



Ashghal Quality Assurance & Quality Control system – QSD Role in Monitoring & Reporting the Quality Performance in Ashghal Projects

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Abstract

Ashghal has established a robust system of quality control and quality assurance for all projects constructed by Ashghal. Ashghal Departments are supervising a sophisticated system of quality control and quality assurance processes and procedures, implemented by the Consultants, Contractors, and Key Supply Chain Partners of Ashghal projects (e.g., Sub-Contractors, Key Suppliers, and Independent Laboratories). This paper illustrates how Ashghal Quality & Safety Department (QSD) monitors and reports the quality performance in Ashghal constructed projects to ensure continuous improvement and adherence to Ashghal quality strategy, policy mission, and targets. QSD is operating as Third Party, reporting directly to Ashghal President, and is monitoring and reporting the compliance of the industry to the quality requirements defined in Qatar Construction Specifications (QCS, 2014), Contracts, Professional Services Agreements, ISO 9001:2015 Standard and specific Ashghal requirements. Effective root cause analysis carried out by the auditing team has led to value-adding activities. QSD has established specific Key Performance Indicators (KPIs) for the management of non-conformities and corrective actions, to improve the performance and minimize the deviations and failures of compliance. QSD is conducting focused and system audits at Ashghal projects and the supply chain and is liaising with departments and individual projects as necessary, to agree on Lessons Learned and Actions to improve the quality of works. These activities include the establishment of consistent criteria of the qualifications and experience of the quality staff of Ashghal departments and Consultants' teams. QSD is making quarterly presentations to the Ashghal President regarding the performance of the Departments (including Contractors' and Consultants' performance) and of the Ashghal Project Managers. The established criteria and evaluation related to the quality are dynamic and reviewed/updated periodically to ensure the improvement of the Quality Performance of Ashghal Projects.

Keywords: PWA; QA/QC; NCR KPIs; Quality requirements

1 Introduction

Ashghal (Public Works Authority in Qatar) is responsible for the design and construction of the Qatari infrastructure and other large-scale projects (Buildings for education, health, etc.). Ashghal is also responsible for the asset management of many of the constructed projects (mainly Roads, Drainage & Sewage Networks) (Emiri Decree, 2014a) The effective delivery of the projects, at the required quality, in conformity with contractual, legal, and technical requirements and specifications, is ensured through a sophisticated quality system, with interrelated processes and procedures, across and within Ashghal Departments.

The minimum quality requirements are defined in Qatar Construction Specifications (QCS), latest edition of 2014. These minimum requirements are expected to be met by all Ashghal projects and the level of compliance is to be verified and reported by QSD.

Ashghal is currently developing its own specifications, Ashghal Construction Specifications (ACS), to incorporate the latest technical and managerial developments, procedures, and best international practices.

Ashghal is supervising and verifying the quality of its projects through direct supervision (in-house projects) but mainly with the assistance of Consultants who operate under the capacity of the Engineer Representative and mobilize experienced quality staff at each project. The day-to-day quality monitoring of projects is performed by Ashghal QSD staff and the quality control staff of the Consultants.

Quality & Safety Department (QSD) in Ashghal is reporting directly to the Ashghal President and is conducting third party audits to verify the compliance to quality, safety, and environmental requirements. The Quality Section of QSD is responsible of monitoring and reporting of the quality performance and levels of compliance to quality requirements to the Ashghal President (Emiri Decree, 2014b).

2 Ashghal Requirements for Quality

The quality requirements expected to be fulfilled in Ashghal projects are defined in QCS (2014) (minimum requirements, applicable for all projects), in the contracts of the Construction Contractors and the Professional Service Agreements (PSA) of the Consultants.

ASHGHAL departments are also issuing circulars on quality control, either with technical content (for example, sampling and testing of materials and works by independent laboratories) or with managerial content (for example, handing-over procedures, management of non-conformities, etc).

2.1 Quality Requirements in Construction Contractor Contracts

Construction Contractors must comply with specific requirements for quality assurance and quality control defined in their contracts. To achieve this, they prepare, obtain approval, and implement a quality management system that includes Project Quality Plan, quality & operational procedures, Inspection & Test Plans, Method Statements, etc. QSD is verifying the implementation periodically through focused audits.

2.2 Quality Requirements in Professional Services Agreements of Consultants

Ashghal has established specific requirements regarding the duties and the responsibilities of the

awarded Consultants in the PSAs, and compliance is verified periodically by QSD through focused audits.

2.3 Quality Requirements in QCS (2014)

QCS (2014) requirements for quality are detailed in several sections and include prescriptive sub-sections and templates to promote understanding and facilitating the implementation.

Section 2 of QCS (2014) details the quality requirements all Ashghal Construction Contractors shall comply with.

Section 1, Part 23 of QCS (2014) defines the role and responsibilities all Ashghal Design & Supervision Consultants shall comply with.

All other QCS (2014) Sections include specific technical requirements directly related with the quality, such as material properties, workmanship and testing of finished works. (Qatar Construction Specifications, 2014)

3 Pwa (Ashghal Qatar) Quality & Safety Department Role in Quality

The role of the Quality & Safety Department (QSD) of Ashghal, by Emiri Decree, is to ensure quality of all Ashghal projects. To deliver on our mandate, we have developed and are continuously improving and implementing a robust auditing programme, with system and focused audits, most of them unannounced, with defined audit scope and mechanisms to record findings, managing non-conformities and identifying areas for improvement.

QSD reports directly to HE the Ashghal President, and as a supporting department of Ashghal, we operate as a third party to ensure the compliance with quality requirements in Ashghal. QSD started issuing Non-Conformity Reports (NCRs) in January 2020 instead of simply submitting audits reports to the Ashghal departments, after receiving authorization and instruction from the Ashghal President. This new approach has proven very fruitful and valuable; noticeable improvements can be identified in the quality performance of all departments since 2020.

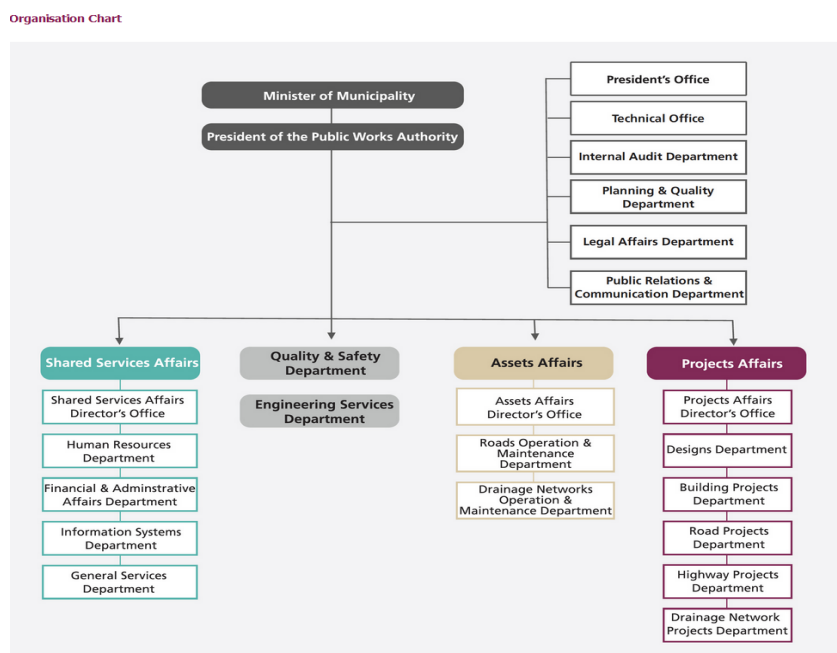


Fig. 1: Ashghal Organization Structure

QSD organization structure comprises four sections with direct interaction with Ashghal and Industry Key supply Chain Partners: Quality, Safety, Environment and Laboratory Sections. The Quality Section team is the team responsible for the monitoring and reporting of the quality performance of Ashghal projects. (Public Work Authority, 2023)

4 QSD Quality Section Auditing on Ashghal Projects

4.1 Summary of Quality Section Audit Process

QSD Quality Section is operating as a Third Party that conducts audits based on a monthly/annual audit plan. There are three different types of audits QSD auditors focus on e.g. (Construction practice, Material management and Quality Management System (QMS)), The monthly audit plan presents the planned audits for active projects in every month of the year and the audits which have been conducted by the auditors of QSD. Annual audit plan gives a brief look on the number of audits conducted for each project through the year.

QSD conducts the audits mainly unannounced and includes in the audit scope the activities of the Key Supply Chain Partners (KSCP) in each project: Consultant, Construction Contractor & main Sub-Contractors (for example Road-Works Sub-Contractor, Independent Site Laboratory) and critical suppliers (for example Asphalt Plants & Qatar Primary Material Company).

QSD Quality Section has scheduled and conducted 1,254 focused and system audits in Ashghal projects until now, since January 2020. The target was to audit all projects under construction, with minimum scope on the quality management systems, the management of materials, the sampling and testing of materials & finished works and the applied construction practices.

4.2 QSD Quality Section Personnel

All Quality Section employees hold various degrees in Engineering (for example Civil, Chemical, Industrial and Systems) alongside other employees with various levels of knowledge and expertise, many of them with more than twenty years' international experience in large-scale infrastructure projects. This multicultural and multi-generation environment allows the staff to be immersed in a work environment that is unique, challenging and always evolving.

Every Quality Auditor processes IRCA Lead Auditor ISO 9001: 2015 certificate and receives specific, on-the-job training in quality management of construction projects by the Quality Experts of the department. In addition, the employees attend internal and external training courses on project management and asset management to attain a higher level of experience in project management and ensure effective and efficient auditing.

4.3 Audit findings – Management of Non-Conformities – Continuous Improvement

Most of the identified non-conformities are related to construction practices, management of materials (including sampling and testing) and completeness & suitability of quality procedures and methodologies applied in the projects by both the Consultants and Contractors' teams. It has become evident over the last three years, that quality awareness among team members of the Consultants and Contractors, not only the assigned quality staff, could be significantly improved.

The main challenges identified during the follow-up on the issued NCRs and the implementation of the action plans was the lack of full understanding of the root cause analysis of the non-

conformities. QSD has established a mandatory classification of the root causes as per the 6-M method and provides expert opinion and support to the audited teams to ensure the differences between Correction & Corrective Action are understood, and the evidence of the implementation of those actions are identifiable, traceable, and legitimate.

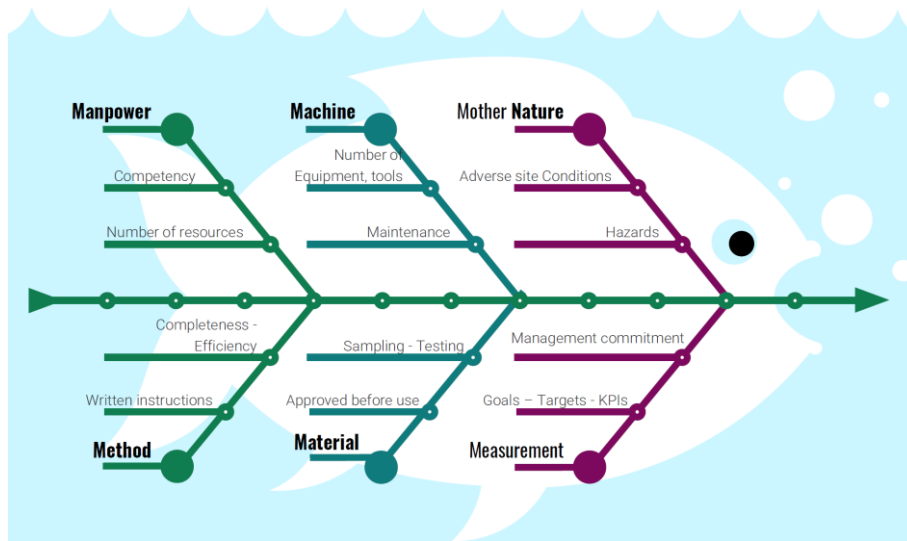


Fig. 2: Root Cause Analysis as per 6-M methodology (Fishbone – Ishikawa diagram)

The whole process resulted in the improvement of the applied corrective actions and the reduction in recurrence of non-conformities. The challenge is continuous and QSD has established more challenging targets through specific KPIs presented in the following section.

5 Key Performance Indicators (KPI) For Quality

5.1 KPIs for Management of Non-Conformities at Projects

KPIs can be developed to increase the functional value of a project by managing its development against a value determined by the owner (Gongbo et al., 2011). To enhance the quality performance, standardize the management methodology and ensure consistency across departments and within project teams, QSD has established specific KPIs for the project NCRs (issued by all involved parties) that are implemented since 2021. Those KPIs will be reviewed and revised accordingly in 2023.

6 Quarterly Performance Evaluation

6.1 QSD Evaluation of Quality Performance for the Ashghal President and Top Management

QSD prepares and conducts quarterly presentations to the Ashghal President regarding the performance of Ashghal projects in quality (including Contractors and Consultants' performance) and of the Ashghal Project Managers. The established criteria and evaluation related to the quality are dynamic, and reviewed/updated periodically, to ensure continuous improvement and adherence to Ashghal Quality Strategy, Quality Policy, Mission, Purpose, and Targets.

The QSD Manager presents quarterly evaluation reports of quality performance of projects to the Ashghal President and top management. QSD Quality Section has developed, established, maintains, and continuously improves the evaluation process. The assigned team analyses the data

of QSD Quality Section Database and presents the results of the analysis with recommendations and actions for improvement.

Objective approach and evidence-based decision making is effectively applied in every performance evaluation process. The Departments follow up each presentation with specific action plans. Critical areas that have been improved to date are:

- Standardization of full-time quality staff requirements in consultants' teams and in each department.
- Monthly Quality Working Committee for Project Affairs Departments.
- Minimization of Stop of Activities incidents.
- Customized software for the management of Non-Conformities.
- Mandatory Quality Walks at projects with the participation of each project top management.
- Quality Awareness Sessions for all project staff, not only for quality staff.
- Quality Awards.
- Penalization system to minimize the recurrence of non-conformities.

6.2 Evaluation of PWA Project Managers

Ashghal top management is materializing the international understanding that quality stops from the top and in achieving so all Ashghal Project Managers are evaluated by QSD Quality Section for performance in quality, as per the Ashghal President instruction, from October 2020. The evaluation criteria are dynamic and are reviewed periodically for suitability and effectiveness.

QSD is currently applying the revision 1 of the evaluation criteria and is intends to conduct a second review of the criteria in July 2023.

The revision 1 applied criteria are:

- Accepted Responses to issued NCRs
- Available system to monitor and report the recurrence of non-conformities as per established criteria.
- Consultant's full-time quality staff at the project.
- Number of Stop of Activities Incidents

The observed improvement in quality of Ashghal projects in the past twelve months can also be attributed to the improvement of awareness and understanding of the quality requirements among Project Managers, after the quarterly evaluations of QSD and the shared feedback with the departments.

7 Promoting Quality Awareness in Ashghal Projects

Ashghal President initiated the top-down approach to the quality performance of the whole organization because of the QSD quarterly presentations and evaluation of the PWA Project Managers. The demonstration of the management commitment has been materialized through customized training sessions delivered by QSD to Ashghal staff and to project staff at the sites.

7.1 Training PWA Project Managers

QSD delivered customized high-level quality training sessions in quality to all Ashghal Project Managers in the years 2021 and 2022. QSD prepared the content and Ashghal Human Resources Department awarded a consultant in year 2022 to provide quality-training sessions to all Ashghal Project Managers.

New quality sessions are under preparation by QSD for the year 2023, with more technical, contractual, and construction-oriented quality management content.

7.2 Training Consultants & Contractors in Quality Control

Ashghal has awarded internationally recognized consultant in the projects, with proven previous experience in similar projects in Qatar and in the world. Nevertheless, the full compliance with quality requirements has proven to be a challenge, despite the experience records and robust tender submissions of technical proposals by the Consultants. QSD identified gaps between the assumed experience of the consultants' staff and their actual performance in the projects. The COVID-19 restrictions on travel imposed more challenges on the mobilization of the best-in-their-fields Quality Managers & Quality Engineers in their fields.

QSD stepped-in and provided customized, in many cases project-oriented, quality trainings to the Consultants' staff, starting in September 2020.

Ashghal has been implementing the nationalist approach to empowering and utilising local Contractors in the projects. Most local contractors had no previous experience in Ashghal quality requirements and, despite (QCS) 2014 establishing the minimum quality requirements in construction, had not been implementing (QCS) 2014, especially the Section 2, in their previous projects. QSD provided awareness sessions to the contractors' quality staff in 2021 & 2022. More training sessions are scheduled for 2023, that will also include the contractors' top management.

7.3 QSD Cooperation with Project Affairs (PA) Departments to Improve Quality

Ashghal Project Affairs incorporates the delivery teams and departments who procure, award and construct the Ashghal projects. QSD has established close cooperation with Project Management Office (PMO) to promote quality awareness and communicate the quality KPIs and objectives to all departments.

PWA Departments have dedicated core quality teams that work closely with QSD to improve quality performance. Monthly meetings have been established and Lessons Learned have been shared among departments and projects.

8 QSD Tools for Quality Management

8.1 QA/QC Questionnaires

All active Ashghal projects submit monthly to QSD, through a specific electronic platform, the project QA/QC questionnaire that includes information on used materials, conducted sampling and testing, mobilized independent laboratories, project progress, submissions and approvals of drawings, NCR status, etc. QSD uses the questionnaire database for managing each project's risk aspect and effectively planning the QSD audits and site assessments. (QSD, 2020).

8.2 Ashghal List of Approved Tests & Laboratories

Ashghal projects and awarded construction contractors can mobilize in their projects only private laboratories approved by QSD to conduct only the tests included in the Ashghal List of Tests & Laboratories. QSD Quality Section administers this list through specific software and publishes the list periodically on Ashghal website for industry information and use. QSD Laboratory Section receives the industry applications for laboratories and tests to be included in the list and conducts the relevant document review, site assessments, and verifications to grant the approval.

8.3 Ashghal Laboratory Data Tracking System - LDTS

Quality Section collects, analyzes, and periodically reports the compliance status of the sampling and testing activities at Ashghal projects through a specific software: the Ashghal Laboratory Data Tracking System. All mobilized laboratories must upload the relevant testing data monthly, and all Ashghal Departments and Consultants have view-only access to the system (The President's Office, 2020)

8.4 Ashghal Quality Tracker System – AQTS

Quality Section has developed specific software for the evaluation and reporting of the level of quality compliance of each project, each Construction Contractor, and even each Department. The system is named Ashghal Quality Tracker System (AQTS), and QSD is currently cooperating with the Information Systems Department to incorporate it into the whole Ashghal Programme Management System (APMS). AQTS provides general and detailed quality control reporting on the incorporated materials, applied construction practices, the workmanship of finished works, and used quality management systems.

9 Conclusion

The Quality Section of QSD Ashghal has established a sophisticated quality assurance and quality control system to monitor and report the compliance of all active Ashghal projects by means of technology, highly-experienced expatriate staff training and mentoring Qatari staff, applying best international practices, and maintaining an eye for lessons learned and opportunities for improvement that is shared with Ashghal Departments.

Ashghal top management has provided QSD with authorization, encouragement, and resources to develop and implement a robust quality assurance and quality control system, and expects QSD and especially the Quality Section, to be vigilant and fully immersed in site activities, the progress of works and the level of quality of KSCPs.

Absolute quality and 100% compliance are the ultimate targets in all Ashghal departments and QSD Quality Section is actively and continuously striving to reach this target.

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