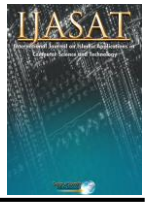

Embedding Tawhidic Epistemology in Ethical Decision-Making for Software Engineering Projects

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ABSTRACT
Ethical decision-making is critical to collaboration and professional integrity in software engineering projects. However, Islamic ethical principles are often absent from student project workflows and Agile industry practices due to limited awareness and a lack of structured guidance. This paper introduces a conceptual framework grounded in Tawhidic Epistemology (TE), which unifies revealed guidance from the Qur'an and Sunnah with empirical reasoning to embed Islamic ethics into project-based learning and Agile decision-making. The framework maps values such as *Shura* (consultation), *Amanah* (trust), *Niyyah* (intention), and *Muhasabah* (accountability) to project tasks, including problem selection, team formation, role delegation, and conflict resolution, while aligning them with Agile mechanisms. Methodologically, the study presents a conceptual model that requires empirical validation in student projects and industry teams. The contribution lies in positioning TE as a dual-layer paradigm, where revealed knowledge provides the ethical anchor and empirical practices serve as operational enablers, offering a roadmap for building ethically resilient and AI-ready software engineering ecosystems in Muslim-majority contexts. The framework is demonstrated through an illustrative scenario and outlines a phased validation strategy to support empirical adoption.
Keywords: *Tawhidic Epistemology, Islamic Ethics, Ethical Decision-Making, Software Engineering Education, Agile Projects, Project-Based Learning*

1. Introduction

Decision-making is a core process in software projects, shaping both educational outcomes and professional practices. Whether in student-led academic initiatives or Agile-driven industry environments, ethical decision-making determines the integrity, inclusivity, and long-term impact of software systems (Karim et al., 2017; Raja et al., 2024; Sakamoto et al., 2021; Setiawan, 2024). In software engineering education, team-based projects foster technical competence, collaboration, and problem-solving ability (Ceh-Varela et al., 2023; Gogoll et al., 2021; Olaf Zimmermann et al., 2024; Pak Hei Li, 2024; Shepherd et al., 2022). Yet, these

projects raise critical ethical questions: Are Islamic ethical guidelines being applied? These challenges are especially relevant in Muslim-majority institutions, where the integration of ethical values into technical education is undeveloped and frequently lacks an integrated epistemological baseline (Al Qur'an, 2025; Karim et al., 2017). Decision-making is fast-paced and cross-functional in professional Agile projects (Cunha et al., 2016; PMI, 2023; Raja et al., 2024). While frameworks like Scrum and SAFe offer structural guidance, they often lack integrated ethical processes that support broad, focused outcomes (Carta & Silvio, 2022; Li et al., 2024; Raja et al., 2024). Islamic governance gives deep insights into communal knowledge and spiritually aligned decision-making with its rich tradition of consultation or consultative practices (Mashwara), formal consultative body (Shura), intention (Niyyah), trust (Amanah), and accountability (Muhasabah) (Al-Ghazali, 2005), that can guide value-sensitive technological decision-making. Mashwara and shura are closely related and sometimes used interchangeably for team consultation. (Elmahjub, 2023; Golam Mohiuddin & Muzahidul Islam, 2016; Shihab A. Hameed, 2009).

To address this gap, this study proposes a conceptual model based on TE. This TE-based model is developed by synthesizing revealed guidance (Qur'an and Sunnah) and existing empirical findings from the literature on Islamic ethics and worldview, Agile practices, and software engineering challenges, thus offering a spiritually anchored yet technically compatible paradigm for integrating ethical values into student projects and industry practices. To demonstrate operational relevance, this study also includes an illustrative scenario showing how TE principles guide decision-making within student and Agile project environments.

2. Ethical Norms and Challenges in Software Engineering

Software engineering projects, whether in student teams or Agile environments, often face challenges related to transparency, fairness, accountability, and consensus-building (Dusturi et al., 2024; Goñi et al., 2020; Kimpton & Maynard, 2024; Sakamoto et al., 2021). Student groups commonly encounter uneven workload distribution, insufficient consensus, and limited ethical scaffolding. In industry settings, fast-paced Agile practices may prioritize efficiency over reflective ethical deliberation (Gogoll et al., 2021; S. A. Hameed, 2009; Zuber et al., 2022).
In Muslim-majority institutions, despite strong ethical traditions, there is no structured method to embed Qur'anic principles, *Shura*, *Amanah*, *Niyyah*, *Muhasabah,* in software engineering tasks. Existing codes, such as ACM, IEEE, and ABET, provide guidance but do not incorporate Islamic ethical constructs.

Therefore, an ethical framework rooted in Islamic epistemology is needed to align technical activities with spiritual and moral values. This motivates the integration of TE as a foundation for ethical decision-making in software engineering.

3. Integrating TE and Islamic Ethics into Decision-Making in Software Engineering

Islamic decision-making is rooted in a holistic epistemological framework that integrates spiritual, ethical, and empirical dimensions (Ahmed Khan et al., 2024; Al Qur'an, 2025; Golam Mohiuddin & Muzahidul Islam, 2016; Karim et al., 2017; Setiawan, 2024). This section presents TE as the foundational paradigm and outlines key Islamic values that guide ethical choices in both academic and industry contexts.

3.1 TE: A Unified Ethical Paradigm

TE views all knowledge, revealed and empirical, as a unified whole rooted in the Oneness of Allah. It integrates Qur'anic guidance with rational inquiry, positioning ethical intent at the center of decision-making. This study adopts TE as its foundational lens to address ethical

challenges in both educational and industry domains. Rooted in the Islamic worldview, TE can be understood as a knowledge system centred on a single, unifying source, Tawhid, from which all fields of study, including science, art, ethics, history, and theology, are derived. Accordingly, the TE model rejects the separation between religious knowledge (from revelation, such as the Qur'an) and empirical knowledge (from observation, science, or reason) (Osman, 2012b, 2012a). In this paradigm, empirical knowledge serves to validate, illustrate, and elaborate upon revealed truths, rather than standing as an independent source of authority, a principle indirectly reflected in approaches that utilize historical data to inform ethically grounded decision-making in software engineering (Raja et al., 2023).

3.2 Classification of Knowledge in Islam: Epistemic Hierarchies and Ethical Intent

Rooted in the Islamic worldview, the TE model is grounded in the Islamic tradition of classifying knowledge as a unified, purpose-driven pursuit. Within TE, knowledge is not fragmented into secular and sacred domains but is viewed holistically under the Oneness of Allah (Tawhid) (Osman, 2008, 2012a).

3.3 Foundational Islamic Values for Ethical Decision-Making

Islamic ethics provides a set of four core principles, Shura (consultation), Amanah (trust), Niyyah (intent), and Muhasabah (accountability), derived from the Qur'an and Sunnah, that guide ethical behavior in decision-making and reflect the moral imperatives embedded in both Fard Aa'yn and Fard Kifayah obligations, as articulated by Al-Ghazali, (2005), and align with the value-centric approach to knowledge emphasized by Osman Bakar and contemporary scholars (Hanapi & Nason, 2021; Osman, 2012a). By incorporating these Qur'anic principles, as in Table 1, TE offers a spiritually grounded alternative to secular models of governance and project management.

TABLE 1: Illustrates Foundational Islamic Principles for Decision-Making

Principle (Meaning)	Principle in Practice
Mashwara (Consultation)	Encourages collective wisdom and inclusive decision-making
Shura (Formal consultative body)	Promotes participatory governance and collective wisdom
Niyyah (Intention)	Ensures that actions are based on sincere ethical intention.
Amanah (Trust/Fiduciary Duty)	Ensures responsibility, reliability, and trustworthy execution of tasks, roles, and resources.
Muhasabah (Self-Accountability)	Continuous ethical evaluation and accountability in decisions, which encourages reflection and continuous ethical improvement.

3.3.1 Historical Foundations

Nasr, (2017) describes classical Islamic knowledge as a spiritually anchored, Tawhid-based system in which all sciences are guided by metaphysical principles. His work highlights that Islamic scholarship historically aligned knowledge with ethical purpose.

3.3.2 Osman Bakar's Model

Osman, (2008, 2012a) presents a hierarchical structure of knowledge: revealed knowledge guides rational and empirical knowledge. This hierarchy reinforces that technical fields, including software engineering, must remain aligned with ethical and spiritual objectives.

3.3.3 Imam Al-Ghazali Classification

As cited by Bakar (Osman, 2012a), Imam Al-Ghazali, (2005), distinguishes between Fard Aa'yn (individual obligations such as ethical conduct) and Fard Kifayah (communal obligations such as engineering and technological sciences). Software engineering, as a communal obligation, must be practiced with Niyyah, Amanah, and Muhasabah.

3.3.4 Contemporary Relevance

Scholars, such as Hanapi & Nason, (2021), emphasizes that Islamic science integrates tawhid, ethics, and Maqasid al-shariah, reinforcing the unity of knowledge and values.

3.3.5 Ethical Integration in Modern Curricula

Hashim, (2013), argues for integrating Islamic values into modern curricula to restore the ethical purpose of knowledge. Her work supports aligning technical education with tawhidic principles.

4. Tawhidic Epistemological Model

This section presents the TE Model for ethical decision-making in software engineering. The model integrates revealed knowledge (ethical principles grounded in the Qur'an and Sunnah) with empirical knowledge (engineering practices and project activities) as a unified mechanism for value-aligned decisions. The overall structure of the model is illustrated in Figure 1.

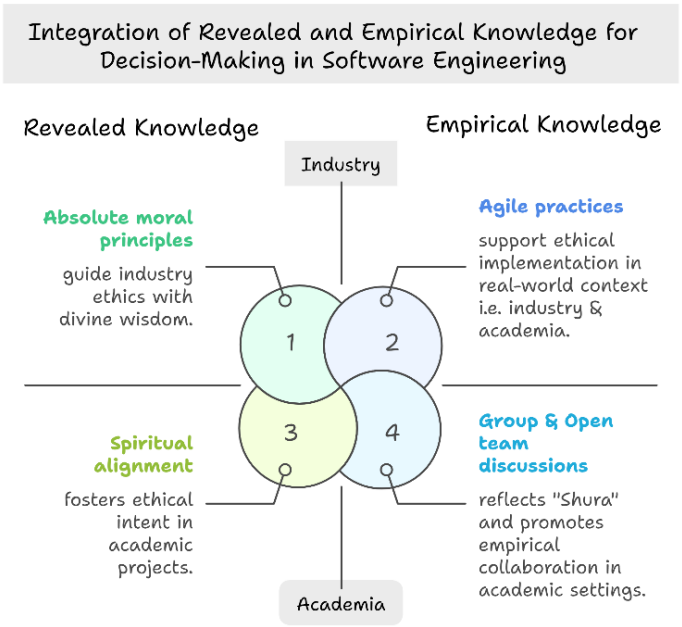

Fig 1. Tawhidic framework integrating the revealed layer with the empirical layer for ethical decision-making in software engineering.

4.1 Foundational Islamic Values for Ethical Decision-Making

Islamic ethics provides four core principles, Shura (consultation), Amanah (trust), Niyyah (intent), and Muhasabah (accountability), that guide moral decisions.

4.1.1 Revealed knowledge

Revealed Layer provides absolute ethical anchors such as Shura (consultation), Amanah (trust), Niyyah (intent), and Muhasabah (accountability) (Al-Ghazali, 2005; Hanapi & Nason, 2021).

4.1.2 Empirical knowledge

The empirical layer operationalizes these values through engineering practices, including planning, retrospectives, documentation transparency, consensus-building, and equitable role distribution. This layer supports the practical implementation of ethics in student projects and Agile (Gogoll et al., 2021; Olaf Zimmermann et al., 2024; Zuber et al., 2022).

4.1.3 Integration of the Two Layers

Together, the two layers establish a unified ethical-technical model that aligns spiritual intent with engineering execution. As shown in Figure 1, revealed principles provide the ethical direction, while empirical practices translate these principles into actionable project behaviour.

4.1.4 Practical Mapping

Practical alignment of Islamic principles includes:

- Shura is collaborative team consultation and decision-making.
- Amanah implies responsible task allocation and trustworthy execution.
- Niyyah is the intention to plan with clarity of purpose.
- Muhasabah is a reflective review and retrospective for continuous improvement.

These mappings facilitate ethical decision-making in both academic and industrial project environments.

For example, consider a student software engineering team selecting a final-year project topic. The team begins with a Shura-based consultation session, where each member proposes potential ideas and discusses feasibility. Amanah is reflected when members accept responsibility for specific tasks, such as requirements gathering or UI design, based on their strengths. Before development begins, the team aligns on a shared Niyyah, ensuring that the project aims to deliver social benefit and avoid harm. During weekly meetings, Muhasabah is practiced through structured reflective reviews where students evaluate ethical conduct, workload fairness, and decision transparency. Similarly, in Agile industry teams, Mashwara (Consultation) corresponds to sprint planning and backlog refinement, while Muhasabah aligns with retrospective meetings, enabling continuous ethical improvement.

5. Research Questions, Research Objectives, and Methodology

This study addresses one central question: How can TE operationalize ethical decision-making in software engineering projects? The paper adopts a conceptual methodology, mapping Qur'anic principles (Shura, Amanah, Niyyah, Muhasabah) to student project tasks and Agile workflows, which involve synthesizing established theoretical concepts and existing empirical findings from the literature on TE, Islamic ethics, and software engineering challenges. The resulting conceptual model is built upon mapping Qur'anic principles (Shura, Amanah, Niyyah, Muhasabah) to student project tasks and Agile workflows. Pilot studies, focus groups and surveys will be conducted in future work to evaluate the framework's impact on transparency, accountability, fairness, and participation (S. A. Hameed, 2009; Karim et al., 2017).

To validate the proposed TE-based ethical decision-making model, a small-scale empirical pilot will be conducted in future work. This will involve 3–5 student software engineering teams and at least one Agile industry team. The evaluation will compare project behaviour before and after applying TE principles, assessing transparency, ethical awareness, role clarity, and fairness. Data will be gathered through observations, weekly sprint reflection logs and review notes, sprint reviews, and post-project surveys. This phased validation responds directly

to the need for practical assessment highlighted by reviewers and ensures that the TE framework is both conceptually rigorous and pragmatically applicable.

6. Implications and Future Direction

The framework supports curriculum development by embedding Islamic ethics into software engineering education (Hashim, 2013). In the industry, it provides value-sensitive checkpoints for Agile governance. Policymakers may use the model to align ICT and AI initiatives with Maqasid al-Shariah. Future research will validate the model through pilot studies and comparative analysis with secular frameworks.

7. Conclusion

This paper presented a conceptual framework grounded in TE to operationalize ethical decision-making in software engineering. By unifying revealed knowledge with empirical practices, the model positions Islamic ethics not as an add-on but as the epistemological core of decision-making in both academic and industry contexts. The framework offers a dual benefit: nurturing ethically conscious students through project-based learning and equipping Agile teams with spiritually grounded decision-making practices.

The inclusion of a practical example and the outline of a validation plan further reinforce the operational relevance of the TE framework. These additions demonstrate how Islamic epistemological principles can transition from conceptual foundations to actionable practices. This ensures that the model not only contributes theoretically but is also positioned for empirical adoption in both academic and industry settings.

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