When Knowledge Becomes an Intelligent Assistant:

A Qatari Study Connecting Artificial Intelligence with Sustainable Project Management

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The Knowledge Gap in Large Organizations

In large organizations, the challenge does not always arise from a lack of knowledge, but from its volume and distribution across documents, systems, departments, and accumulated experience. An organization may possess thousands of pages of manuals, specifications, procedures, contracts, and reports, yet accessing the right information at the right time remains a daily challenge.

In the infrastructure sector, this challenge becomes more sensitive. Decisions are linked not only to time and cost, but also to quality, sustainability, compliance, and data confidentiality. Lengthy manual searches or reliance on unverified information may delay decisions, create inconsistent interpretations, and weaken institutional traceability.

This challenge motivated the doctoral research of Dr. Awad Yousef Alomari, completed at Qatar University in 2026. The study asked a central question: how can artificial intelligence help large organizations transform dispersed knowledge into reliable answers while preserving data security and the confidentiality of institutional knowledge?

An Intelligent Library within the Organization

The dissertation is based on Retrieval-Augmented Generation, or RAG. The concept can be understood as an intelligent library operating within the organization. When an employee asks a question, the system does not merely generate a general response. It first searches approved documents, retrieves the relevant information, and then formulates a clear answer.

This distinction is important in enterprise environments. General-purpose artificial intelligence may be fast, but its answers are not always grounded in the organization's own documents and policies. A retrieval-augmented system begins with sources selected and governed by the organization, making it more suitable for governance, auditing, and information protection.

For institutions such as the Public Works Authority "Ashghal", which manages technical, contractual, regulatory, and procedural documents, the value is not limited to speed. The response must also be controlled, traceable, and secure within the boundaries of institutional knowledge.

How Was the Bridge Built?

The researcher followed a multi-stage methodology. The study began with a broad scientific review of trends and challenges in the use of Generative AI for sustainable project management. It then developed a knowledge-based model to support access to sustainability requirements and related specifications within the built environment.

The research subsequently compared three solution types: a general-purpose language model, a retrieval-augmented system, and a domain-specific fine-tuned model. The evaluation was not limited to technical performance. Actual users assessed the responses in terms of clarity, completeness, and correctness, thereby combining technical design, comparative testing, and end-user judgment.

Mosaed: From Research to Application

The practical value of the dissertation extended beyond academic research into a real institutional experience through the "Mosaed" system at Ashghal. Mosaed was developed through local expertise within the Information Systems Department under the leadership of Dr. Abeer Al Hajri. It was further enhanced through collaboration with the Office of the Director of Project Affairs, under the leadership of Eng. Khalid Al Khayareen, Director of Project Affairs.

Mosaed is an enterprise knowledge platform that uses artificial intelligence to help employees access approved information more quickly and reliably, positioning it as a knowledge companion that supports daily work and decision-making across the Authority.

The Mosaed success story demonstrates how scientific research can be translated into tangible institutional value. It also provides an important model of collaboration between academic research and the government sector, where knowledge does not remain confined to dissertations but is converted into tools that can be applied in the workplace.

The development of Mosaed expanded the institutional knowledge base and linked it to approved technical, contractual, procedural, and regulatory documents. The system was also strengthened with search capabilities that understand the meaning of a question, not only its words, and with mechanisms that connect answers to relevant sources. In this way, dispersed documents are transformed into a secure intelligent platform.

A core advantage of retrieval-augmented systems is that they enable organizations to benefit from artificial intelligence without relinquishing control over their data. Instead of depending on public tools that may not suit sensitive information, the system operates within a controlled institutional environment, preserves confidentiality, and reduces the risk of sharing data outside the approved setting.

Faster Answers and More Secure Knowledge

Mosaed has become a practical model for transforming institutional knowledge into a daily service. It helps employees access policies, procedures, specifications, and technical guidance more quickly, while reducing manual search, improving information accuracy, and increasing confidence in the answers provided.

In large organizations, a convincing answer is not enough. It must be verifiable at source, aligned with approved documents, and governed by clear security controls. Retrieval-augmented artificial intelligence therefore offers more than speed. It provides a responsible model for institutional knowledge management.

It also supports knowledge sharing across departments. Rather than allowing expertise to remain fragmented among individuals, files, and systems, knowledge becomes available in an organized form while preserving governance and confidentiality. This strengthens institutional continuity and reduces the effects of knowledge loss or limited accessibility.

What Did the Research Demonstrate?

The dissertation showed that the architecture selected for an artificial intelligence solution directly affects decision quality and suitability for enterprise use. The retrieval-augmented system demonstrated a clear advantage for

questions requiring sources, procedures, and reliable explanation, particularly when answers were connected to sustainability or compliance requirements.

General-purpose models may remain useful for summarization and broad inference, but they are less suitable when the organization requires an answer linked to a clear source. The study also demonstrated that training a specialized model is not sufficient on its own unless it is supported by high-quality data and stable controls.

From a sustainability perspective, these systems help project teams access environmental and technical requirements more quickly, supporting more consistent decisions concerning materials, energy, water, documentation, and compliance.

Research That Serves Society

The experience of Dr. Alomari and the Mosaed system provides a model that can be adapted by other organizations in Qatar and beyond. Every large organization possesses substantial knowledge, but it requires an intelligent and secure method to convert that knowledge into a daily capability that supports employees.

This experience reflects the integration between Qatar University and the Public Works Authority "Ashghal" in applying artificial intelligence to support sustainability while safeguarding data security (Figure 1).

This direction is aligned with Qatar National Vision 2030, which places innovation and digital transformation at the heart of sustainable development. True digital transformation is not only the adoption of new tools. It is the establishment of trusted systems that protect knowledge, improve efficiency, support decision-making, and serve society.

"*The true value of artificial intelligence does not appear when it merely answers quickly, but when it helps an organization make a reliable, secure, traceable decision that benefits society.*" … Dr. Awad Alomari

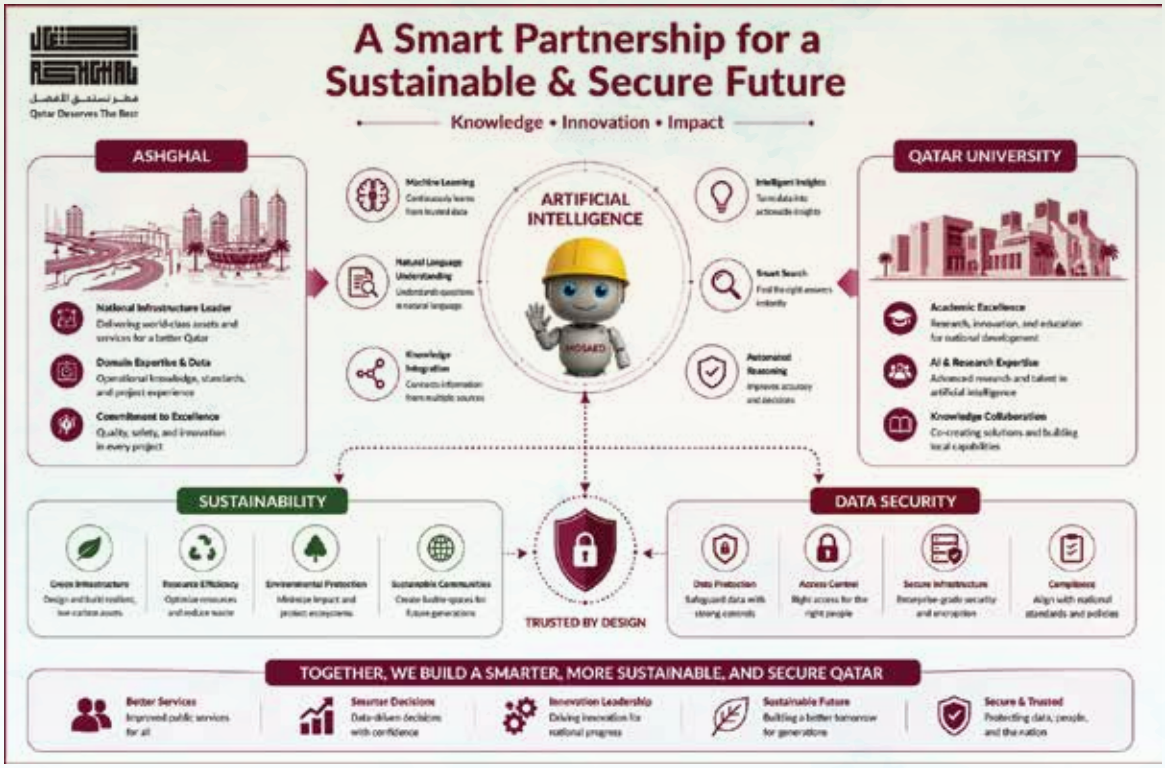


Figure 1: A diagram connecting Qatar University, Ashghal, artificial intelligence, sustainability, and data security.