

## REVAMPING TRADITION WITH TECH: GUIDING INNOVATION IN ZAKAT FOR SOCIAL GOOD

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**ABSTRACT:** *As a pillar of Islam, zakat holds profound meaning and socioeconomic significance. However, oversight deficiencies have constrained its capacity for poverty alleviation. This paper explores emerging technologies - including blockchain, artificial intelligence, and mobile platforms - to strengthen zakat management. Through a qualitative literature review, we examine the digital transformation of zakat systems. We argue for cautious technology adoption to enhance transparency, efficiency, and inclusivity while aligning with Islamic ethics. Guiding principles grounded in maqasid al-shariah are offered, emphasizing human discretion and oversight. While risks around exclusion, security, and algorithmic bias necessitate vigilance, thoughtfully implemented technology can optimize zakat distribution and amplify impact. By leveraging innovation to uphold foundational values, zakat can fulfil its noble obligations of uplifting communities and promoting social justice.*

**Keywords:** *Artificial Intelligence, Technology, Blockchain, Islamic Ethics, Transparency, Zakat*



## A. Introduction

Zakat, a foundational pillar of Islam, serves as a symbol of profound commitment to charity, social justice, and community solidarity.<sup>1</sup> It obligates financially capable Muslims to contribute 2.5% of their wealth to specified recipients, emphasizing wealth redistribution and poverty alleviation as fundamental principles of Islamic finance.<sup>2</sup> This religious financial obligation extends far beyond a mere ritual; it embodies the essence of Islamic principles and values. As a religious and financial obligation, zakat carries significant responsibility in adhering to Islamic principles of transparency, accountability, and optimizing charitable funds for poverty alleviation.<sup>3</sup> However, mismanagement remains a persistent challenge. Issues such as leakage, inadequate targeting of beneficiaries, and a lack of trust from donors have plagued non-profit organization systems.<sup>4</sup> While zakat collection in Indonesia has increased over the years, there are some issues in its distribution. For example, zakat distribution is uneven, with some poor areas receiving less funds than others. Additionally, there are cases where people register as poor in multiple zakat institutions to receive multiple benefits. More transparency and coordination is needed to improve zakat distribution. These challenges hinder the ability of zakat to fulfil its noble mission of reducing poverty and addressing socioeconomic disparities. When managed effectively, zakat holds the potential to play a vital role in addressing social inequalities.<sup>5</sup> It can uplift marginalized communities, provide essential resources for those in need, and contribute to broader socioeconomic development. However, the shortcomings in zakat oversight have limited its impact.

Emerging technologies, including blockchain, artificial intelligence, and mobile platforms, offer a promising avenue to revitalize and strengthen zakat systems.<sup>6</sup> These technologies, if thoughtfully implemented, have the potential to address longstanding challenges in zakat management. Blockchain technology can encode zakat distribution rules

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<sup>1</sup> Supriani, Indri, Sri Iswati, Firsty Izzata Bella, and Yunice Karina Tumewang. 2022. "A Bibliometric Analysis of Zakat Literature from 1964 to 2021." *Journal of Islamic Economic Laws* 5, no. 2: 263–96. Hassan, M. Kabir, and Juanyed Masrur Khan. 2007. "Zakat, External Debt and Poverty Reduction Strategy in Bangladesh." *Journal of Economic Cooperation* 28, no. 4: 1–38.

<sup>2</sup> Hudayati, Ataina, and Achmad Tohirin. 2019. "Performance Measurement System for Zakat Institutions: Integrating Maqashid Sharia and Sharia Enterprises Theory." *International Conference of Zakat*, 291–99.

<sup>3</sup> Sirajul Munir. 2023. "Integration of Social Regulations and Zakat Management Regulations as National Efforts to Alleviate Poverty" 10, no. 1: 83–97.

<sup>4</sup> Herman, Melanie L, George L. Head, Peggy M. Jackson, Toni E. Fogarty, and Jessica Kronstadt. 2004. *Managing Risk in Nonprofit Organizations : A Comprehensive Guide*.

<sup>5</sup> Venkatesha Nayak, and Kavya P Hegde. 2023. "Examining the Impact of Wealth Redistribution through Zakat." *Millah: Journal of Religious Studies* 22, no. 2: 285–312.

<sup>6</sup> Zulfikri, Salina Hj Kassim, and Weni Hawariyuni. 2021. "Proposing Blockchain Technology Based Zakat Management Model to Enhance Muzakki's Trust in Zakat Agencies: A Conceptual Study." *Journal of Accounting Research, Organization and Economics* 4, no. 2: 153–63.

into smart contracts, providing an immutable ledger of fund flows and enhancing transparency.<sup>7</sup> This technology can ensure that zakat contributions are channeled to their intended recipients, mitigating issues of leakage and corruption that have plagued traditional systems. Artificial intelligence can revolutionize zakat distribution by enabling real-time needs assessment and personalized disbursements.<sup>8</sup> AI algorithms can analyze community needs, adjusting zakat allocations dynamically to match the evolving requirements of beneficiaries. This data-driven approach ensures that zakat funds are optimally utilized for poverty alleviation. Mobile platforms and applications offer accessible channels for both payers and recipients, simplifying the zakat payment process and enabling real-time monitoring.<sup>9</sup> These platforms can engage a wider audience of donors, provide transparency in donation tracking, and empower beneficiaries to access zakat resources conveniently.

A number of pioneering initiatives have utilized landscape technology to transform zakat management in practice.<sup>10</sup> In Malaysia, zakat institutions have adopted digitalized systems to analyse historical data and optimize targeting of zakat distributions, leading to a 10% increase in funds directed to the neediest households.<sup>11</sup> In Indonesia, Dompot Dhuafa has leveraged social media digital campaign, validating that has succeeded in increasing volume and expanding audience reach as a target of muzakki.<sup>12</sup> In the Gulf region, pioneering crowdfunding apps have simplified giving for tech-savvy youth. According Al Arif et al. (2023) for instance, an mobile platform increased zakat donations among young professionals in its first year by enabling seamless recurring payments and transparent impact reporting. Such real-world examples validate technology's potential while also revealing important lessons for effective and ethical implementation.

While the promise of technology is substantial, there are inherent risks that must be addressed in the integration of technology with zakat management. The digital divide, where

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<sup>7</sup> Khairi, Khairil Faizal, Nur Hidayah Laili, Hisham Sabri, Azuan Ahmad, Van Hieu Pham, and Manh Dung Tran. 2023. "The Development and Application of the Zakat Collection Blockchain System." *Journal of Governance and Regulation* 12, no. 1 special issue: 294–306.

<sup>8</sup> Nugraha, Fajar, Sendi Permadia, Aditya Rahmat Gunawan, and Erip Saeful. 2019. "Artificial Intelligence Usage in Zakat Optimization." *International Conference of Zakat*, 14–24.

<sup>9</sup> Angga Syahputra, and Mukhtasar Mukhtasar. 2021. "Digitizing Zakat Collection through the E-Payment System." *Al-Amwal : Jurnal Ekonomi Dan Perbankan Syariah* 13, no. 1: 14.

<sup>10</sup> Noortel. 2015. "The Digital Islamic Services Landscape." *Deloitte*, v.

<sup>11</sup> Rosele, Muhammad Ikhlas, Abdul Muneem, Noor Naemah Binti Abdul Rahman, and Abdul Karim Ali. 2022. "The Digitalized Zakat Management System in Malaysia and the Way Forward." *Al-Ihkam: Jurnal Hukum Dan Pranata Sosial* 17, no. 1: 242–72.

<sup>12</sup> Nasution, Juliana. 2022. "Strategi Digital Fundraising Zakat Di Indonesia." *Jurnal Edukasi* 10, no. November: 143–54. Bakar, M A, S Ahmad, A D Salleh, and M F M Salleh. 2021. "Governance and Waqf Funds Sustainability: Case Study in DompotDhuafaRepublika, Indonesia." *Linguistica ...* 13.

marginalized communities lack access to technology, could exacerbate inequalities.<sup>13</sup> Unethical use of data surveillance tools can violate privacy rights and compromise the ethical foundations of zakat.<sup>14</sup> Additionally, biased algorithms have the potential to discriminate against marginalized populations if not rigorously evaluated and monitored.<sup>15</sup>

This paper delves deeper into the opportunities and limitations of leveraging technology to strengthen oversight, efficiency, and the impact of zakat distributions in line with Islamic principles. By carefully navigating these challenges and aligning technological advancements with the ethical underpinnings of zakat, it is possible to unlock the full potential of this fundamental pillar of Islam. Technology, when harnessed thoughtfully, has the capacity to enhance the effectiveness of zakat in addressing poverty and promoting social justice.

## B. Literature Review

### Prior Studies on Digitization of Zakat Collection and Distribution

Numerous studies have examined the digitization of zakat collection and distribution systems.<sup>16</sup> Millatina et al. (2022) reviewed various fintech innovations for zakat management, analysing how crowdfunding platforms and blockchain-based smart contracts could enhance transparency and accountability in fund flows. Their findings highlight efficiency gains and trust-building potential, but caution that proper regulations are needed. Syed et al. (2020) specifically analysed the potential of artificial intelligence to automate certain processes and personalize zakat disbursement amounts based on individual recipient needs and profiles. However, the study noted algorithmic bias risks and emphasized that AI should remain assistive, not autonomous, with humans overseeing technology alignment with Islamic ethics.

Fachmi & Fatwa (2023) assessed mobile apps for streamlining zakat reporting by donors and recipients. While finding such platforms improved access and monitoring capabilities, they reiterated that human discretion must be retained for oversight, particularly regarding sensitive decisions on fund allotments. de Bruijn & Janssen (2017) examined the

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<sup>13</sup> Tewathia, Nidhi, Anant Kamath, and P. Vigneswara Ilavarasan. 2020. "Social Inequalities, Fundamental Inequities, and Recurring of the Digital Divide: Insights from India." *Technology in Society* 61, no. January: 101251.

<sup>14</sup> Saura, Jose Ramon, Domingo Ribeiro-Soriano, and Daniel Palacios-Marqués. 2022. "Assessing Behavioral Data Science Privacy Issues in Government Artificial Intelligence Deployment." *Government Information Quarterly* 39, no. 4.

<sup>15</sup> Akter, Shahriar, Grace McCarthy, Shahriar Sajib, Katina Michael, Yogesh K. Dwivedi, John D'Ambra, and K. N. Shen. 2021. "Algorithmic Bias in Data-Driven Innovation in the Age of AI." *International Journal of Information Management* 60.

<sup>16</sup> (Syahputra and Mukhtasar 2021). Yuniar, Adela Miranti, Adela Natasya, Rahmatina Kasri, and Dodik Siswanto. 2021. "Zakat and Digitalization: A Systematic Literature Review." *5th International Conference of Zakat Proceedings*, 523–34.

urgency of developing appropriate regulations to govern emerging technologies, highlighting risks like cybersecurity vulnerabilities. This applies to oversight of fintech's growing role in zakat management. These influential studies provide insights into key opportunities and limitations of digitizing zakat systems. The literature emphasizes that while technologies like AI and blockchain offer efficiency and transparency gains, they necessitate vigilant governance, oversight and continued adherence to Islamic principles by human decision-makers.

### **Academic Discourse on Benefits and Risks of Applying AI and Fintech for Islamic Finance**

The academic discourse on AI and fintech applications in Islamic finance provides important insights into the opportunities and challenges of using these emerging technologies for oversight and optimization of zakat systems. Several scholars have explored the potential of AI tools like machine learning and data analytics to improve targeting and personalization of zakat disbursements. Haleem et al. (2022) and (Mohadi and Tarshany 2023) found that AI-based needs assessment and profiling of recipients allowed more precise distribution, it can also aligned with Islamic term maqasid al-shariah. Anderson & Raine, (2023) argued AI could simulate scenarios for optimizing allocations resources across eligible recipient and have deep concerns about people's and society's overall well-being. But they also expect great benefits in health care, scientific advances and education. However, Borgesius (2018) cautioned that AI systems reflect the biases of their human designers, risking discrimination against marginalized groups in automated decisions. They advocate rigorous pre-deployment testing and monitoring.

On fintech, Ikhsan (2023) examined the promise of blockchain and smart contracts to embed transparency, accountability and trust in zakat fund flows. But studies like Albenjasim et al. (2023) also underscored the need for appropriate regulations to govern fintech systems, highlighting risks of cybersecurity vulnerabilities. Scholars have prescribed guidelines for the ethical adoption of these technologies in Islamic finance, applicable to zakat. Mohadi & Tarshany (2023) recommended AI be positioned as an assistive rather than autonomously decisional technology, emphasizing human oversight aligned with maqasid values. Hodson et al. (2023) advocated for participatory design processes to centre end-user needs and perspectives.

## **Analyses of Blockchain for Charity Transparency**

Blockchain technology has gained significant attention for its potential to enhance transparency and accountability in zakat distribution.<sup>17</sup> Rejeb (2020) explored the benefits of blockchain-based smart contracts that can encode zakat disbursement rules, ensuring fund transfers reach intended beneficiaries immutably. They argued this transparency builds trust and integrity. However, risks have also been identified. (Parliament 2020; Slaughter 2021) warned that algorithms underpinning blockchain systems may discriminate against vulnerable groups if built without sufficient safeguards. They recommend rigorous testing for bias before deployment.

Millatina et al. (2022) advocated for designing inclusivity into technological solutions like blockchain for zakat, stressing the need to address barriers faced by segments of society with limited digital access or literacy. Studies like Singla et al. (2022) provide specific guidance on decentralized identity frameworks to ensure inclusive access. Examining governance implications, (Prayudya and Al-Ayubi 2023) argued for guidelines grounded in maqasid al-shariah to ensure new technologies like blockchain align with Islamic principles and ethics. This includes conducting impact assessments to uphold values like social justice.

## **Research on Mobile Platforms for Crowdfunding and Accountability**

Mobile platforms are gaining prominence as tools to facilitate crowdfunding and accountability in zakat initiatives. Studies by Chuttur (2023) assessed mobile apps that enabled donors to track their zakat contributions and view disbursement reports. While ease of monitoring increased donor trust, the studies stressed the need for mechanisms to verify the reliability of data. Hudaifah et al. (2022) evaluated an app that integrated geo-tagging and photos to provide donors with real-time visibility into zakat distributions. They found this improved transparency but noted concerns around infringing on recipient privacy. Guidelines on ethical use of monitoring features are needed. Several scholars have highlighted the potential of mobile apps to increase youth engagement in zakat payment and oversight.<sup>18</sup> However, issues like digital illiteracy must be addressed.

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<sup>17</sup> (Zulfikri et al. 2022)

<sup>18</sup> Mohammad Nur Rianto Al Arif, Nofrianto Nofrianto, and Muhammad Iqbal Fasa. 2023. "The Preference of Muslim Young Generation in Using Digital Zakat Payment: Evidence in Indonesia." *Al-Uqud : Journal of Islamic Economics* 7, no. 1: 1–16. Utami, Pertiwi, Tulus Suryanto, M Nasor, and Ruslan Abdul Ghofur. 2020. "The Effect Digitalization Zakat Payment Against Potential of Zakat Acceptance." *Iqtishadia* 13, no. 2: 216–39. Muneeza, Aishath, and Shahbaz Nadwi. 2019. "The Potential of Application of Technology-Based Innovations for Zakat Administration in India." *International Journal of Zakat* 4, no. 2: 87–100.

### C. Research Method

This study utilizes a systematic literature review methodology to examine the opportunities and challenges of adopting emerging technologies for zakat management oversight. Academic papers were retrieved from scholarly databases including JSTOR, Emerald Insight, and SpringerLink, focusing on literature published in the last five years specifically at the intersection of technology and zakat systems. Search terms used included combinations of the keywords: “zakat”, “fintech”, “blockchain”, “artificial intelligence”, “mobile platforms”, “transparency”, “accountability”, “efficiency”, “targeting”, and “Islamic ethics”. The initial search yielded over 50 relevant papers which were reviewed in depth.

Industry publications and conference proceedings from key Islamic finance and technology organizations were also analysed, including sources such as the Islamic Development Bank, the Islamic Fintech Alliance, and the International Zakat Foundation. The findings from these sources were systematically compared and contrasted to identify key themes and insights on the opportunities for emerging technologies to enhance zakat oversight, as well as risks and challenges that require mitigation. Aspects examined included transparency, efficiency, inclusivity, governance, and adherence to Islamic principles. This rigorous systematic review aimed to provide a comprehensive overview of the current academic discourse and industry insights at the intersection of emerging technologies and zakat management systems. The findings inform the analysis and recommendations presented in this paper.

### D. Findings And Discussion

#### Blockchain, AI, Big Data Analytics, and Mobile Platforms

Blockchain technology offers several benefits for oversight of zakat systems.<sup>19</sup> The decentralized immutable ledger enhances transparency in fund flows, allowing donors and regulators to trace transactions.<sup>20</sup> Smart contracts can encode rules for zakat calculation and distribution, automating transfers based on verified recipient eligibility.<sup>21</sup> This boosts accountability and reduces reliance on intermediaries. Artificial intelligence tools can optimize

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<sup>19</sup> Mahri, A Jajang W, Ripan Hermawan, and Ipan Ahmad. 2023. “Society Readiness Index Using Blockchain Technology in Zakat Payments : Technology Readiness Index Approach.” *Jurnal UPI* 1, no. June: 1–22.

<sup>20</sup> Nurul Ikhsan. 2023. “Blockchain Zakat in Zakat Management Organizations, Is It Necessary?” *Journal of Enterprise and Development* 5, no. 3: 317–30.

<sup>21</sup> H. Elasrag. 2019. “Blockchains for Islamic Finance: Obstacles & Challenges.” *Munich Personal RePEc Archive*, no. 03: 1–39. <https://mpra.ub.uni-muenchen.de/92676/>.

beneficiary targeting through machine learning-based needs assessment and profiling.<sup>22</sup> Predictive analytics can forecast zakat contributions and recipient numbers for more data-driven planning. However, risks of algorithmic bias must be addressed through rigorous testing.<sup>23</sup>

Mobile platforms provide more accessible channels for payers and recipients while enabling real-time monitoring of funds.<sup>24</sup> Features like GPS tagging of disbursements improves oversight. Crowdsourced feedback can inform usage audits and impact evaluations. However, platforms must be designed inclusively, considering digital literacy barriers. Big data analytics can integrate information from diverse sources to identify gaps, priorities and opportunities for enhanced oversight.<sup>25</sup> Dashboards can track key metrics for stakeholders. But data privacy and security mechanisms are needed to prevent misuse.

### **Alignment with Islamic Ethics**

The responsible adoption of technology in zakat management necessitates a deep commitment to alignment with Islamic ethics and principles.<sup>26</sup> Ensuring that technology implementations adhere to Islamic values and principles is not merely desirable but essential.<sup>27</sup> Any deviation from these ethical foundations can jeopardize the integrity and legitimacy of zakat practices.<sup>28</sup> One area where alignment with Islamic ethics is crucial is in the realm of privacy.

Islamic principles strongly emphasize the value of individual privacy.<sup>29</sup> The unethical use of surveillance data, such as intrusive monitoring of beneficiaries or donors, clearly violates these principles. Zakat institutions must be vigilant in safeguarding the privacy and dignity of individuals involved in zakat transactions. Implementing technology should never compromise these fundamental values.

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<sup>22</sup> Gkikas, Dimitris C., and Prokopis K. Theodoridis. 2022. *AI in Consumer Behavior*. Springer International Publishing.

<sup>23</sup> Australian Human Rights Commissions. 2020. *Using Artificial Intelligence to Make Decisions : Addressing the Problem of Algorithmic Bias : Technical Paper*.

<sup>24</sup> (Syahputra and Mukhtasar 2021)

<sup>25</sup> Muhsin Nor Paizin. 2021. "Big Data Analytics for Zakat Administration: A Proposed Method." *Ziswaf: Jurnal Zakat Dan Wakaf* 8, no. 2: 104.

<sup>26</sup> Salleh, Marhanum Che Mohd, and Mohammad Abdul Matin Chowdhury. 2020a. "Technological Transformation in Malaysian Zakat Institutions." *International Journal of Zakat* 5, no. 3: 44–56.

<sup>27</sup> Seyed Ebrahim Hosseini, and Abdollatif Ahmadi Ramchahi. 2014. "The Impact of Information Technology on Islamic Behaviour." *Journal of Multidisciplinary Engineering Science and Technology* 9, no. 5: 236–39.

<sup>28</sup> Ebrahimi, Mansoureh, and Kamaruzaman Yusoff. 2017. "Islamic Identity, Ethical Principles and Human Values." *European Journal of Multidisciplinary Studies* 6, no. 1: 325.

<sup>29</sup> Lubis, Muharman, and Mira Kartiwi. 2013. "Privacy and Trust in the Islamic Perspective: Implication of the Digital Age." *2013 5th International Conference on Information and Communication Technology for the Muslim World, ICT4M 2013*, no. March 2013.



Inclusivity is another ethical imperative. It's vital to recognize that marginalized groups, including those in poverty, may lack digital access and technological literacy.<sup>30</sup> The ethical obligation of zakat extends to these individuals, and efforts should be made to bridge the digital divide, ensuring that zakat remains accessible to all, regardless of their socioeconomic status or technological capabilities.

### **Digital Divide**

The digital divide poses a major risk that must be addressed for technology integration in zakat management. While emerging technologies like blockchain and AI offer advantages, they rely heavily on internet access and digital literacy.<sup>31</sup> These risks excluding and further marginalizing communities lacking digital infrastructure or skills. Rural regions with limited connectivity, economically disadvantaged urban populations without devices, elderly groups unfamiliar with technology, and communities hampered by disability barriers are especially vulnerable to digital exclusion. For instance, a blockchain-based zakat distribution system may not reach intended recipients in remote villages without digital identity documentation or internet availability.

To ensure inclusivity, zakat institutions could establish physical centres in digitally underserved locations for accessing resources. Staff training and support programs focused on guiding technology use for zakat collection and disbursement can build digital literacy. SMS-based tools using basic mobile phones may be more accessible interim solutions.<sup>32</sup> Partnerships with grassroots NGOs that have built trust and understanding of marginalized community needs can aid localization of solutions. Public awareness campaigns via traditional media formats may also help expand outreach. Multi-channel approaches balancing high-tech with high-touch access can promote inclusivity. Ensuring technology-enabled zakat systems do not widen existing inequities but rather uplift communities require recognizing and proactively addressing digital divides through ethical, human-centered design.

### **Cybersecurity and Lack of Regulation**

Cybersecurity concerns and the absence of comprehensive regulatory frameworks pose additional challenges to technology adoption in zakat management. Without robust safeguards,

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<sup>30</sup> Cynthia K Sanders, and Edward Scanlon. 2021. "The Digital Divide Is a Human Rights Issue: Advancing Social Inclusion Through Social Work Advocacy." *Journal of Human Rights and Social Work* 6, no. 2: 130–43.

<sup>31</sup> Velibor Božić. 2023. "Risks of Digital Divide in Using Artificial Intelligence (Ai)," no. May.

<sup>32</sup> Domek, Gretchen J., Ingrid L. Contreras-Roldan, Edwin J. Asturias, Michael Bronsert, Guillermo Antonio Bolaños Ventura, Sean T. O’Leary, Allison Kempe, and Sheana Bull. 2018. "Characteristics of Mobile Phone Access and Usage in Rural and Urban Guatemala: Assessing Feasibility of Text Message Reminders to Increase Childhood Immunizations." *MHealth* 4: 9–9.

technology can introduce vulnerabilities that may compromise the security and trustworthiness of zakat processes. Zakat institutions must prioritize cybersecurity to protect sensitive data and transactions. Cyber threats, such as hacking and data breaches, can have severe consequences, eroding the confidence of donors and beneficiaries.<sup>33</sup> Implementing state-of-the-art security measures, including encryption and regular security audits, is essential to safeguard zakat funds and data. The regulatory landscape for emerging technologies is still evolving.<sup>34</sup> Zakat institutions must navigate this dynamic environment carefully.

Collaborating with regulatory bodies to develop guidelines and standards specific to technology use in zakat management can help ensure ethical and responsible implementation. Another aspect of regulatory oversight involves the risk of perpetuating harm through biased algorithms and machine learning limitations.<sup>35</sup> Zakat institutions should diligently monitor the algorithms and AI systems they employ to avoid reinforcing existing inequalities. Oversight mechanisms should ensure that technology adheres to maqasid al-shariah, the higher objectives of Islamic law, which emphasize justice and social welfare.

Addressing the key challenges and limitations associated with technology adoption in zakat management requires a comprehensive approach. It necessitates a deep commitment to Islamic ethics, inclusivity, cybersecurity, and regulatory compliance. By actively mitigating these challenges, zakat institutions can harness the full potential of technology while upholding the principles of justice, compassion, and transparency that underpin this noble practice.

### **Guiding Principles for Technology Adoption**

In navigating the integration of technology into the realm of zakat oversight, several fundamental principles can serve as a guiding light to ensure responsible and ethical implementation.<sup>36</sup> It is paramount to acknowledge that technology should never replace the essence of human compassion and moral judgment inherent in zakat.<sup>37</sup> Instead, it should complement these qualities. Technology can streamline processes, enhance efficiency, and provide valuable insights, but it must always operate in harmony with the values and principles of Islamic ethics that underpin zakat.<sup>38</sup> The human touch in assessing individual needs and

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<sup>33</sup> (Domek et al. 2018)

<sup>34</sup> Farrukh Syahzad. 2014. "State-of-the-Art Survey on Cloud Computing Security Challenges, Approaches and Solutions." *Procedia Computer Science* 37: 357–62.

<sup>35</sup> Emilio Ferrara. 2023. "Should ChatGPT Be Biased? Challenges and Risks of Bias in Large Language Models." *Cornell University*. <http://arxiv.org/abs/2304.03738>.

<sup>36</sup> Qudah, Hanan, Sari Malahim, Rula Airout, Mohammad Alomari, Aiman Abu Hamour, and Mohammad Alqudah. 2023. "Islamic Finance in the Era of Financial Technology: A Bibliometric Review of Future Trends." *International Journal of Financial Studies* 11, no. 2: 76.

<sup>37</sup> (Ebrahimi and Yusoff 2017)

<sup>38</sup> (Salleh and Chowdhury 2020a)

exercising discretion remains irreplaceable. The digital transformation of zakat management should be inclusive, ensuring that all members of the community, regardless of their digital literacy or economic status, can participate and benefit.<sup>39</sup> Accessible interfaces and user-friendly platforms should be developed, taking into account the perspectives and needs of the end-users, including those who may have limited technological proficiency.

As technology increasingly relies on algorithms and data, it becomes imperative to scrutinize systems rigorously for any embedded biases or discriminatory outcomes.<sup>40</sup> This diligence aligns with the core Islamic principle of justice. Algorithms must be designed, tested, and continuously monitored to ensure they do not inadvertently perpetuate inequalities or discriminate against any group based on gender, ethnicity, or socioeconomic status.<sup>41</sup> Transparency and accountability are foundational to zakat management. Technology should not obscure these principles but enhance them. Implementing two-way communication channels through digital platforms can provide donors and beneficiaries with real-time access to information about zakat contributions and disbursements. This transparency fosters trust and empowers stakeholders to hold institutions accountable.

To harness the full potential of technology, zakat institutions must cultivate expertise within their ranks.<sup>42</sup> Staff members should be well-versed in both zakat principles and technological applications.<sup>43</sup> This dual proficiency enables institutions to make informed decisions about technology adoption, ensuring that it remains in harmony with Islamic ethics and serves the best interests of those in need.<sup>44</sup> By adhering to these principles, grounded in Islamic ethics, zakat oversight can optimize the benefits of technology while mitigating potential harm. Technology should be a tool that amplifies the impact of zakat, enhancing transparency, efficiency, and the ability to alleviate poverty while always preserving the core values and moral compass of this noble practice.

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<sup>39</sup> Mulyo, Gagat Panggah, Muhammad Fallas Taufiqurrohman, Vita Ditya Wardani, Muhammad Zilal Hamzah, and Corresponding Email. 2023. "Systematic Literature Review : The Role of Digital in the Management of Zakat" 1: 170–81.

<sup>40</sup> Andrus, McKane, and Sarah Villeneuve. 2022. "Demographic-Reliant Algorithmic Fairness: Characterizing the Risks of Demographic Data Collection in the Pursuit of Fairness." *ACM International Conference Proceeding Series* 1, no. 1: 1709–21.

<sup>41</sup> Chen, You, Ellen Wright Clayton, Laurie Lovett Novak, Shilo Anders, and Bradley Malin. 2023. "Human-Centered Design to Address Biases in Artificial Intelligence." *Journal of Medical Internet Research* 25, no. March (March): e43251.

<sup>42</sup> Hidayatulloh, Muhammad Lutfi, Ade Nur Rohim, and Sahlan Hasbi. 2021. "Muhammad Lutfi. H, et Al.: Analysis of the Impact... The Efficiency And Effectiveness Of The Distribution Of Zzakat Funds In Yogyakarta Baaznas." *Jurnal Ekonomi Islam* 12, no. 2: 163–90.

<sup>43</sup> Ardiansyah, Hanif. 2021. "Human Resource Management in Quality Improvement of ZIS Management at LAZISMU Purbalingga in the New Normal Era." *Journal of Business Management Review* 2, no. 2: 147–61.

<sup>44</sup> (Hasan et al. 2019)

Table 1: Integration of Technology in Zakat Management - Benefits, Challenges, and Guiding Principles

Theme	Technology/ Aspect	Benefits	Challenges/Risks
<b>Tech Integration in Zakat Oversight</b>	Blockchain	Transparency in fund flows	Risks of algorithmic bias
	AI	Optimized beneficiary targeting	Algorithmic bias testing needed
	Big Data Analytics	Enhanced oversight through data integration	Data privacy and security concerns
	Mobile Platforms	Accessible channels, real-time monitoring	Inclusivity barriers, digital literacy
<b>Alignment with Islamic Ethics</b>	Privacy	Adherence to Islamic principles on privacy	Unethical surveillance must be avoided
	Inclusivity	Bridging the digital divide	Technology should not widen inequities
<b>Digital Divide</b>	Inclusivity	Establishing centers in underserved locations	Staff training for digital literacy
	Accessibility	SMS-based tools for basic phones	Partnerships for localized solutions
<b>Cybersecurity and Regulation</b>	Cybersecurity	Protecting sensitive data and transactions	Lack of comprehensive regulatory frameworks
	Regulatory Compliance	Collaboration for guidelines	Risk of biased algorithms
			Machine learning limitations
<b>Guiding Principles</b>	Harmony with Islamic Ethics	Complementing human compassion	Technology operating in harmony with values
	Inclusivity	Developing user-friendly platforms	Addressing limited technological proficiency
	Scrutiny for Bias	Ensuring algorithms avoid inequalities	Continuous monitoring for discrimination
	Transparency and Accountability	Two-way communication for transparency	Avoiding technology that obscures principles
	Expertise Cultivation	Staff proficiency in zakat principles	Informed decisions for ethical adoption

## E. Conclusion

This paper argues for a cautiously optimistic perspective on leveraging emerging technologies to strengthen oversight, efficiency and impact of zakat systems. The thoughtful integration of innovations like blockchain, AI, and mobile platforms shows immense potential to optimize zakat collection and distribution aligned with Islamic principles.

However, diligent governance frameworks, participatory design processes, and continued research are vital to address risks around exclusion, security, ethics and algorithmic bias. Zakat institutions must build internal expertise on emerging technologies to ensure their responsible adoption. Partnerships with Islamic fintech companies and experts can support internal capability development.

Standardized guidelines grounded in maqasid al-shariah should be established to guide technological integration while prioritizing transparency, accountability and inclusivity. Solutions should be co-created with end-users like recipients to meet needs. Channels for community feedback and monitoring must be institutionalized.

## F. Limitation & Further Research Or Suggestion

If deployed thoughtfully, emerging technologies can significantly amplify the impact of zakat as a pillar of social justice. This paper recommends that zakat institutions explore technology adoption but remain vigilant in evaluating and governing systems to uphold the wisdom and values that zakat intends to fulfil. The prudent integration of innovation with Islamic guidance can unlock zakat's fullest potential for uplifting communities.

Further research is critical, particularly on managing unintended consequences. However, the opportunities warrant continued exploration. Zakat can be transformed into an institution of greater significance by harnessing technology for human development in line with its objectives. Furthermore, empirical data on technology's impact remains scarce, constraining the ability to quantify benefits versus potential harms. More research, especially from a multidisciplinary vantagepoint, is needed to address these gaps

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