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Digital Integration of Zakat Management Systems in Islamic Fiscal Policy: An Evidence-Based Conceptual Framework

Muharman Lubis [1*], Yadi Janwari [2], Sofian Al Hakim [2], Egi Al Fansyah [1], Brial Asif Hayi Paka [3]

[1] *Master of Information System Study Program, School of Industrial Engineering*, *Telkom University, Main Campus (Bandung Campus), Jl. Telekomunikasi no. 1, Bandung 40257, West Java*, Indonesia.
[2] *Postgraduate program, Sunan Gunung Djati State Islamic University, Bandung,* Indonesia.
[3] *Institute of Science, Erciyes University, Yenidogan, Turhan Baytop Street No:1, 38280*, Talas/Kayseri/Türkiye.

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ABSTRACT

Zakat can complement public expenditure in addressing socioeconomic vulnerability, yet the records needed to examine their regional relationship remain dispersed across institutions. This study develops an evidence-based conceptual framework for integrating zakat management information, realized regional government expenditure (APBD), and socioeconomic indicators in Indonesia. Drawing on Design Science Research and qualitative document analysis, the study derives five functional and three non-functional requirements and translates them into a four-layer architecture comprising institutional data sources, integration and standardization, analytical information services, and fiscal monitoring outputs. The architecture proposes authorized data exchange, schema mapping, fund classification, geographic and temporal alignment, and cross-cutting governance controls. Three desk-based scenarios examine regional comparisons, the separation of zakat and APBD accounts, and the handling of inconsistent or restricted records. All eight requirements are mapped to architectural components, with four assessed as supported and four as partially supported at the design level. The framework offers a basis for coordinated fiscal analysis without transferring institutional financial authority, although operational feasibility and policy effects remain unverified.

1. INTRODUCTION

Poverty and income inequality continue to present substantial challenges to Indonesia's economic development, particularly in ensuring that fiscal resources reach vulnerable communities. According to Statistics Indonesia (BPS), the national poverty rate increased from 9.22% in September 2019 to 10.19% in September 2020, before declining to 9.57% in September 2022 [1][2]. As shown in Table 1, these fluctuations reflect the vulnerability of low-income households to economic disruptions and highlight the importance of effective redistribution mechanisms. Beyond conventional government expenditure, Islamic social finance offers an additional means of addressing socioeconomic disparities, particularly through zakat.

Table 1. National Poverty Rate in Indonesia, 2019–2022

Year	Poverty rate (%)	Annual change (pp)
2019	9.22	-
2020	10.19	+0.97
2021	9.71	-0.48
2022	9.57	-0.14

Source: Statistics Indonesia (BPS), September observations [1], [2]. pp = percentage points.

Zakat serves as a redistributive instrument within Islamic fiscal policy, transferring resources from eligible contributors (*muzakki*) to designated beneficiaries (*mustahik*). Its potential contribution extends beyond immediate poverty alleviation to supporting household consumption and broader economic stability. Yusoff [3] identified a significant relationship between zakat expenditure and real output in Malaysia, suggesting that zakat may complement conventional fiscal instruments. Similarly, Nursaman et al. [4] examined the relationship between zakat, regional government expenditure, and poverty reduction in Banten Province. These studies provide an empirical basis for considering zakat within fiscal policy discussions, although its contribution also depends on institutional capacity and coordination. The growing adoption of digital technology has created opportunities to strengthen zakat administration, particularly in financial reporting, beneficiary management, and resource distribution. Lubis [5]

*Corresponding Author Email: muharmanlubis@telkomuniversity.ac.id

explored the role of knowledge management systems in zakat institutions, while Lubis et al. [6] examined institutional approaches to Zakat Management Systems (ZMS) across different countries. Further research by Lubis et al. [7] demonstrated the application of Enterprise Resource Planning (ERP) in improving inventory management at Rumah Yatim. Although these studies illustrate the operational value of digitalization, their primary focus differs from the integration of zakat information with broader fiscal and socioeconomic datasets.

Institutional coordination introduces additional considerations. Ajahar et al. [8] found that trust in public authorities and legal awareness significantly influenced perceptions of zakat-related tax incentives in Malaysia, indicating the importance of institutional credibility in fiscal arrangements. In Indonesia, the introduction of the Satu Data ZIS-DSKL initiative in 2026 represents an effort to improve the integration of zakat-related information with national socioeconomic data [9]. However, integrating beneficiary information does not automatically establish interoperability between zakat management systems, regional fiscal expenditure records, and poverty indicators. Differences in data structures, institutional responsibilities, and reporting practices remain important considerations for developing a coordinated information framework.regional zakat reporting provides further evidence of the need for more consistent information integration. According to the National Zakat Management Report published by BAZNAS [10], reported collection and distribution activities varied considerably across Indonesian regions in 2024. Zakat institutions reporting under West Java recorded approximately IDR 620.95 billion in collections across different fund categories and IDR 574.82 billion in disbursement and utilization. In Central Java, the corresponding figures were approximately IDR 501.89 billion and IDR 446.63 billion. These amounts reflect reported institutional activities across several categories of Islamic social funds and should not be interpreted as zakat-only figures or direct measures of assistance received by residents of each province. Nevertheless, the differences illustrate the importance of preserving regional identifiers, distinguishing collection from distribution, and maintaining consistent financial classifications. Without comparable information on institutional coverage, reporting periods, and fund categories, regional financial records may offer limited support for examining zakat allocation alongside government expenditure and socioeconomic conditions.

In this respect, the regional reporting evidence and previous studies somehow point to an information integration problem that extends beyond the availability of digital zakat services. The existing research has examined zakat's economic contribution and the adoption of institutional technologies, but the selected literature offers limited guidance on aligning regional zakat records with realized government expenditure and socioeconomic indicators while preserving differences in financial classifications, reporting periods, and institutional responsibilities. To address this gap, the present study develops an evidence-based conceptual framework guided by Design Science Research principles [11]. The proposed framework translates identified information needs into eight system requirements, a four-layer integration architecture, and governance mechanisms for controlled information exchange. Its intended contribution lies in providing a traceable design for regional fiscal monitoring without consolidating zakat and government budget accounts or assuming that information integration directly improves socioeconomic outcomes.

2. LITERATURE REVIEW

2.1 Zakat as an Islamic Fiscal Instrument

Zakat constitutes a fundamental component of Islamic public finance, functioning as a mechanism for redistributing wealth from eligible contributors (*muzakki*) to specified beneficiaries (*mustahik*). Unlike conventional taxation, its distribution follows religiously defined eligibility criteria, which distinguish zakat administration from general government expenditure. Yusoff [3] argued that zakat could serve broader economic purposes by supporting consumption and mitigating fluctuations in economic activity. Its contribution to fiscal policy is therefore best understood as complementary rather than interchangeable with conventional public spending. The effectiveness of zakat also depends on how collected resources are allocated and administered. Productive distribution may support income-generating activities, whereas consumptive assistance addresses immediate household needs. Evidence from Banten Province suggests that zakat and regional government expenditure are both relevant to poverty reduction [4]. Meanwhile, Ajahar et al. [8] demonstrated that institutional trust and legal awareness influence perceptions of zakat-related fiscal incentives in Malaysia. These findings suggest that the economic role of zakat cannot be separated from the institutional arrangements governing its collection, distribution, and accountability.

2.2 Theoretical and Empirical Evidence of Zakat in Macroeconomic Policy

The macroeconomic role of zakat is commonly explained through redistribution and its potential effect on aggregate demand. Yusoff [3] distinguished between automatic and discretionary stabilization mechanisms, suggesting that zakat collection may respond to economic conditions while adjustments in disbursement could support consumption during downturns. His model also highlights differences in the marginal propensity to consume between contributors and beneficiaries. Since lower-income households may allocate a greater proportion of additional income to consumption, zakat transfers can potentially generate positive multiplier effects. However, the magnitude of these effects depends on actual spending behavior and distribution practices. Empirical findings provide support for this theoretical relationship, although their implications require careful interpretation. Using Malaysian data, Yusoff [3] reported a statistically significant relationship between zakat expenditure and real output. Nursaman et al. [4] examined five districts and municipalities in Banten Province during 2017–2021 and identified significant relationships between zakat, regional expenditure, and poverty reduction. Both studies indicate the relevance of zakat to economic policy, but their observational findings do not independently establish causality. Moreover, neither directly evaluates how integrated information systems could improve the availability and use of fiscal data. This limitation provides a basis for examining the informational requirements of zakat–fiscal coordination.

2.3 Digital Transformation of Zakat Management Systems

Digital transformation has gradually reshaped the administration of zakat, particularly through improvements in information management, transaction processing, and institutional reporting. Lubis [5] examined the role of Knowledge Management Systems (KMS) in supporting zakat administration, while Lubis et al. [6] compared different Zakat Management System (ZMS) approaches across institutional settings. At the operational level, Lubis et al. [7] investigated the customization of an ERP inventory module at Rumah Yatim using Odoo. These studies illustrate the potential of digital tools to improve organizational processes, although their primary contributions concern internal administration rather than integration with external fiscal datasets. Recent studies have broadened the discussion beyond operational efficiency. Makarim and Hamzah [11], through a systematic literature review, identified the growing importance of digitalization in zakat collection and distribution. Musa et al. [12] examined digital zakat information systems in Aceh and West Nusa Tenggara, revealing differences in implementation and reporting practices. Research from Malaysia further highlighted the opportunities and institutional challenges associated with digital zakat management [13]. Meanwhile, Ahimsa et al. [14] investigated factors influencing the adoption of digital zakat payments in Indonesia. Taken together, these findings suggest that digital adoption has progressed, but institutional digitalization alone does not guarantee interoperability between zakat records and broader public-sector information systems.

Digital transformation in zakat management extends beyond the availability of electronic payment channels. It involves changes in how institutions engage contributors, record transactions, organize operational information, and report the allocation of collected funds. Makarim and Hamzah [11] identified collection and distribution as major areas in which digitalization contributes to zakat management. At the participation level, Ahimsa et al. [14] found that performance expectancy, effort expectancy, social influence, and zakat literacy were positively associated with the intention to use digital zakat payment platforms among surveyed muzaki in Java. These findings suggest that awareness and accessibility are relevant to the adoption of digital collection services. Nevertheless, increased platform usage does not necessarily indicate that transaction records can be integrated with other institutional datasets. The informational value of digital collection also depends on how those records are classified, maintained, and subsequently reported. Organizational processes introduce a different set of technological requirements. Knowledge management applications may support the preservation and exchange of institutional knowledge [5], while ERP systems provide opportunities to structure internal operational records [7]. However, the availability of digital applications does not guarantee comprehensive reporting across collection, allocation, and distribution activities. Musa et al. [12], in their examination of digital zakat information systems in Aceh and West Nusa Tenggara, identified limitations in the implementation and reporting functions of institutional systems. Research on Malaysia likewise highlights the need to examine digitalization in relation to institutional arrangements and management practices [13]. Taken together, these studies indicate that digital transformation should be considered in terms of both technological adoption and the capacity of institutions to maintain consistent, usable information throughout their operational processes.

For the proposed integration framework, awareness, collection, organizational management, and distribution provide complementary perspectives on the zakat information lifecycle rather than a fixed sequence of technological maturity. Awareness and digital payment adoption influence participation, whereas collection and distribution activities generate the financial records required for regional analysis. Organizational information management determines how these records are maintained, classified, and made available for authorized reporting. The framework therefore concentrates on the information produced by institutional processes, particularly collection and disbursement amounts, reporting periods, geographic identifiers, and fund classifications. Where reliable records exist, productive and consumptive distributions may also be distinguished. This approach connects operational digitalization with the broader objective of fiscal information integration without assuming that participating institutions have adopted uniform systems or reporting procedures [6][12][13].

2.4 Information Systems Integration in Fiscal Governance

Information systems integration involves more than connecting databases or exchanging electronic records. It requires compatibility between data structures, organizational processes, and institutional responsibilities. Chen et al. [15] examined enterprise integration and interoperability architectures, emphasizing the importance of coordinated system design. Similarly, Scholl and Klischewski [16] discussed the organizational and technical challenges of interoperability in electronic government. In Indonesia, the introduction of the Satu Data ZIS-DSKL initiative represents a significant step toward integrating zakat beneficiary information with national socioeconomic data [9]. Nevertheless, further conceptual development is needed to explain how such information can also support coordinated analysis of zakat distribution and regional fiscal expenditure. A reliable integration framework should therefore address both technical functionality and information governance. DeLone and McLean [17] identified information quality, system quality, and service quality as important dimensions in evaluating information systems. These considerations are relevant to fiscal information exchange, where data accuracy, accessibility, and institutional accountability affect the usefulness of integrated information. Peffers et al. [18] also emphasized the systematic development and evaluation of information system artifacts through Design Science Research. Building on these perspectives, the present study focuses on defining data requirements, information flows, and governance mechanisms for a conceptual zakat–fiscal integration framework, while retaining the separate administrative responsibilities of zakat institutions and government agencies.

Interoperability becomes more demanding when information originates from institutions with different operational objectives and administrative responsibilities. Chen et al. [15] distinguished enterprise integration from the broader challenge of enabling independent systems to exchange and interpret information. Scholl and Klischewski [16] similarly emphasized that interoperability in electronic government involves organizational processes and institutional coordination in addition to technical connectivity. These perspectives suggest that zakat-fiscal integration requires compatibility at several levels. Technical interoperability concerns the mechanisms through which information is exchanged, semantic interoperability addresses the consistency of data definitions, and organizational interoperability relates to the authority and procedures governing information sharing. A framework that

addresses only data transfer would therefore leave important questions concerning interpretation, accountability, and institutional ownership unresolved.

At the technical level, the proposed architecture could accommodate Application Programming Interfaces (APIs), standardized file exchanges, or integration middleware, depending on the capabilities and authorization arrangements of participating institutions. Lubis et al. [6] identified APIs, middleware, and web services among the technologies associated with coordinated zakat management approaches. Drawing on the interoperability principles discussed by Chen et al. [16], these mechanisms may be combined with schema mapping and validation procedures to reconcile differences between institutional datasets. For example, records obtained from Zakat Management Systems would require consistent identification of collection and distribution amounts, fund categories, geographical areas, and reporting periods. Regional expenditure records would need corresponding administrative identifiers while preserving their separate fiscal classifications. Such mechanisms are proposed implementation options rather than evidence that operational interfaces between zakat institutions and government agencies are currently available. A service-oriented framework developed for Indonesia's transportation sector also highlights the need to consider stakeholder coordination alongside technological change [20]. Its sector-specific findings are used here as a design perspective, not as evidence that zakat and fiscal systems are already interoperable. Semantic consistency presents a further challenge because equivalent field names do not always represent comparable information. Zakat collection, zakat distribution, and realized regional government expenditure refer to different financial activities, even when their values are expressed in the same currency. Similar difficulties arise when datasets use different geographical boundaries or observation periods. Annual fiscal expenditure, for instance, cannot automatically be interpreted as temporally equivalent to poverty indicators reported for a particular reference month. The proposed integration layer would consequently require explicit mapping rules, preservation of original reporting periods, and validation flags for records that cannot be compared reliably. Rather than forcing inconsistent information into a uniform structure, the framework should retain relevant differences and communicate their implications to the analytical services. This interpretation follows the broader argument that interoperability depends on shared meaning and coordinated procedures, not merely compatible technical interfaces [16][17].

Information governance must accompany these integration mechanisms throughout the exchange process. The Satu Data ZIS-DSKL initiative provides an institutional reference for improving coordination of zakat-related information in Indonesia [9], although it should not be interpreted as evidence that regional fiscal and socioeconomic datasets are already interoperable. In the proposed architecture, participating institutions would retain responsibility for their respective records, while access permissions, source identification, and audit information would govern authorized exchanges. DeLone and McLean [18] identified information quality and system quality as central dimensions of information systems success, reinforcing the need to consider the reliability and usability of integrated information. Accordingly, analytical outputs should preserve data provenance and indicate unresolved quality issues, while sensitive beneficiary-level information should remain outside routine regional comparisons unless specific authorization and safeguards are established. These governance provisions constitute conceptual design requirements whose operational feasibility remains subject to further evaluation. Research on organizational privacy policies in Indonesia also stresses the need to define responsibilities for personal-data collection, processing, and disclosure, a consideration that should inform the proposed authorization rules [21].

2.5 Informant Comparative Zakat Management Approaches and Integration Implications

Zakat Management Systems (ZMS) differ not only in their digital applications but also in how authority, reporting responsibilities, and information exchange are organized. Lubis et al. [6] distinguish eight approaches: centralized, decentralized (controlled), distributed, delegated, coordinated, supervised, isolated (unsupervised), and integrated. These approaches describe alternative institutional arrangements rather than successive stages of technological maturity. Such distinctions are relevant to fiscal information integration because compatible records cannot be assumed simply from the presence of electronic collection or distribution services. Table 2 re-examines the classification proposed by Lubis et al. [6]. It retains the eight organizational categories and selected examples of applications and national settings reported in that study, while developing a separate interpretation of interoperability constraints and their implications for the proposed zakat–fiscal architecture. The latter two columns represent the present study's design-oriented synthesis, informed by the wider literature on enterprise and government interoperability [16][17].

Table 2. Comparative ZMS Approaches and Their Implications for Zakat–Fiscal Integration

ZMS approach	Illustrative applications	Countries reported	Organizational arrangement	Integration concern	Implication for proposed framework
Centralized	GIS; portal gateway	Saudi Arabia; Brunei	A central authority directs operational decisions and reporting.	Approvals may delay local updates; regional detail can be overlooked.	Apply common definitions while retaining regional identifiers and source provenance.
Decentralized (controlled)	CRM; ERP; social systems	Malaysia; UAE	Local units exercise defined operational discretion under broader oversight.	Reporting formats and data classifications may differ across units.	Use source adapters, schema mapping, and validation of categories and periods.

Distributed	Cloud; web-based systems	Pakistan; Qatar	Tasks and information are spread across participating entities.	Exchange interfaces, access conditions, and data quality may vary.	Define secure exchange contracts, permission checks, and quality flags.
Delegated	Service-delivery systems; assisted automation	Indonesia; Egypt	Selected responsibilities are assigned to implementing organizations.	Ambiguous accountability can weaken data traceability.	Record institutional ownership, access roles, and auditable transfers.
Coordinated	API; middleware; web services	Bangladesh; India	Autonomous institutions coordinate information for shared objectives.	Agreed formats, interfaces, and exchange routines are required.	Favor controlled APIs or file exchange, common schemas, and consistent identifiers.
Supervised	Community networks; supervisory tools	Albania; Nigeria	Local activities are monitored through supervisory arrangements.	Approval chains and supervisory responsibilities may be unclear.	Specify authorization rules, review points, and exception logs.
Isolated (unsupervised)	Mobile apps; DMS; CMS	Thailand; Cambodia	Operational records remain largely within stand-alone units.	Siloed data and irregular exports limit cross-region comparison.	Provide minimum export formats and checks for incomplete metadata.
Integrated	EAI; BPM; enterprise systems	Kazakhstan; Singapore	Cross-functional activities are connected through shared workflows.	Tight dependencies may increase cost or blur institutional boundaries.	Integrate analytical outputs without consolidating zakat and APBD accounts.

The comparison points to a tension between consistent reporting and institutional discretion. Centralized or tightly integrated arrangements may support standardized procedures, whereas decentralized and delegated models can preserve local responsiveness at the cost of greater variation in data definitions. Neither arrangement, on its own, ensures that collection, disbursement, and socioeconomic records are comparable across regions. For the present design, regional identifiers, reporting reference periods, fund classifications, and provenance metadata should be specified independently of the managerial approach used by each institution [6][16][17]. The coordinated approach is especially relevant to the proposed framework because participating zakat institutions, fiscal authorities, and statistical agencies can exchange selected information while maintaining control over their respective systems. The integration layer could therefore employ authorized APIs or standardized file transfers, schema mapping, and validation rules rather than a common transaction database. Analytical services may subsequently distinguish collection from distribution and, when the source records permit, productive from consumptive assistance. Such comparisons must retain the separation between zakat and regional budget expenditure and should not expose beneficiary-level information without appropriate authorization [6][17][22]. These are design requirements to be examined in the following sections, not claims of operational interoperability.

2.6 Zakat Distribution Models and Regional Information Requirements

Zakat distribution serves different socioeconomic purposes depending on the needs of eligible beneficiaries and the forms of assistance provided. Consumptive zakat generally addresses immediate household necessities, while productive zakat seeks to strengthen income-generating activities through business capital, equipment, or other economic support. Lubis et al. [6] discussed these forms of assistance in relation to institutional approaches to zakat management, emphasizing the need to align distribution practices with beneficiaries' circumstances. Empirical evidence from Beik and Arsyianti [23], involving 221 zakat recipients in Jakarta and Bogor Regency, further illustrates how productive zakat programs may be evaluated through material and spiritual welfare indicators. Although their findings concern a particular program and population, they indicate the value of distinguishing distribution objectives when examining zakat's socioeconomic contribution. For information systems, this distinction requires distribution purposes to be recorded separately from fund classifications and beneficiary eligibility categories. Regional differences introduce further complexity into the interpretation of zakat allocation. Wardani et al. [24] examined productive and consumptive zakat allocations across Indonesian provinces through a proposed Resiliency Priority Index. Their analysis revealed variation in allocation patterns, although the inclusion of operational costs within the consumptive category presented a limitation in interpreting the resulting index. This classification issue has implications for integrated fiscal analysis. Without consistent definitions, differences between regions may reflect institutional reporting practices rather than actual variations in assistance priorities. Regional comparisons should consequently preserve information about expenditure categories, reporting periods, and the institutional sources from which allocation figures are obtained.

The geographical dimension of zakat administration has also received attention in earlier information systems research. Lubis et al. [25] proposed an integrated distribution management approach using Geographic Information Systems (GIS) to support spatial analysis and institutional coordination in Malaysia. Their study emphasized the potential of geographical information for examining distribution patterns across administrative areas and identifying differences in local needs. However, the proposed approach should be understood as a conceptual technological solution rather than evidence of verified operational improvements. Its relevance to

the present research lies in identifying spatial information as a useful analytical component when zakat distribution records are examined alongside regional socioeconomic indicators. These studies suggest several information requirements for the proposed zakat-fiscal integration framework. In addition to collection and disbursement amounts, relevant records should identify the geographical area, reporting period, fund category, and distribution purpose whenever these attributes are available. The location of collection may also differ from that of distribution, requiring both to be distinguished where source records permit. Differences in administrative boundaries, financial classifications, and temporal coverage would need to be examined before records are combined for regional analysis. Such requirements are consistent with broader interoperability research, which emphasizes semantic compatibility, institutional accountability, and controlled information exchange [16][17].

An integrated framework could support comparative reporting by presenting productive and consumptive zakat distributions alongside regional poverty indicators and realized government expenditure. Nevertheless, the purpose of this analytical integration is not to treat these financial instruments as interchangeable or to infer that observed allocation patterns directly produce changes in poverty. Instead, the proposed framework would provide a structured basis for examining geographical distribution, preserving source-specific definitions, and identifying inconsistencies that limit meaningful comparison. This approach extends the informational role of Zakat Management Systems while maintaining institutional ownership and the separate administrative responsibilities of zakat institutions and fiscal authorities [6][22].

3. RESEARH METHODS

3.1 Research Design

This study adopts a Design Science Research (DSR) approach to develop a conceptual framework for integrating Zakat Management Systems (ZMS) with regional fiscal and socioeconomic information. DSR is appropriate for research that seeks to address an organizational problem through the development and evaluation of an information systems artifact [11][19]. The present study focuses on information fragmentation between zakat institutions, government fiscal agencies, and statistical authorities in Indonesia. Its primary output is a conceptual integration framework rather than an operational software application.

The research design follows six activities adapted from Peffers et al. [19]: problem identification, definition of solution objectives, design and development, demonstration, evaluation, and communication. Figure 1 illustrates the sequence. The initial activities establish the information requirements through documentary evidence, while the design stage translates these requirements into an integration architecture and data-flow model. Demonstration and evaluation examine whether the proposed components can accommodate representative fiscal information scenarios. The final activity communicates the framework, its design rationale, and its limitations through the research report [26].

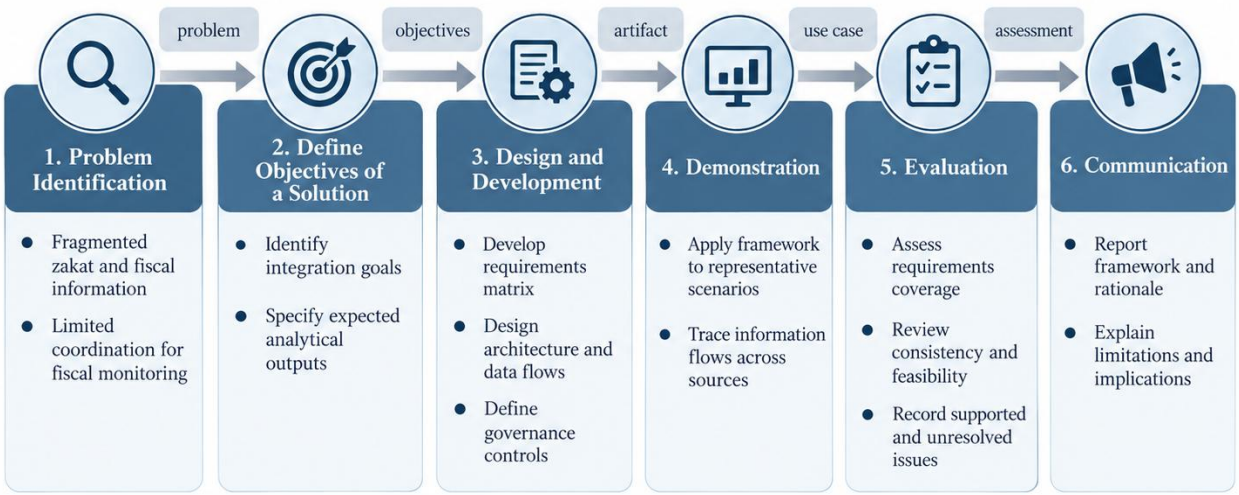


Figure 1. *Proposed research methodology framework*

3.2 Literature Selection and Evidence Synthesis

This study employs qualitative document analysis to examine the theoretical, institutional, and technological considerations underlying zakat-fiscal information integration. Unlike a systematic or scoping review, the approach emphasizes the relevance of selected academic and institutional sources to the research problem rather than exhaustive coverage of the available literature. Following the documentary analysis principles discussed by Bowen [27], the sources are selected purposively and organized into four areas: zakat as an Islamic fiscal instrument, digital transformation and institutional approaches to zakat management, information systems interoperability, and regional distribution analysis. Empirical studies concerning zakat and socioeconomic outcomes [3][4] provide the fiscal perspective, while research on Zakat Management Systems (ZMS), organizational arrangements, and digital applications [5][6][7], [12][13][14][15] contributes to the understanding of institutional information processes. Studies of enterprise and government interoperability [16][17], together with relevant institutional publications [9], provide an additional basis for examining data exchange and governance requirements.

The selected documents are examined through a thematic extraction matrix covering their research objectives, principal findings, information requirements, institutional responsibilities, and reported limitations. Particular attention is given to distinguishing evidence concerning zakat's economic contribution from studies addressing technological implementation and organizational coordination. These sources provide different forms of knowledge and cannot be treated as equivalent evidence of system effectiveness. Their findings are compared to identify recurring information problems, including inconsistent reporting formats, differences in geographic and temporal coverage, fragmented institutional records, and restrictions on information sharing. The comparison also considers how collection and distribution activities, including productive and consumptive assistance where relevant, may introduce different classification requirements for regional analysis.

The synthesis distinguishes requirements supported by the reviewed literature from technical provisions developed through the authors' design reasoning. For instance, the need for comparable regional information is informed by empirical research on zakat and public expenditure [4], whereas the consideration of standardized exchange formats, schema mapping, and validation procedures draws on established interoperability principles [16][17]. These considerations are translated into functional and non-functional requirements for the proposed framework. The resulting synthesis provides a traceable basis for conceptual design without implying that the identified mechanisms have been implemented or independently validated. No exhaustive search protocol or PRISMA-based screening procedure is claimed, as the purpose of the analysis is to inform the development of an information systems artifact rather than to produce a comprehensive review of all available studies.

3.3 System Requirements Analysis

System requirements are derived from the information needed to examine zakat collection and distribution alongside regional government expenditure and socioeconomic conditions. The analysis considers three institutional data sources: Zakat Management Systems operated by BAZNAS and related zakat institutions, regional fiscal records maintained by government authorities, and socioeconomic indicators published by Statistics Indonesia (BPS). Although these sources may share geographical and temporal references, they serve different administrative purposes and do not necessarily follow compatible reporting procedures. The proposed framework therefore requires a common basis for interpreting selected information without replacing the original institutional databases. Drawing on enterprise and government interoperability research [15][16], the analysis identifies data attributes, exchange conditions, and institutional responsibilities that would need to be addressed before meaningful regional comparisons could be produced. At the data level, the required attributes include institutional source identifiers, geographical references, reporting periods, financial amounts, fund classifications, and relevant socioeconomic indicators. Zakat collection and distribution must be treated as distinct financial activities, with collection and distribution locations recorded separately when the source information permits. A further distinction is necessary between zakat and other categories included within ZIS-DSKL reporting [9]. For distribution analysis, productive and consumptive assistance may be recorded as separate attributes where consistent classifications are available. These categories describe the purpose of assistance and should not be confused with either the source of funds or the eligibility classification of beneficiaries. Such distinctions are relevant because differences in institutional reporting practices could otherwise produce misleading comparisons between regions [4][6].

The functional requirements address five related capabilities: acquiring permitted institutional aggregates (FR-01), preserving financial classifications (FR-02), aligning geographical and temporal references (FR-03), maintaining separate zakat and government expenditure records (FR-04), and generating comparable regional summaries (FR-05). Particular attention is given to the alignment process, since administrative boundaries, reporting frequencies, and observation periods may differ between institutional sources. For example, annual zakat and APBD records cannot automatically be treated as temporally equivalent to BPS poverty indicators collected for a specific reference month. The proposed integration layer would need to preserve the original observation periods, identify incompatible geographical or temporal references, and flag records whose comparability remains uncertain. Standardized exchange formats, schema mapping, and validation procedures are considered as possible technical mechanisms for supporting these functions, consistent with the interoperability principles described in previous research [15][16], [22]. Meanwhile, non-functional requirements concern the reliability, security, and accountability of cross-institutional information exchange. Data quality controls (NFR-01) should preserve information about source institutions, reporting dates, classification rules, and validation status so that analytical outputs remain traceable to their original records. These considerations reflect the importance of contextual and representational information quality discussed by Wang and Strong [21]. Access restrictions (NFR-02) are equally relevant, particularly where beneficiary-related information may contain sensitive personal details. The framework therefore prioritizes authorized aggregate exchange and requires explicit access permissions before more detailed records can be considered. Institutional ownership and auditability (NFR-03) further require that participating organizations retain responsibility for their respective datasets, while information exchanges remain identifiable and reviewable. These provisions are informed by the governance and security considerations associated with information systems interoperability [16][22][23].

The resulting requirements provide a basis for translating the identified information problems into the proposed four-layer architecture. Institutional data sources supply the relevant records, the integration layer addresses classification and alignment, analytical services support regional comparisons, and monitoring outputs present information subject to quality and access restrictions. GIS-based visualization may be considered within the analytical services when suitable geographical aggregates are available, although its inclusion does not require beneficiary-level location data. The requirements also establish boundaries for subsequent scenario-based evaluation, particularly concerning inconsistent records, restricted information, and comparisons between zakat and public expenditure. At this stage, they represent conceptual design specifications rather than verified operational capabilities. The availability of institutional datasets, compatibility of exchange mechanisms, and effectiveness of the proposed controls would require further technical and stakeholder-based validation.

3.4 Conceptual Framework Development

The conceptual framework is constructed by translating the requirements into a layered information architecture. Four components are proposed: institutional data sources, data integration and standardization, analytical information services, and fiscal monitoring outputs. The integration layer is designed to reconcile reporting periods, geographic identifiers, and financial classifications without replacing existing institutional databases. Such an approach reflects the interoperability principles discussed by Chen et al. [16], particularly the need to maintain consistency between technical processes and organizational responsibilities. The framework is documented through an architecture diagram, a data-flow model, and a requirements-to-component mapping. Each component is assigned a defined function, while information flows specify the source, transformation process, and intended output. Standardized data formats and controlled information exchange are considered as potential implementation mechanisms. The design also incorporates relevant quality attributes from ISO/IEC 25010:2023 [29], including compatibility, functional suitability, and security. These design decisions provide a basis for examining the framework through representative usage scenarios rather than assuming that institutional system integration has already been implemented.

3.5 Framework Evaluation Method

The proposed framework is evaluated through a desk-based scenario walkthrough and requirements traceability assessment. This approach is consistent with Design Science Research (DSR), in which conceptual artifacts may be examined against their intended objectives before operational implementation [19]. Drawing on the evaluation principles discussed by Prat et al. [30], the assessment focuses on whether the architecture provides identifiable components, information flows, and decision rules for addressing the requirements established in Section 3.3. The purpose is to examine the internal adequacy of the design rather than measure system performance or demonstrate institutional effectiveness. Three representative scenarios are used to examine different aspects of the proposed architecture. The first considers the comparison of regional zakat distribution with poverty indicators, particularly where geographical identifiers and reporting periods require alignment. The second examines how zakat and realized regional government expenditure can be presented within a common analytical view while retaining their separate financial classifications. The third addresses information containing mixed ZIS-DSKL categories, incomplete temporal references, or restricted beneficiary-related records. These scenarios represent anticipated information-processing conditions derived from the requirements analysis. They do not constitute observations from operational institutional databases.

Each scenario is traced through the relevant components of the four-layer architecture. The walkthrough begins by identifying the institutional data sources and minimum information attributes, followed by the proposed acquisition, classification, and validation procedures. It then considers how analytical services would process records that satisfy the required conditions and how monitoring outputs would communicate the resulting information or its limitations. Governance requirements are examined throughout this sequence, particularly concerning authorization, provenance, institutional ownership, and the treatment of sensitive information. The assessment uses the requirements matrix in Table 4 and the information attributes in Table 5 to determine whether the proposed components offer a coherent response to the conditions represented in each scenario. Requirements coverage is assessed using three categories: supported, partially supported, and unresolved. A requirement is considered supported at the design level when an identifiable component, handling rule, and expected scenario response are documented. Partial support indicates that the principal design mechanism is specified but relevant details, such as institutional mapping rules, analytical procedures, or authorization arrangements, remain insufficiently defined. A requirement is classified as unresolved when the architecture does not provide an adequate design response. These classifications concern conceptual coverage only and should not be interpreted as evidence of functioning interfaces, verified data quality, or effective security controls. Consistent with the distinction between artifact evaluation and practical applicability [30][31], operational feasibility would require subsequent prototype testing, authorized institutional datasets, and independent stakeholder or expert assessment.

4. RESULT AND DISCUSSIONS

4.1 Synthesis of Zakat's Fiscal and Macroeconomic Roles

The source studies offer complementary, but not directly comparable, accounts of zakat's economic role. Yusoff [3] examined zakat expenditure in relation to real output in Malaysia, whereas Nursaman et al. [4] investigated zakat, regional expenditure, and poverty reduction across five districts and municipalities in Banten during 2017–2021. The studies suggest a rationale for considering zakat alongside fiscal indicators. They do not, however, establish that combining institutional databases will itself improve economic outcomes. Their relevance to the present design lies chiefly in the types of information needed for regional analysis. Institutional evidence adds a different dimension. ERP customization at Rumah Yatim illustrates the operational use of digital records [7], while Ajahar et al. [8] found that perceptions of zakat-related tax incentives were associated with religiosity, legal awareness, and trust in public authorities among 104 respondents in Malaysia ($R^2 = 0.403$). These findings concern different outcomes and cannot be pooled into a common effect estimate. Instead, they point toward two requirements for an integration framework: comparable fiscal information and clear rules governing how that information is handled.

Table 3. Selected Evidence and Its Relevance to Framework Design

Study	Reported evidence	Design implication
Yusoff [3]	Malaysia; zakat expenditure and real output	Retain time-specific zakat expenditure measures.

Nursaman et al. [4]	Five Banten districts/cities, 2017–2021; zakat, APBD and poverty	Align region and reporting periods across fiscal and welfare series.
Lubis et al. [7]	ERP inventory customization at Rumah Yatim	Identify operational records and source ownership.
Ajahar et al. [8]	104 respondents; $R^2 = 0.403$ for zakat-rebate perceptions	Treat accountability and governance as design requirements.

4.2 Information System Integration Requirements

The requirements analysis identified five functional and three non-functional requirements for integrating zakat management information with regional fiscal and socioeconomic datasets. Although the participating institutions may maintain records associated with similar geographical areas, their reporting structures, financial classifications, and administrative responsibilities are not necessarily compatible. Research on zakat management approaches has highlighted differences in institutional coordination and technological adoption [6], while interoperability studies emphasize the need to address both technical compatibility and organizational arrangements [16][17]. These considerations informed the requirements summarized in Table 4, which links the identified information needs to proposed design rules and architectural components. At the functional level, the framework must distinguish between the acquisition of institutional records and their subsequent use for comparative analysis. Collection and distribution amounts should be identified separately, with their institutional sources, reporting periods, and geographical references preserved throughout the integration process. Financial classification also requires particular attention. The broader ZIS-DSKL reporting category should not be treated as equivalent to zakat-only funds [9]. Where source information permits, productive and consumptive assistance may be distinguished to support a more detailed interpretation of distribution priorities. Previous research has discussed these forms of assistance within zakat management practices [6], while regional allocation studies provide a basis for considering differences in their distribution across geographical areas [24]. Such distinctions would allow the analytical services to examine allocation patterns without assuming that all institutions apply identical classifications.

Table 4. Refined Requirements Matrix for the Proposed Zakat-Fiscal Integration Framework

ID	Refined requirement	Proposed design rule	Mapped component	Evidence
FR-01	Acquire authorized regional zakat collection and distribution aggregates.	Accept permitted records through standardized files or APIs; preserve institutional sources, reporting periods, and collection or distribution locations where available.	Source adapters and data exchange interfaces	[5], [6], [9]
FR-02	Preserve fund classifications and distribution purposes.	Maintain distinct categories for zakat and other ZIS-DSKL funds. Identify productive and consumptive distributions when supported by source records; flag undefined classifications.	Classification and validation module	[6], [9], [27]
FR-03	Align geographical identifiers and temporal references.	Apply region-code and schema mapping; retain original observation periods and flag incompatible geographical or temporal records.	Standardization and validation layer	[4], [15], [16]
FR-04	Maintain separation between zakat and realized APBD expenditure.	Preserve independent financial classifications and accounting domains; present comparable indicators without consolidating institutional balances.	Fiscal data adapter and analytical services	[4], [16]
FR-05	Generate regional fiscal and socioeconomic comparisons.	Produce descriptive summaries from validated aggregates, with optional GIS-based visualization when suitable geographical data are available.	Analytical services and monitoring outputs	[4], [6], [28]
NFR-01	Maintain data quality and provenance.	Record source identifiers, reporting dates, transformation history, and validation flags to support traceability.	Data quality and provenance controls	[17], [21]
NFR-02	Restrict unauthorized access to sensitive information.	Apply authorization checks and controlled exchange; prioritize aggregated records and restrict beneficiary-level information.	Security and authorization controls	[22], [23]
NFR-03	Preserve institutional ownership and exchange accountability.	Retain data stewardship responsibilities and record authorized exchange activities through auditable logs.	Governance and audit controls	[16], [22]

The implementation implications extend beyond the presence of compatible data fields. Under FR-03, geographical and temporal alignment must be assessed before information is presented as comparable. For instance, annual zakat distribution and realized APBD figures may be examined alongside poverty indicators reported by BPS for March or September, but these observations do not represent identical measurement periods. The framework would therefore preserve their original reference dates and indicate limitations arising from differences in reporting frequency or geographical coverage. Similar checks would be required when administrative identifiers are missing, regional boundaries differ, or institutional records contain incomplete classifications. Rather than automatically combining such records, the integration layer could retain them with appropriate validation flags or exclude them from comparisons that require consistent definitions. This approach reflects the distinction between technical data

exchange and meaningful interoperability emphasized in previous research [16][17]. The non-functional requirements establish conditions under which these information exchanges could be considered reliable and institutionally appropriate. Data provenance is particularly relevant because a regional summary may incorporate records maintained by several organizations, each with different reporting procedures. Preserving source metadata and validation histories would help users identify the origin and limitations of the information presented. Wang and Strong [28] emphasized that information quality extends beyond accuracy to include characteristics affecting its interpretation and use. Security and accountability introduce further considerations. Access to beneficiary-related information would require explicit authorization and suitable safeguards, while routine fiscal comparisons should rely on permitted aggregates. Participating institutions would continue to own and administer their respective datasets, with audit records supporting accountability for information exchange [17][22][29].

The refined requirements provide a more explicit connection between the information problems identified in the literature and the proposed four-layer architecture. Source adapters would support controlled acquisition, the integration layer would address classification and alignment, analytical services would generate regional comparisons, and monitoring outputs would communicate results together with their relevant limitations. APIs, middleware, structured data formats, and validation procedures are considered possible implementation mechanisms rather than predetermined technologies. Their suitability would depend on institutional capabilities, data availability, and authorization arrangements. At this stage, the requirements demonstrate the intended scope and internal consistency of the conceptual design. Operational feasibility, exchange performance, and the effectiveness of governance controls remain subjects for subsequent validation.

4.3 Proposed Integrated Digital Zakat–Fiscal Framework

Fiscal policy and tax harmonization should be integrated through an incentive-shift mechanism and a transparent final tax liability framework, supported by an architectural mandate that enables sustainable digital transformation. Fiscal policy should move beyond conventional tax reductions and exemptions toward performance-based incentives that encourage productive investment, innovation, digital adoption, employment creation, and socially responsible economic activities, while harmonizing tax treatment across sectors and jurisdictions to minimize distortions, regulatory fragmentation, and opportunities for tax avoidance. Under this framework, the final tax liability should be determined through clear, consistent, and interoperable rules that account for eligible incentives, tax credits, allowable deductions, and applicable tax obligations, ensuring that incentives generate measurable economic and social returns without undermining fiscal sustainability. The architectural mandate should be established through core principles of transparency, proportionality, neutrality, accountability, interoperability, data security, and equitable treatment, complemented by a governance blueprint that defines institutional responsibilities, data-sharing protocols, regulatory compliance, digital identity and reporting standards, auditability, and performance evaluation. By embedding these principles and governance arrangements into an integrated digital tax architecture, governments can automate tax administration, improve real-time compliance monitoring, reduce administrative costs, strengthen coordination among tax authorities, and ensure that fiscal incentives remain traceable, targeted, and outcome-oriented. Ultimately, the alignment of fiscal policy, tax harmonization, incentive allocation, and final tax liability within a coherent governance and technology architecture provides a foundation for a more adaptive, efficient, equitable, and digitally enabled fiscal system as show in Figure 2 that presents zakat fiscal information integration framework.

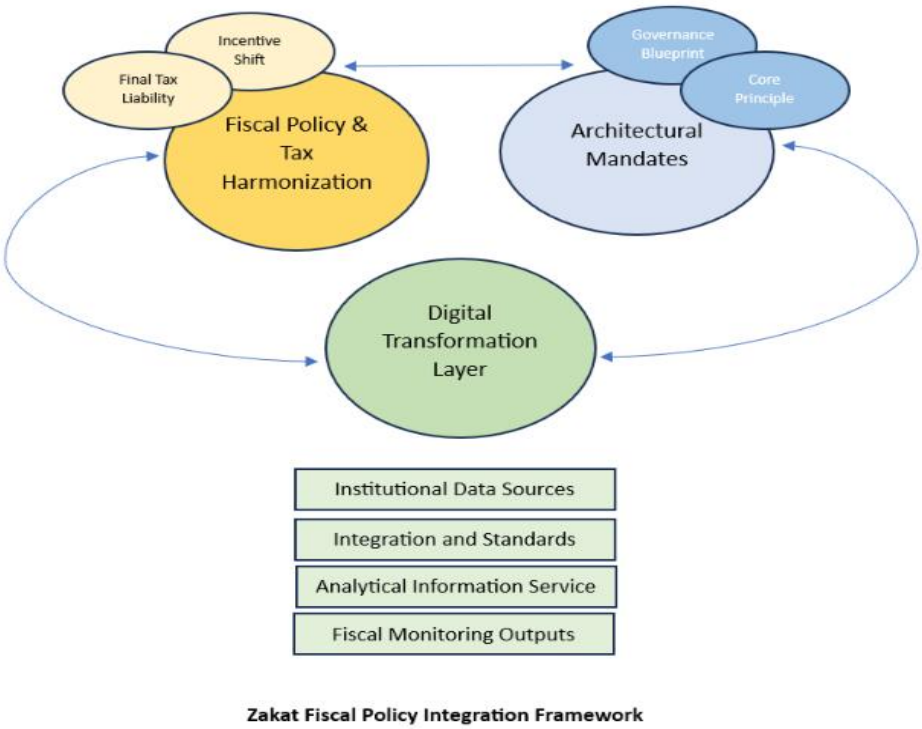


Figure 2. Zakat–Fiscal Information Integration Framework

Digital transformation in fiscal policy and tax harmonization involves a systematic transition from fragmented, manual, and paper-based tax administration toward an integrated, data-driven, and interoperable digital ecosystem. The process begins with institutional and regulatory assessment to identify gaps in existing tax policies, incentive schemes, reporting requirements, and governance arrangements, followed by business process reengineering to standardize tax procedures, harmonize definitions, and simplify incentive eligibility and final tax liability calculations. The next stage involves developing a shared digital architecture that integrates tax administration systems, digital identification, electronic invoicing, payment platforms, taxpayer databases, and secure data-sharing mechanisms through standardized APIs and interoperable data formats. Subsequently, automation, artificial intelligence, and data analytics can be introduced to facilitate tax assessment, verify incentive claims, detect inconsistencies, monitor compliance, and evaluate the economic impact of fiscal incentives. Effective implementation also requires robust cybersecurity, data protection, transparent accountability mechanisms, institutional coordination, and continuous capacity building for tax officials and taxpayers. As shown in figure 3, the transformation should proceed through phased implementation, pilot testing, stakeholder engagement, performance measurement, and continuous improvement, using indicators such as compliance rates, administrative costs, processing time, revenue efficiency, and incentive effectiveness to assess progress, which here allocates into four phase related to sourcing, standardization, advanced analytics and intelligent dashboard. Through this iterative process, digital transformation becomes not merely the adoption of technology but a fundamental redesign of fiscal governance that enhances efficiency, transparency, policy coherence, and equitable tax administration while maintaining fiscal sustainability.

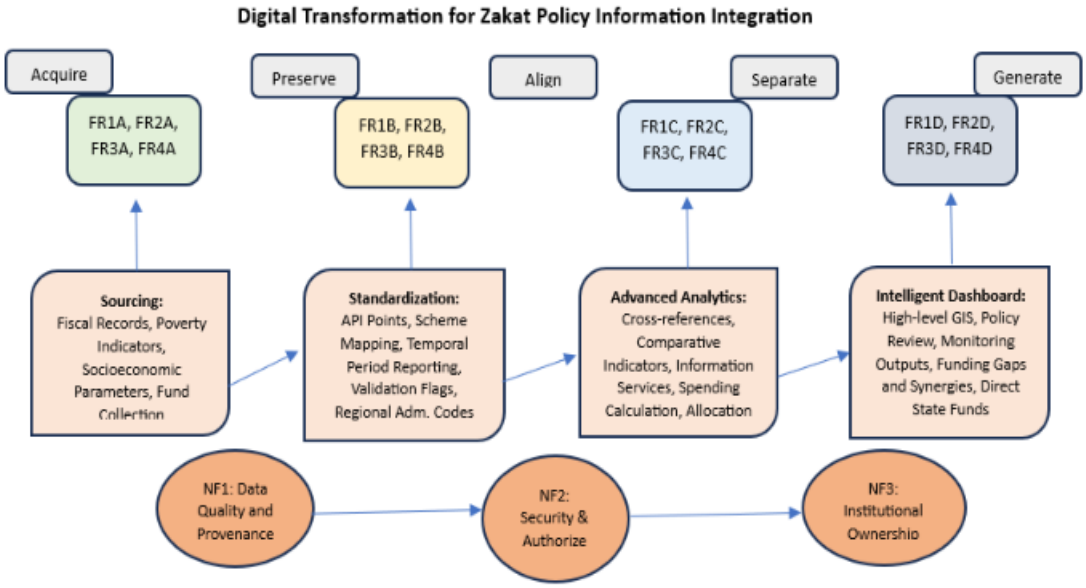


Figure 3. Zakat–Fiscal Information Digital Transformation Concept

Figure 4 presents the proposed four-layer architecture for integrating zakat management information with regional fiscal expenditure and socioeconomic indicators. The framework comprises institutional data sources, data integration and standardization, analytical information services, and fiscal monitoring outputs, supported by governance controls across all layers. Rather than establishing a centralized financial management system, the architecture is intended to facilitate controlled information exchange among institutions with different administrative responsibilities. This distinction reflects the coordinated approach discussed by Lubis et al. [6], in which technological integration supports interorganizational collaboration without necessarily transferring operational authority. The separation of institutional systems also follows interoperability principles emphasizing the need to accommodate differences in information structures and organizational arrangements [16][17]. Meanwhile, the first layer represents the institutional sources from which relevant information would be obtained. Zakat Management Systems operated by BAZNAS and related institutions maintain records concerning collection, distribution, fund classifications, and reporting periods. Regional government authorities provide information on realized expenditure under the Anggaran Pendapatan dan Belanja Daerah (APBD), while Statistics Indonesia (BPS) supplies socioeconomic indicators, including regional poverty statistics. These datasets are maintained for different administrative purposes and cannot be assumed to share identical reporting structures. Moreover, zakat records may distinguish the location of collection from the area receiving assistance, whereas government expenditure generally follows established budgetary classifications. The proposed architecture therefore preserves source-specific attributes before information is transferred for integration. This approach also recognizes the institutional coordination objectives of Satu Data ZIS-DSKL without assuming that existing initiatives have already established interoperability across zakat, fiscal, and statistical information systems [9]. The second layer addresses the technical requirements for exchanging and standardizing selected institutional records. Source adapters could receive authorized information through Application Programming Interfaces (APIs) or structured files, depending on the capabilities of the participating institutions. Once received, the records would undergo schema mapping to reconcile differences in field definitions, geographical identifiers, reporting periods, and financial classifications. Validation procedures would then examine whether the information is sufficiently complete and consistent for the intended analytical purpose. These mechanisms reflect the distinction between technical connectivity and semantic compatibility discussed

in interoperability research [16][17]. A shared exchange format alone would not resolve differences in meaning, particularly when institutions apply different classifications to financial activities or administrative areas.

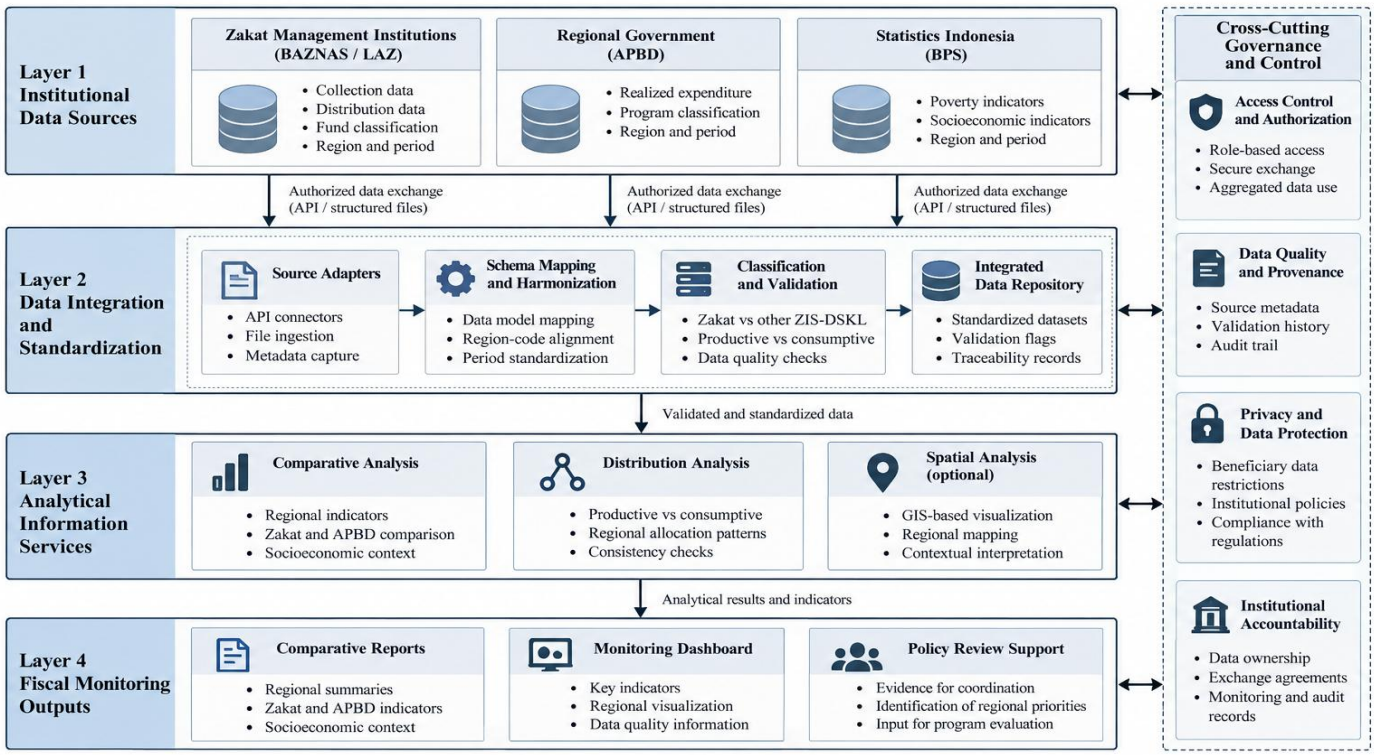


Figure 4. Proposed Four-Layer Zakat–Fiscal Information Integration Architecture

Financial classification constitutes a central concern within this process. Zakat should remain distinguishable from infak, *sadaqah*, and other categories included in ZIS-DSKL reporting. Where source records provide the necessary information, distribution purposes may also be classified as productive or consumptive without treating these categories as equivalent to fund types or beneficiary eligibility. Geographical and temporal harmonization requires similar caution. Annual zakat and APBD records may be presented alongside BPS poverty indicators associated with March or September observations, but their reporting periods are not inherently equivalent. The integration layer would therefore retain original reference dates and apply validation flags when records have incompatible periods, incomplete classifications, or inconsistent geographical coverage. Rather than automatically reconciling every discrepancy, the design allows uncertain records to remain identifiable and prevents their unrestricted use in comparative outputs. These principles are consistent with the need for controlled interpretation and standardized information exchange in cross-institutional systems [16][22]. The standardized information would be maintained within a proposed integrated data repository containing authorized aggregates, relevant metadata, and validation records. This repository represents a logical component for analytical integration rather than a replacement for the operational databases maintained by participating institutions. Original financial records and institutional accounting responsibilities would remain under their respective authorities. Table 5 summarizes the minimum information attributes and alignment considerations associated with each source. The proposed fields represent information requirements for future integration, and their availability would need to be verified during implementation.

Table 5. Minimum Information Attributes and Alignment Rules for Zakat–Fiscal Integration

Information source	Proposed minimum attributes	Integration and alignment rules
ZMS: Zakat collection	Source institution, collection region, reporting period, fund category, collection amount	Preserve source identifiers and fund classifications. Distinguish zakat from other ZIS-DSKL funds and retain original reporting periods.
ZMS: Zakat distribution	Source institution, distribution region, reporting period, fund category, disbursement amount; distribution purpose and asnaf category where available	Distinguish collection from distribution. Preserve productive and consumptive classifications when reported; prioritize authorized aggregates over beneficiary-level records.
Regional fiscal records (APBD)	Region identifier, fiscal year, realized expenditure, expenditure classification, reporting status	Retain realized expenditure and fiscal classifications separately from zakat records. Identify differences in reporting periods and administrative coverage.

BPS socioeconomic information	Region identifier, reference month/year, poverty indicator, measurement unit	Preserve the original statistical reference period and geographical coverage. Do not treat monthly observations and annual financial records as directly equivalent.
Integration metadata	Source identifier, extraction date, reference period, validation status, transformation record	Maintain provenance and record classification or alignment issues. Flag incomplete or incompatible information before analytical use.

The third layer provides analytical information services for examining the standardized data. Its primary function is to generate descriptive comparisons of zakat collection, distribution, regional expenditure, and socioeconomic conditions while preserving the distinctions between these measures. Comparative indicators could reveal geographical differences in reported zakat allocations or identify regions where available financial and poverty information warrants closer examination. Where reliable classifications exist, productive and consumptive distributions may be analyzed separately to provide a more detailed account of allocation priorities. Previous studies have recognized the relevance of such distinctions for understanding zakat management and regional allocation patterns [6][24]. Nevertheless, differences in reporting coverage and institutional definitions must remain visible in the resulting analysis. Spatial analysis represents an additional, rather than mandatory, capability of the analytical layer. Lubis et al. [25] proposed the use of Geographic Information Systems (GIS) to strengthen the geographical interpretation of zakat distribution and support institutional coordination. Building on this perspective, the proposed framework could incorporate GIS-based visualization to display authorized regional aggregates alongside relevant socioeconomic indicators. Such functionality would depend on the availability of compatible geographical identifiers and sufficiently reliable data. The analytical services would not require the disclosure of individual beneficiary locations for routine regional comparisons. More importantly, geographical proximity between zakat allocations, public expenditure, and poverty conditions should not be interpreted as evidence of a causal relationship. The immediate analytical contribution lies in improving the organization and comparability of available information.

The fourth layer translates analytical results into fiscal monitoring outputs intended for institutional review. Comparative reports would present regional zakat and APBD indicators within their respective financial domains, while monitoring dashboards could display distribution patterns, socioeconomic references, and data-quality information. These outputs are designed to assist participating institutions in identifying information gaps, examining geographical priorities, and reviewing possible areas of program coordination. Where records contain incomplete classifications or incompatible reporting periods, the relevant limitations should accompany the displayed indicators. This would help prevent apparent differences between regions from being interpreted without consideration of their underlying data conditions. Accordingly, the proposed monitoring services are intended to support informed policy review rather than automate financial allocation decisions or combine zakat and government budget balances.

Governance operates across the four layers because the reliability of an integrated output depends not only on its analytical processing but also on the conditions under which information is obtained and exchanged. Access control and authorization would determine which institutions or users may access particular datasets, while data-quality and provenance controls would preserve information concerning the source, transformation, and validation of each record. Such provisions reflect the relevance of information quality and traceability to the usefulness of information systems [18][28]. Privacy safeguards would restrict unauthorized disclosure of beneficiary-related information, and institutional accountability mechanisms would document responsibilities for data ownership, information exchange, and audit activities. These requirements are consistent with established interoperability governance principles and software quality considerations [22][29]. Their inclusion does not imply that participating institutions currently operate under a common technical security infrastructure. Research on information security awareness in university systems likewise emphasizes the human responsibilities that accompany technical safeguards [32]. This provides a related governance consideration, rather than validation of the security controls proposed here.

In the end, the architecture connects the eight identified system requirements with specific components and information-processing functions. The source and integration components address data acquisition, classification, and alignment, while the analytical and monitoring layers provide the intended comparative outputs. Governance mechanisms establish conditions for data quality, authorized access, and institutional accountability throughout the information flow. The proposed arrangement offers a technical design rationale for coordinating zakat and fiscal information without consolidating institutional financial responsibilities. However, the architecture remains a conceptual artifact. The availability of operational interfaces, compatibility of institutional datasets, performance of exchange mechanisms, and effectiveness of governance controls have not yet been established through implementation or independent testing. These limitations provide the basis for the scenario-based conceptual assessment discussed in the following section.

4.4 Framework Evaluation

The conceptual evaluation examines whether the proposed architecture can accommodate the three information-processing scenarios defined in Section 3.5. The assessment draws on the eight requirements in Table 4, the minimum information attributes in Table 5, and the processing components represented in Figure 2. Its emphasis is on the consistency between identified requirements and proposed system behavior. Since operational datasets and executable interfaces were not available for testing, the walkthrough considers the expected responses of the architecture rather than observed computational outcomes. The resulting assessment is therefore limited to design coverage and cannot establish operational effectiveness [19][30]. The first scenario (S1) concerns the comparison of regional zakat distribution with socioeconomic indicators. Its starting condition assumes that authorized zakat distribution aggregates and regional poverty information are available, although their geographical identifiers or reporting periods may differ. Within the proposed architecture, source adapters would identify the relevant records, while the integration

layer would examine regional correspondence, preserve reference periods, and record inconsistencies through validation flags. Analytical services could subsequently produce regional comparisons using records that satisfy the required conditions. Where temporal coverage or geographical definitions remain incompatible, the monitoring output should retain the relevant limitations rather than present the information as directly comparable. This scenario addresses FR-01, FR-03, FR-05, and NFR-01. Nevertheless, the availability of suitable institutional records and the feasibility of harmonizing their geographical and temporal references have not been independently verified.

The second scenario (S2) examines the parallel presentation of zakat and realized regional government expenditure. Although these financial records may share regional identifiers, they represent distinct administrative and accounting domains. The proposed integration layer would preserve their respective classifications, reporting periods, and institutional origins before passing authorized aggregates to analytical services. Regional summaries could then display zakat distributions and APBD expenditure as separate indicators without consolidating the underlying financial balances. Where reporting periods differ, the output would identify the discrepancy to avoid suggesting an equivalence that the records do not support. This scenario primarily examines FR-03, FR-04, and FR-05, with institutional accountability under NFR-03 remaining relevant to the exchange process. The design specifies how financial separation should be maintained, but compatibility with actual reporting structures remains untested. The third scenario (S3) considers records containing mixed ZIS-DSKL categories, incomplete reference periods, or restricted beneficiary-related information. Such conditions present both classification and governance challenges. Under the proposed design, the integration layer would distinguish zakat from other fund categories where sufficiently detailed information is available and assign validation flags to records with unresolved classifications. Incomplete temporal references would similarly require further verification before the corresponding values could enter comparative analysis. Where records contain sensitive beneficiary information, authorization controls would determine whether the information may be accessed or exchanged for the stated purpose. Unpermitted or insufficiently classified records should be withheld from routine analytical outputs rather than incorporated without qualification. This scenario addresses FR-02 and NFR-01 through NFR-03, while also illustrating the relevance of temporal validation under FR-03. However, institution-specific authorization policies, audit procedures, and the practical effectiveness of the proposed safeguards have yet to be established.

Table 6. Scenario-Based Conceptual Evaluation of the Proposed Framework

Scenario	Proposed design walkthrough	Intended analytical response	Requirements addressed	Remaining verification
S1. Regional zakat and poverty comparison	Acquire authorized aggregates; examine regional identifiers and observation periods; apply validation and provenance checks.	Regional indicators presented with original reference periods and flags for incompatible records.	FR-01, FR-03, FR-05, NFR-01	Dataset availability, regional mapping accuracy, and temporal comparability.
S2. Zakat and APBD comparison	Preserve independent financial classifications; align permissible regional references; maintain institutional ownership.	Parallel zakat and APBD indicators without consolidating their accounting balances.	FR-03, FR-04, FR-05, NFR-03	Financial definitions, source compatibility, and institutional exchange arrangements.
S3. Mixed funds and restricted records	Apply fund classification rules, identify incomplete metadata, and examine authorization conditions.	Separate, flag, or withhold records that do not satisfy classification, quality, or access requirements.	FR-02, FR-03, NFR-01, NFR-02, NFR-03	Classification consistency, actual access policies, and effectiveness of audit and privacy controls.

The scenario walkthrough provides a basis for examining requirements coverage across the proposed architecture. All eight requirements can be associated with at least one component and one representative scenario, although the completeness of their design specifications varies. Requirements related to fund classification and separation of institutional financial accounts have relatively explicit handling rules. By comparison, geographic harmonization, detailed analytical procedures, and institutional authorization depend on information or agreements that have not yet been established. Table 7 presents the corresponding traceability assessment, distinguishing requirements that are sufficiently represented at the conceptual level from those whose design remains partially specified.

Table 7. Requirements Traceability and Conceptual Design Coverage Assessment

Requirement	Architectural response	Relevant scenario	Design-level assessment
FR-01	Source adapters and authorized acquisition through proposed APIs or structured files.	S1	Supported: the acquisition pathway and required source attributes are identified.
FR-02	Fund classification and validation rules distinguishing zakat, other ZIS-DSKL funds, and distribution purposes where available.	S3	Supported: the classification boundaries and handling of undefined categories are specified.

FR-03	Geographic and temporal alignment with preserved reference periods and validation flags.	S1, S2, S3	Partially supported: alignment logic is defined, but institution-specific mapping rules remain unresolved.
FR-04	Separate fiscal data processing and analytical presentation of zakat and APBD records.	S2	Supported: financial domain separation is explicitly represented in the design.
FR-05	Comparative analytical services and regional monitoring outputs.	S1, S2	Partially supported: the intended indicators are identified, but their operational calculations have not been established.
NFR-01	Source metadata, validation status, provenance records, and traceability controls.	S1, S3	Supported: the required metadata and conceptual quality-control functions are identified.
NFR-02	Authorization checks and restrictions on beneficiary-level information.	S3	Partially supported: access controls are proposed, but institution-specific permissions and enforcement remain unverified.
NFR-03	Institutional data ownership and auditable information exchange.	S2, S3	Partially supported: accountability functions are identified, while actual interinstitutional arrangements remain undefined.

The traceability assessment suggests that the architecture offers a coherent conceptual response to the principal information-integration problems identified in the study. Four requirements are supported at the design level, while four are partially supported because their practical realization depends on more detailed technical or institutional specifications. No requirement is left without an identifiable architectural component or representative scenario. This finding indicates coverage within the proposed design, not evidence that the corresponding functions operate correctly in institutional environments. In particular, the existence of classification rules or access-control components within an architecture diagram cannot demonstrate the accuracy of financial records, the security of information exchange, or the consistency of regional analytical outputs. Several limitations therefore remain, which the walkthrough relies on internal examination of proposed information flows and requirements rather than executable software, independent expert judgments, or observations from participating institutions. Consequently, the study cannot determine whether the architecture would improve processing efficiency, reduce reporting errors, strengthen institutional coordination, or contribute to poverty reduction. A subsequent evaluation should first examine the framework with authorized aggregate datasets to determine whether the proposed schema mapping, validation rules, and regional indicators can be implemented consistently. Expert review involving zakat administrators, fiscal authorities, and information systems practitioners could then assess the applicability of the architecture and the adequacy of its governance arrangements. Such investigations would extend the present design-level assessment toward the practical applicability considerations discussed by Rosemann and Vessey [31].

4.5 Implications for Islamic Fiscal Policy

The proposed framework offers an information-oriented approach to coordinating zakat management with regional fiscal analysis. Rather than incorporating zakat into government budgetary accounts, its purpose is to make information from separate financial institutions more accessible for comparative assessment. Zakat remains governed by its religiously defined distribution principles, while regional government expenditure follows public budgeting procedures. Previous research has examined the relationship between zakat, government expenditure, and poverty reduction, suggesting that these instruments may contribute to related socioeconomic objectives despite their different institutional arrangements [3], [4]. The present framework extends this discussion by addressing the information requirements needed to examine their geographical and temporal relationships. It does not assume that coordinated reporting changes financial authority or establishes a causal relationship between zakat allocation and poverty outcomes. An important institutional reference is the Satu Data ZIS-DSKL initiative launched by the Ministry of National Development Planning (Bappenas), the Ministry of Religious Affairs, and BAZNAS in August 2026. According to Bappenas [9], the initiative seeks to integrate mustahik information with the Data Tunggal Sosial dan Ekonomi Nasional (DTSEN), supporting beneficiary validation, program coordination, and more informed allocation of Islamic social finance. These objectives provide a relevant foundation for improving information consistency among zakat institutions. Nevertheless, beneficiary data integration and regional fiscal analysis address different analytical questions. The former emphasizes information concerning eligible recipients and the coordination of assistance, whereas the proposed framework examines how authorized zakat aggregates may be interpreted alongside realized government expenditure and regional socioeconomic indicators. Accordingly, the architecture should be understood as a potential analytical complement to existing national data initiatives, not as a competing platform or a replacement for their institutional functions.

Table 8. Complementary Roles of Satu Data ZIS-DSKL and the Proposed Zakat–Fiscal Framework

Dimension	Satu Data ZIS-DSKL: published objectives [9]	Proposed framework: conceptual contribution
Institutional focus	Improve coordination of ZIS-DSKL information and its use in socioeconomic programs.	Support comparative analysis across zakat institutions, fiscal authorities, and statistical sources.

Data emphasis	Integration of mustahik information with DTSEN to support beneficiary-related planning and validation.	Authorized regional zakat aggregates, realized APBD expenditure, and BPS socioeconomic indicators.
Analytical orientation	Improve information use for targeting, distribution, and coordination of assistance programs.	Examine regional allocation patterns, financial classifications, geographical coverage, and reporting-period differences.
Information processing	National data coordination and beneficiary information integration as described in the initiative.	Proposed source adapters, schema mapping, validation rules, provenance controls, and regional analytical services.
Institutional responsibility	Support coordination among participating institutions within their respective mandates.	Preserve independent financial administration, data ownership, and controlled information exchange.

The additional analytical value of the proposed framework lies in the ability to examine several forms of regional information without treating them as interchangeable. For zakat institutions, standardized reporting could support comparisons between collection and distribution patterns, including productive and consumptive assistance where reliable classifications are available. Differences between collection and distribution locations may also provide useful information about the geographical allocation of resources. Research on Zakat Management Systems has highlighted the influence of institutional arrangements on information coordination [6], while regional allocation studies indicate the relevance of distinguishing distribution purposes across geographical areas [24]. The framework translates these considerations into proposed analytical services that retain the origin, classification, and reporting period of each record. Such services could assist institutional review, although they would not independently establish whether a particular allocation was equitable or effective. For regional fiscal authorities, the framework could provide a complementary perspective on the geographical distribution of social assistance and public expenditure. By presenting zakat disbursement and realized APBD figures as separate indicators, participating institutions may identify areas that warrant further examination in relation to local socioeconomic conditions. A region with substantial reported financial assistance, for example, may still exhibit considerable poverty, but this observation would require additional investigation before conclusions about program performance could be drawn. Differences in population size, beneficiary eligibility, reporting coverage, and the timing of interventions may influence the interpretation of such patterns. The proposed analytical outputs therefore offer a basis for identifying questions relevant to policy coordination rather than prescribing resource reallocations or attributing socioeconomic changes to particular financing instruments [4][16][17].

The contribution of statistical information is equally consequential. Poverty indicators published by BPS provide socioeconomic references against which regional financial information may be examined, although the underlying measurement periods and geographical definitions must remain explicit. Annual zakat or government expenditure figures cannot be assumed to correspond directly to poverty observations collected in March or September. Regional boundary differences may create further difficulties, particularly when institutions use administrative classifications that are not fully aligned. The proposed integration layer would address these conditions through reference-code mapping, preservation of source periods, and validation flags for records that cannot be compared reliably. Information quality and provenance are therefore essential to the intended analytical value of the framework. As discussed by Wang and Strong [28], data usefulness depends on more than numerical accuracy, particularly when information is interpreted for decisions beyond its original collection purpose. Practical adoption would also depend on agreements governing data access, classification standards, institutional responsibilities, and permitted information exchange. The framework does not require zakat institutions to surrender control of their financial records or government agencies to assume responsibility for zakat distribution. Instead, participating organizations would retain their respective administrative mandates while sharing selected information under defined authorization and accountability arrangements. Beneficiary-level records should remain subject to applicable privacy safeguards, with regional fiscal monitoring relying primarily on authorized aggregates. These provisions are consistent with interoperability governance principles that emphasize institutional coordination alongside technical compatibility [17][22]. Their effectiveness, however, cannot be inferred from the inclusion of access-control and audit components within a conceptual architecture. The proposed framework consequently offers a possible extension of existing zakat information initiatives toward cross-institutional fiscal monitoring. Its anticipated contribution is the structured comparison of regional zakat, public expenditure, and socioeconomic information, supported by explicit classification rules and governance controls. Whether these capabilities would improve institutional decision-making remains an empirical question. Further work should examine the feasibility of obtaining authorized aggregate records, assess compatibility with existing reporting standards, and involve relevant institutional representatives in reviewing the proposed analytical outputs. Prototype-based assessment and expert evaluation would also be necessary before claims concerning operational reliability, usability, or policy effectiveness could be justified [30][31].

5. CONCLUSSION

This study developed an evidence-based conceptual framework for integrating zakat management information with regional government expenditure and socioeconomic indicators in Indonesia. Drawing on Design Science Research and qualitative document analysis, the proposed architecture consists of four interconnected layers supported by data standardization, analytical services, and cross-cutting governance controls. Its main contribution lies in translating institutional information challenges into five functional and three non-functional requirements that can be traced to specific architectural components. The framework accommodates regional comparisons while preserving differences in fund classifications, reporting periods, and institutional

financial responsibilities. Through three scenario-based walkthroughs, all eight requirements were mapped to the proposed architecture, with four assessed as supported and four as partially supported at the conceptual design level. The resulting framework provides a basis for extending zakat information integration toward regional fiscal monitoring, complementing existing national data initiatives without merging zakat administration with government budgetary authority. Despite these contributions, the framework has not been implemented or examined using operational institutional databases. Its evaluation relies on documentary evidence and internal scenario assessments, leaving questions concerning technical interoperability, data availability, security enforcement, and institutional feasibility unresolved. The findings therefore demonstrate conceptual design coverage rather than verified system effectiveness or measurable improvements in poverty reduction. Future research should examine the architecture using authorized regional datasets, particularly to assess geographical and temporal alignment, fund classification consistency, and the feasibility of distinguishing productive and consumptive distributions. Prototype development and independent evaluation involving zakat institutions, fiscal authorities, and information systems practitioners would provide further evidence of its technical and organizational applicability. Such investigation is necessary to determine whether coordinated information services can support more informed fiscal monitoring while maintaining the governance requirements and distinctive allocation principles of zakat.

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