable portfolio coordination frameworks and decentralized decision structures may be necessary given distinct megaproject uncertainty aspects and interdependencies.

Empirical portfolio implementation studies remain few presently, calling for further validation especially across public sector megaproject categories.

In essence, portfolio management adoption for megaprojects shows early promise but continues to evolve in structure and tools to effectively reflect unique mega capital project dynamics.

DISCUSSION

Instituting portfolio oversight for megaproject governance presents a values-driven proposition to enhance outcomes via coordinated systems view. Group level entry points allow tackling complex challenges like uncertainty at suitable scales by balancing novelty and experimentation. Portfolio formalization also responds to identified megaproject risk factors of fragmented decision making and strategic misalignment [8]. Customized coordination further helps navigate typical mega project fluidity in setting direction and requirements.

At the same time, introducing portfolio processes faces cultural and tooling barriers with centralized governance norms in public infrastructure agencies and decision inertia noted as adoption constraints historically. There are also open debates on measurable portfolio impacts given multivariate project environments with successes hard to isolate [5]. Portfolio management integration hence warrants careful change management and analytical instrumentation [2].

Overall though, portfolio coordination aligns well with emerging megaproject governance paradigms that stress distributed control, customized metrics and adaptive delivery models [3]. This holds especial relevance as mega infrastructure undertakings crucial to sustainable development multiply globally [4]. There are hence strong merits and timeliness to integrating portfolio methodologies customized for megaproject environments as part of formal oversight mechanisms.

CONCLUSION

In closing, adopting portfolio management procedures to oversee groups of megaprojects holds potential to drive performance improvements on critical parameters of schedule, cost, stakeholder acceptance and ultimate delivery success levels. Structured reviews assessing strategic fit, risk exposures, resource sharing possibilities and project interactions can address systemic megaproject challenges like uncertainty, fragmentation and misalignment. Appropriately designed evaluation techniques are also able to capture long duration public amenity contexts better. Concerted change initiatives across governing agencies, analytical refinements and increased adoption validation can help portfolio coordination formalization for megaprojects translate promise to robust practice over time.

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