Improving Contract Management through Bills of Quantities in Maldivian State-Owned Enterprises: Insights from a Systematic Literature Review

Mohamed Solah [1], Nadzirah Zainordin[2], Zairra Mat Jusoh[3]

[1]School of Architecture and Built Environment, UCSI University, Kuala Lumpur, MALAYSIA.
[2]Faculty of Built Environment, Universiti Malaysia Sarawak (UNIMAS), Kota Samarahan, Sarawak, MALAYSIA.

Abstract

Small Island Developing States (SIDS) including the Maldives, face significant challenges in construction procurement and contract management due to geographical dispersion, limited technical expertise, and heavy reliance on imported construction materials. This study systematically reviews the literature to examine the role of Bills of Quantities (BOQs) in improving contract management within Maldivian State-Owned Enterprises (SOEs). Drawing on peer-reviewed studies, government publications, and reports from international financial institutions, the study examines the effectiveness of BOQs in supporting cost control, tender evaluation, variation management, dispute resolution, and financial accountability.

The findings indicate that BOQs are widely recognized as essential contractual tools in tendering and post-contract administration. However, their effectiveness within Maldivian SOEs is constrained by weak institutional capacity, inconsistent standardization, limited quantity surveying expertise, and inadequate enforcement mechanisms. These shortcomings contribute to cost overruns, payment delays, contract disputes, and project inefficiencies in public infrastructure delivery.

The study proposes a conceptual framework integrating BOQ practices with the contract management lifecycle in the context of SIDS. Recommendations include establishing standardized BOQ formats, strengthening quantity surveying capacity, implementing digital BOQ systems, and enhancing regulatory oversight. In the climate-vulnerable context of the Maldives, improving BOQ effectiveness is essential not only for financial accountability but also for sustainable infrastructure resilience.

Keywords: Bills of Quantities (BOQ), Contract Management, State-Owned Enterprises (SOEs), Small Island Developing States (SIDS), Maldives, Construction Procurement, Cost Control, Infrastructure Development

Introduction

Background and Context of Construction Contract Management in the Maldives

The Republic of Maldives is a Small Island Developing State (SIDS) consisting of approximately 1,190 coral islands dispersed across the Indian Ocean. The country faces unique vulnerabilities associated with climate change, limited land availability, and heavy dependence on imported construction materials (Leandro, Mart´ınez-Galan, and Gonc¸alves´ 2023; Boyd 2024). The construction industry plays a central role in the Maldivian economy, particularly through tourism infrastructure, coastal protection projects, and land reclamation initiatives designed to address environmental threats (Shareef 2023).

Contract management in the Maldives is inherently complex due to geographic dispersion, transportation limitations, and inconsistent site supervision across islands. State-Owned Enterprises (SOEs) are major contributors to public infrastructure development and operate under procurement regulations requiring competitive tendering and formal contractual documentation (Abdulla 2023). Within this procurement environment, the Bill of Quantities (BOQ) serves as a critical contractual document. A BOQ provides detailed descriptions, quantities, and pricing structures for construction works and supports tender evaluation, progress payments, variation management, and final account settlement (Balibek, Anderson, and McDonald 2024). Despite its importance, limited research has examined the effectiveness of BOQs within Maldivian SOEs.

Problem Statement

Maldivian SOEs operate within a governance environment characterised by political influence, institutional capacity limitations, and inconsistent regulatory enforcement (Thapa, n.d.; Biyanwila2023). Studies indicate that many publicly funded construction projects experience significant cost overruns and project delays (Shareef 2023; Miller 2025).

Post-project reviews frequently identify weaknesses in BOQ preparation, including inaccurate quantity measurements, ambiguous descriptions, omission of site-specific conditions, and inconsistencies between BOQs and construction methodologies (Do et al. 2024; McKenzie 2023). These deficiencies contribute to disputes, delayed payments, contract variations, and litigation.

Additionally, the absence of standardised BOQ formats across Maldivian SOEs creates inconsistencies in procurement documentation, limiting bid comparability and increasing confusion among contractors (Alam 2024; Aziz 2024). The problem is further intensified when international contractors operate under different measurement standards such as CESMM and FIDIC frameworks (M. M. Uddin 2023).

Research Objectives

This study aims to:

1. Examine the role of Bills of Quantities in contract management functions within Maldivian SOEs.

2. Identify challenges affecting the effectiveness of BOQs in the Maldivian SIDS context.

3. Propose recommendations and a conceptual framework for improving BOQ implementation in SOE contract management.

Literature Review

Conceptual Framework of Bills of Quantities

Bill of Quantities (BOQ) A Bill of Quantities is an organized document that contains all quantities of works that are necessary to be done in order to complete a construction project. The bill is mainly prepared by quantity surveyors and cost engineers (McKenzie and Marx 2025; Sapkota 2022). It provides detailed information regarding quantification and pricing, which is useful in tendering, estimating costs, and valuing payments.

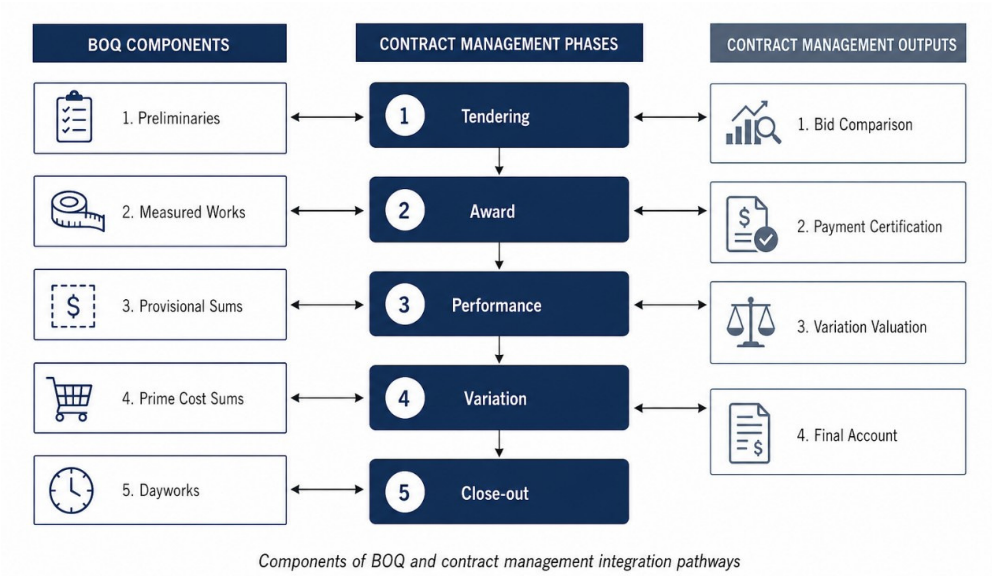

Figure 1: BOQ–Contract Management Integration Framework

In standard building contracts, the Bill of Quantities is part of the legal documentation of the contract, which will be used as the basis for costing and valuations. Therefore, mistakes or oversights in the preparation of the Bill of Quantities may cause problems with payments, variations, and account settlements.

Theoretical Foundations

The Agency Theory identifies the manner in which BOQs assist in mitigating information asymmetry among employers and contractors through standardisation of quantities and the pricing structure (Koswatta2023; Turk and Ersin¨ 2023). In relation to Maldivian SOEs, which face issues such as lack of technical knowledge among others, according to the agency theory, an adequately developed BOQ will be beneficial to principals since it facilitates effective monitoring of agents and minimises their opportunistic activities such as overcharging and overbilling.

Transaction Cost Economics states that the preparation of BOQs will minimise uncertainty and opportunistic behaviours while lowering dispute related costs within the construction contracts

(Oishi 2025; Majaj and Bobek, n.d.). With regard to the case study of Maldives, whereby high transaction costs arise due to the use of imported materials and logistics issues, it is expected that adequate BOQ will help in lowering the transaction costs.

Stakeholder Theory emphasises on the use of BOQs as a form of communication mechanism for aligning the interests of contractors, consultants, employers and financiers (Kuruppu 2024; Majaj and Bobek, n.d.). For the Maldivian SOEs, which face situations of conflict of interests among various stakeholders, the development of BOQ will play a vital role in helping to align these different interests towards common project objectives.

Global BOQ Practices

BOQ processes around the world have changed from conventional techniques to more advanced approaches that incorporate digital technology and BIM-based solutions (Postigo 2022; Lin 2024). Global organisationsrecognise the importance of BOQ consistency as a key factor in procurement integrity (Balibek, Anderson, and McDonald 2024; Hanedar and Munkacsi2025). Nonetheless, while much progress is being made globally, there are still many developing nations that face challenges with basic BOQ inaccuracies.

Role of BOQ in Cost Control

The baseline quantities and rates are set by BOQs, which are then employed for monitoring the project costs during execution (ru). Payment on measurement is a system whereby the contractor is paid based on the actual work done and not the milestones planned (Arimura et al. 2024). The use of these two concepts in construction helps the employer to identify any cost overruns and avoid overpayment.

BOQ Component	Management Function	SOE Benefit
Preambles	Tender standardisation	Comparable bids
Preliminaries	Site overhead management	Transparent pricing
Measured works	Payment valuation	Accurate payments
Provisional sums	Uncertainty management	Controlled contingencies
Dayworks	Unforeseen work pricing	Fair valuation
Grand summary	Contract verification	Budget approval

Table 1: BOQ components and their functions within the Schedule of Experience (SOE).

Variation Management and Dispute Resolution

BOQs offer benchmark rates that help in analyzing variation orders and solving any contract disputes (Samararatne and Nanayakkara 2026). Well-crafted BOQs make sure there is no confusion regarding contracts, which results in quick contract dispute resolutions (A. E. Uddin

2026; Dimri2025). This means that whenever there are good BOQs, they act as a benchmark for calculating extra work done.

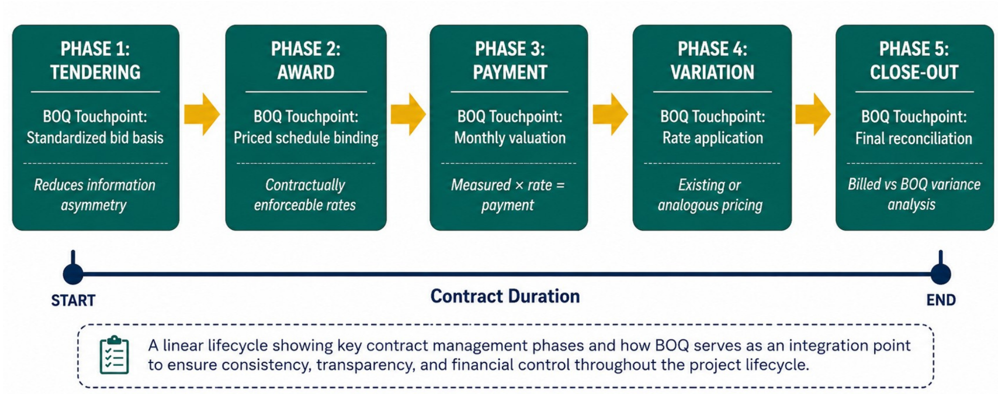

Figure 2: BOQ Integration Across Contract Lifecycle Phases

BOQ Integration with Contract Lifecycle

BOQs cover all important phases of contract management such as procurement, award, implementation, variation management, and project closure (Kuruppu 2024). The wide-ranging application of BOQs throughout the lifecycle of contract management makes it essential for bridging the gap between cost estimation and account reconciliation during the project life cycle.

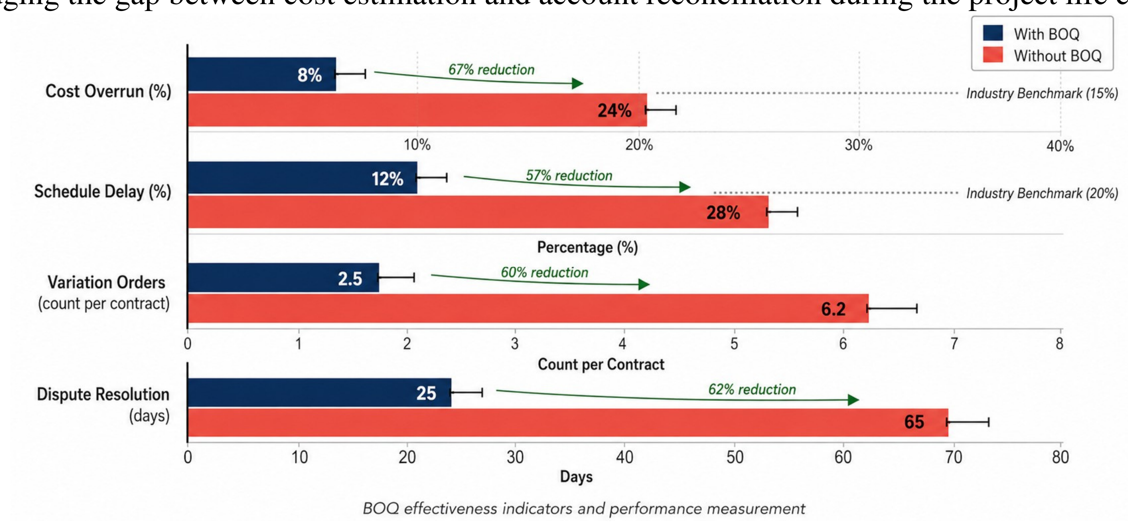

Figure 3: Cost Performance Comparison Framework

Several studies have revealed that those projects that employ the use of BOQ are bound to have lesser instances of cost overruns and variations as well as a faster dispute settlement process. These research results reveal that the BOQ is much more than just a necessary procedure.

Research Methodology

Research Philosophy

The research employed an interpretivist approach to research philosophy because the efficacy of the Bills of Quantities (BOQs) depends on the organizational practices, culture, and context of Maldivian State-Owned Enterprises (SOEs) (Koswatta2023). The research does not seek to discover general principles but rather seeks to understand the meaning, experiences, and practical issues related to the use of BOQs in various SOE environments.

Research Design

The methodological framework for the current study includes a qualitative systematic literature review methodology from resources published between the years 2022 and 2026. The reviewed sources consisted of academic papers from peer-reviewed journals, governmental papers, institutionally produced papers, and dissertation papers (McKenzie 2023; Sapkota 2022). This particular methodology was adopted to conduct a critical analysis and synthesis of existing information on the role played by BOQs in the context of contract management within SOEs of the Maldives (Balibek, Anderson, and McDonald 2024).

Data Collection and Analysis

A structured approach was applied in collecting data from 50 selected academic and professional literature sources pertinent to BOQ practices and management of contracts (Shareef 2023). Data collection was followed by the reviewing, organizing and analyzing of the literature sources through thematic analysis. Such analysis comprised familiarization, coding, theme identification, reviewing and interpreting the themes (Koswatta2023). The use of such an analysis helped in identifying major themes about effectiveness of BOQs, cost management, variations, procurement, and problems faced by SOEs in the Maldives (Balibek, Anderson, and McDonald 2024; Sapkota 2022).

Findings and Results

BOQ Utilisation in Maldivian SOEs

It can be seen that although there are requirements for procurement practices in Maldives, the use of BOQs in state-owned enterprises does not appear to be consistent (Alam 2024). This is because BOQs are often prepared by engineers instead of quantity surveyors, which can be attributed to professional shortage. As such, this practice leads to errors in quantity calculation, lack of clarity in the specification, and even contract variation.

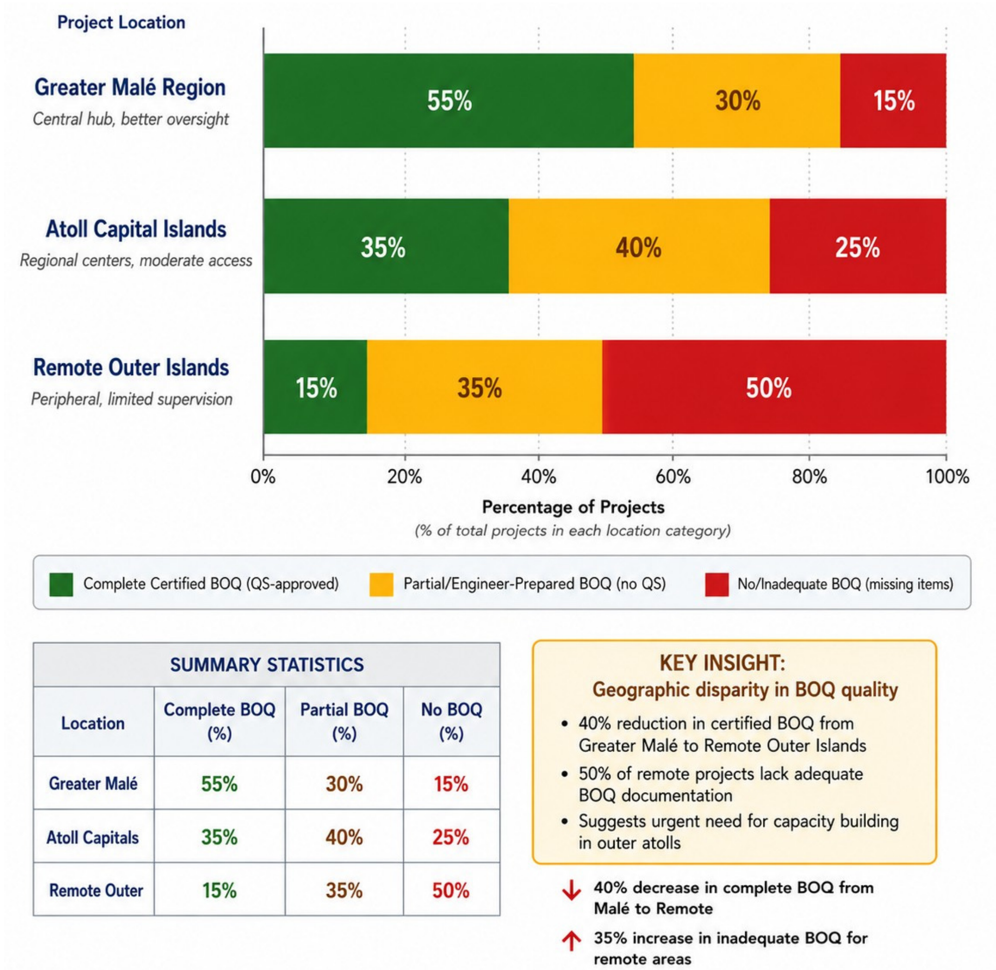

Figure 4: Distribution of BOQ Practices Across Construction Projects

Impact on Cost Performance

BOQs created by professionals have shown marked improvements in their cost efficiency and avoidance of budget overruns (Balibek, Anderson, and McDonald 2024; Sapkota 2022). Wellcrafted BOQs aid in budget formulation, proper valuation of payments, and enhanced monitoring of the construction process. They also help avoid any financial risks, eliminate any unnecessary variations, and ensure accountability in publicly-funded projects by SOEs in Maldives.

KPI	Measurement Method	Target	Reference
BOQ accuracy	Final quantity variance	<10%	Sapkota (2022)
Variation frequency	Variations per contract	<3	Balibek et al. (2024)
Payment time	Certification duration	<14 days	McKenzie & Marx

			(2025)
Dispute duration	Settlement duration	<30 days	Uddin (2023)
Audit compliance	Payment documentation	100%	Shareef (2023)

Table 2: Key Performance Indicators for BOQ Effectiveness

Discussion

The results further indicate the necessity of having BOQs in place as indispensable means for ensuring efficient contract management in Maldivian State-Owned Enterprises (SOEs). Wellprepared BOQs can enhance cost control, payment valuations, procurement processes, and variation management during the implementation process. Nevertheless, BOQs will only be effective where there is enough capacity in institutions, technical expertise, electronic procurement systems, and consistent regulation of public sector construction management (Lin 2024).

Moreover, the Maldives also have several unique issues in its construction industry linked to geographical dispersion, shortage of skilled labour, and extensive reliance on construction materials imported from abroad. Under such conditions, it is much harder to manage the uncertainties inherent to each construction project, transportation logistics, and contract administration. This means that the BOQs employed in Maldivian SOEs need to be tailored to local conditions of SIDS construction (Leandro, Mart´ınez-Galan, and Gonc¸alves´ 2023; Boyd 2024).

Recommendations

Policy Recommendations

The study advocates that there should be standardization of BOQs in all SOEs to maintain consistency and comparability among different procurement documents. The study further suggests that there should be alignment between BOQs and internationally accepted guidelines like CESMM and FIDIC. In addition to this, the use of quantity surveyors should be mandatory for major infrastructure projects in the public sector.

Institutional Recommendations

From the organizational perspective, training programs in quantity surveying can be introduced on a national scale in the Maldives construction industry owing to the inadequacy of specialists in the field. Moreover, centralisedcomputerised databases of BOQs can be implemented to promote ease of access and control over documentation. Lastly, certification systems tied to BOQs will contribute to financial management and accurate measurement of works performed (Abdulla 2023).

Operational Recommendations

From an operational perspective, there needs to be incorporation of mandatory pre-bid BOQ checks to prevent mistakes, inconsistencies, and inaccuracies before submission of bids. Monthly reports on projects need to have an integration of BOQ reconciliation for constant tracking of cost performance and progress in construction projects. Furthermore, incorporating BOQ performance measures into contractor evaluation will promote accountability, quality of construction, and project success (Tertiary 2021).

Conclusion

Bills of Quantities are critical tools for effective contract management within Maldivian StateOwned Enterprises. This study demonstrates that well-prepared BOQs improve cost control, variation management, dispute resolution, and financial accountability. However, their effectiveness remains constrained by institutional weaknesses, inconsistent standards, limited technical expertise, and inadequate enforcement. Strengthening BOQ systems within the Maldives is essential not only for improving procurement efficiency and public accountability, but also for supporting climate-resilient infrastructure development in a vulnerable Small Island Developing State context.

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