



The quest for sustainable mosques: A paradigm shift with the quadruple bottom line framework

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ABSTRACT

There are over 3.6 million mosques worldwide, and the Muslim population is projected to reach 2.76 billion by 2050. However, significant gaps persist in understanding how mosques contribute to sustainable development and how this benefits the mosque as an organization.

This study investigates the sustainability performance of mosques, which are faith-based organizations, using the Quadruple Bottom Line (QBL) framework: Prosperity, People, Planet, and Prophet. By employing surveys of mosque attendees ($n = 719$) and managers ($n = 97$) in Indonesia, this research analyzes the mosques' QBL performance through Structural Equation Modelling (SEM) and evaluates their sustainability scores in Jakarta, Indonesia, using the RDAP model.

The results reveal a significant impact from all four dimensions of the 4P framework on sustainability. The "People" dimension has demonstrated the lowest performance. Furthermore, 32 % of mosques exhibit reactive or defensive behaviors, indicating a lack of proactive sustainability initiatives. This research contributes to the development of the QBL framework within the context of non-profit and faith-based organizations. From a practical perspective, it offers valuable insights for mosque managers to identify areas for improvement and align with the Sustainable Development Goals (SDGs). Additionally, these insights can help mosque managers and policymakers craft strategies to enhance mosque sustainability.

1. Introduction

The Conference of Parties (COP 26), held in Glasgow in 2021, warned all nations worldwide that under the current targets and performance levels, the world is projected to experience a temperature increase of more than 3.8 °C by the year 2100 [1]. Consequently, organizations across all sectors were urged to adopt more ambitious Sustainable Development Goals (SDGs) and strive for greater impacts on the Triple Bottom Line (TBL) to enhance their environmental and social contributions [1]. This event provided additional momentum not only to governments and businesses but also to non-profit organizations.

As a non-profit organization, a mosque serves as a gathering place for Muslim activities and thus plays an important role in sustainable development. The number of mosques has significantly increased to more than 3.6 million worldwide [2]. Daily prayer congregations take place five times a day. Most mosques provide additional services such as Islamic education (*madrasah*), counselling, and conflict resolution,

indicating that they are highly functional spaces for social activities and community engagement [3]. Therefore, the contribution of mosques to sustainable development should be regarded as an important topic; however, this is not the case, as there are currently limited studies in literature regarding the contribution of mosques to the SDGs [4,5].

In the Islamic context, the primary role of a mosque is to provide worship services aligned with Islamic values. Therefore, there is a need for integration between TBL and the *maqasid al-shari'a* (the higher objectives of Islamic law), interpreted as the well-being of humanity and all stakeholders. Previous scholars have attempted this by adding an additional 'P' for 'Prophet' [6,7], which has been used to assess the global sustainability of Islamic banks. However, to the authors' knowledge, this framework has not yet been tested in the context of places of worship (mosques).

This research, therefore, aims to explore the impact of the Quadruple Bottom Line (QBL) on mosque sustainability. Additionally, this paper seeks to evaluate how extensively mosques in Jakarta are implementing

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sustainability based on the RDAP (reactive, defensive, accommodative, and proactive) measurement.

This research makes several contributions. First, as the number of mosques reaches 3.6 million worldwide [2], this study is timely in examining the transition to becoming a sustainable organization within the religious non-profit sector. Second, it expands the TBL framework by incorporating religiosity (*Prophet*) into sustainable development and discusses the effects of applying this innovative framework to the organizational sustainability of religious non-profits located in the capital city of the world's largest Muslim population, Jakarta, Indonesia. Finally, this study provides insights for policymakers and mosque managers to help evaluate and identify their sustainability performance gaps, which may assist regulators in establishing policies aimed at enhancing their sustainability performance.

2. Literature review and hypothesis development

2.1. Religious nonprofit organizations and sustainable development

Among the various types of nonprofits, religious nonprofits have become significant players in the global economy, arguably due to their social mission of providing services while embodying identity-based values [8]. Most scholars agree that a religious or faith-based organization can be recognized by its explicit declaration of affiliation with a religion [9]. Drawing from this definition and its humanity-driven values, it can be concluded that social service providers with congregations and houses of worship, such as churches and mosques, can be classified as religious nonprofit organizations [10].

Religious organizations mobilize more volunteers than any other type of nonprofit, with three-fourths of adult volunteers regularly attending religious services in the United States [11]. Religious nonprofit organizations also tend to receive more charitable funds than any other category and are more prevalent in the U.S. context [12]. A moral imperative for service and a personal belief in accountability to God have been identified as significant predictors of voluntary participation [13,14]. Some volunteers believe that religious expression motivates engagement in religious voluntarism [15], and conducting collective religious practices, such as praying, can promote social cohesion in diverse communities [16]. Moreover, religious calls for justice and equality can serve as a foundational basis for sustained civic action and advocacy [17]. Scholars have argued that religious organizations have been largely overlooked in the study of nonprofit organizations, resulting in a research gap regarding the impact of religious affiliation on nonprofit practices, characteristics, and outcomes [18]. This gap in practices and outcomes must be emphasized concerning their contributions to sustainable development. Furthermore, these findings were primarily drawn from research in Western countries, mainly within the context of Christianity, with limited studies on how Islamic nonprofit organizations (i.e., mosques) contribute to sustainable development.

2.2. The QBL and mosque sustainability

Elkington [19] proposed that organizations should focus their outcome indicators not only on profit (*Prosperity*) but also on social (*People*) and environmental (*Planet*) factors, commonly referred to as the 3Ps. This concept has evolved, with some scholars suggesting additional dimensions such as governance [20] along with policies, practices, and processes [21]. Stefanescu [22] incorporated the concept of Sustainable Development Goals (SDGs) into the TBL framework by adding Peace and Partnership (5Ps). The TBL concept is universal and is also used by non-profit organizations (NGOs), including churches and mosques [23].

This study utilized the QBL framework developed by Hamidi and Worthington [6], which is grounded in Islamic values. From an Islamic standpoint, the seamless integration of all aspects of life with the fundamental objectives of Islamic law (*maqasid al-shari'a*) is

emphasized. Al-Qahtani [24] observed that *maqasid al-shari'a* focuses on essential principles, including the promotion of benefits, prevention of harms and disadvantages, and the protection of humanity from evil and injustice. In a more detailed explanation, al-Ghazali, as referenced in Chapra [25], expanded on *maqasid al-shari'a*, detailing five interconnected elements: (1) preservation of faith (*din*), (2) protection of the soul (*nafs*), (3) nurturing the intellect ('*aql*), (4) safeguarding progeny (*nasl*), and (5) preserving wealth (*mal*).

Moreover, Islam strongly advocates for the protection and preservation of nature. The Holy Qur'an (30:41) attests to the visible environmental damage caused by human actions on land and sea. This serves as a powerful reminder for humanity to care for the environment for the betterment of society. An-Najjar [26] further enhanced al-Ghazali's five criteria by introducing an additional element, highlighting the importance of protecting the environment (*bi'ah*). Consequently, the environmental aspect should be recognized as the sixth element within the *maqasid al-shari'a*.

Recent studies have explored the connection between TBL and *maqasid al-shari'a*, along with their potential for performance evaluation [6,7,27,28]. Notably, Hamidi and Worthington [6,7] found that TBL values closely align with the teachings of *maqasid al-shari'a*, asserting that TBL could serve as an effective framework for assessing Islamic financial institutions. This newly introduced element represents one of the Ghazalian *maqasid*, emphasizing the preservation of faith (*din*), as illustrated in Fig. 1. The incorporation of this additional dimension is expected to provide crucial Islamic moral guidance in supporting business activities.

This study employs the 4Ps framework to evaluate its impact on the sustainability of mosques. Various scholars have established that the contribution of TBL positively affects an organization's performance [29,30]. To refine the framework accordingly, the items initially designed to assess the sustainability of Islamic financial institutions were adjusted to better fit nonprofit organizations, particularly in the context of mosques.

In the context of mosque performance, *prosperity* is explained using two *maqasid* dimensions (*self* or *nafs*, and *wealth* or *mal*) and four of Chapra's [25] elements: (i) employment and self-employment; (ii) minimization of crime; (iii) marriage and proper upbringing of children; and (iv) security of life and property. These tenets can be elucidated through Social Capital Theory (SCT). According to Putnam [31], SCT illustrates how strong social networks, trust, and community engagement contribute to economic opportunities, lower crime rates, and improved child-rearing. One of the contributions of nonprofit entities is to create jobs, including in the education sector, social services, and religious organizations [32]. Mosques provide employment in various capacities, such as mosque leaders (imams), administrative staff, educators, and social workers. Some mosques use a mix of paid employees and volunteers to sustain their operations and ensure sustainability [33]. Breneman [34] explores how religious institutions serve as safe spaces, offering security and alternatives to criminal involvement. Johnson et al. [35] noted that higher levels of religious participation correlate with lower rates of violence and property crime. Therefore, the following hypothesis was developed:

H1. *Prosperity has a significant effect on mosque sustainability*

The *People* dimension refers to how mosque management can maximize benefits for its workers and the surrounding community. This variable can be explained through two *maqasid* dimensions (intellect or '*aql*, and posterity or *nasl*), as discussed by Chapra [25], incorporating at least five factors: (i) library and research facilities, (ii) expansion of knowledge and the technological base, (iii) rewards for creative work, (iv) marriage and family integrity, and (v) social solidarity. These elements are highly relevant and aligned with the Theory of Change (ToC) proposed by Weiss [36]. ToC is a strategic framework that explains how and why a particular change is expected to occur within a specific context. It is widely utilized in social programs and nonprofit

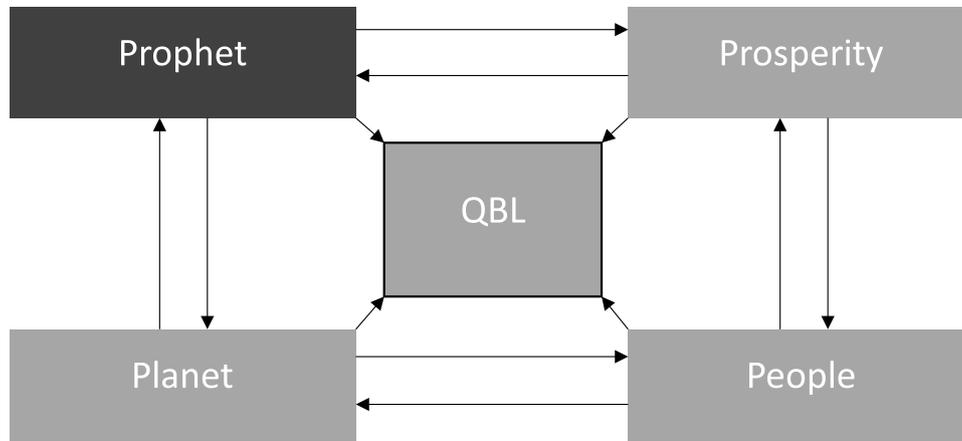


Fig. 1. Quadruple bottom line (QBL) framework.

organizations.

Libraries and research centers contribute to education, knowledge dissemination, and innovation, all of which are essential for social and economic transformation [37]. Establishing libraries in mosques can promote lifelong learning within the community. Sudana et al. [38] argued that, aside from being places of worship, mosques also play a crucial educational role. Thus, the presence of mosque libraries enhances knowledge, Islamic teachings, and attendee engagement. The expansion of knowledge and technology fosters economic development, scientific progress, and innovation [39]. The adoption of technological innovations in mosques—such as online sermons, financial transparency, and digital learning platforms—modernizes mosque management and improves accessibility, encouraging greater community participation and financial resilience. Promoting creativity and intellectual contributions leads to increased productivity and sustainable economic development [40,41]. Additionally, robust family structures contribute to economic stability, social cohesion, and human capital development [42,43]. Therefore, the following hypothesis was developed:

H2. People have a significant effect on mosque sustainability

The concept of *planet* relates to how mosque management addresses environmental preservation. In this context, An-Najjar [26] introduced the dimension of *maqasid shari'a* concerning environmental protection. Researchers suggest that environmental preservation positively correlates with financial performance [44,45]. Albertini [46] emphasized a meta-analysis of 52 studies spanning 35 years, confirming a positive relationship between environmental performance and financial performance. Additionally, de Burgos-Jiménez et al. [47] explore the connection between environmental protection and mid-term financial performance, discovering a positive effect, particularly regarding environmental proactivity and performance. Consequently, the following hypothesis was developed:

H3. Planet has a significant effect on mosque sustainability

The *Prophet* exemplifies the norms and values taught by Prophet Muhammad in effectively managing mosque operations. These norms and values are essential for sustainability as they shape both individual and collective behaviors towards sustainable practices. Steg and de Groot [48] explored how personal norms and values impact pro-environmental behavior, while Whitmarsh et al. [49] examined the influence of social norms and values on sustainable behaviors and public engagement with climate change. Adhering to religious norms is associated with a reduced risk of misrepresenting financial statements [50]. This leads to the following hypothesis:

H4. Prophet has a significant effect on mosque sustainability

3. Methodology

3.1. Data collection

This research employs two data collection methods through surveys. The first dataset assesses the impact of mosques' QBL performance on sustainability from the attendees' perspective. Data were obtained from two channels: online and drop-off surveys. For the online survey, we utilized the SurveyMonkey platform from June 15, 2022, to July 14, 2022, resulting in 389 responses with a 79 % completion rate; however, only 323 responses were valid for analysis. For the drop-off survey, our surveyors collected data from participants at the targeted mosques. We used non-probability sampling, which is commonly implemented [51, 52]. The total number of participants from the offline survey was 396, and with the online survey returns, the total reached 719 respondents. Table 1 illustrates the key demographic indicators of the respondents.

The second dataset aimed to rank the sustainability performance of mosques in Jakarta. Data were collected through cluster sampling to survey mosque managers. Cluster sampling is beneficial in situations where there is variation within clusters but consistency between them. It is also advantageous when selecting and sampling entire clusters is less costly than sampling individual units. This method may be preferred over individual unit sampling, especially when conducting field surveys [53]. We targeted mosques from five districts in DKI Jakarta province, as this area is representative of Indonesia. To facilitate this, we trained 10 undergraduate students to distribute surveys among 111 mosques in Jakarta. The questionnaires were returned by 97 mosque management teams, resulting in an 87.45 % success rate, as shown in Table 2, which also illustrates the characteristics of the mosques in terms of area size and locality in Jakarta.

Table 1
Demographic data of the mosques.

Indicators	Characteristic	N	%	Districts	N	%
Size	Under 500 m ²	44	45.4 %	Central Jakarta	20	20.6 %
	501–1000 m ²	37	38.1 %	South Jakarta	20	20.6 %
	1001–2500 m ²	15	15.5 %	North Jakarta	16	16.5 %
	Above 2500 m ²	1	1 %	East Jakarta	16	16.5 %
	Total	97	100 %	West Jakarta	25	25.8 %
Certificate	SHM	17	17.5 %	Total	97	100 %
	Waqf	72	74.2 %			
	HGB	1	1 %			
	Owned by State	1	1 %			
	SHGB	1	1 %			
	Total	97	100 %			

Table 2
Demographic data of mosques' stakeholders.

Indicators	Characteristic	N	%	Indicators	Characteristic	N	%	
Gender	Male	572	79.6 %	Education	None	6	0.8 %	
	Female	147	20.4 %		Primary/Sec. School	355	49.4 %	
	Total	719	100 %		Diploma	101	14 %	
Age	18–25 years	128	17.8 %		Undergraduate	159	22.1 %	
	26–35 years	125	17.4 %		Master degree	76	10.6 %	
	36–45 years	173	24.1 %		Doctoral	22	3.1 %	
	36–45 years	173	24.1 %		Total	719	100 %	
	46–55 years	205	28.5 %		Praying in Mosque	Every day	380	52.9 %
	Above 55	88	12.2 %			5–6/week	82	11.4 %
	Total	719	100 %			3–4/week	128	17.8 %
Province	DKI Jakarta	439	61.1 %	1–2/week		117	16.3 %	
	Banten	73	10.2 %	Never	12	1.7 %		
	West Java	116	16.1 %	Total	719	100 %		
	Central Java	30	4.2 %	Position	Founder/Advisor	20	2.8 %	
	East Java	29	4 %		Chairman/Vice-chairman	30	4.2 %	
	Outside Java	32	4.5 %		Secretary	12	1.7 %	
	Total	719	100 %		Treasurer	17	2.4 %	
			Head/Member of Divisions		131	18.2 %		
			Members (No position)		509	70.8 %		
			Total		719	100 %		

3.2. Questionnaire

We developed two questionnaires. The first was designed to capture attendees' perceptions of mosque sustainability and consisted of two sections: (1) demographic data and (2) perceptions of mosque sustainability (PMS). For the PMS section, we adapted the scale from Hamidi and Worthington [6] to measure Islamic banking sustainability, modifying it to better align with mosque sustainability assessment.

The survey employed a combination of closed-ended multiple-choice questions and a seven-point Likert scale to evaluate respondents' perceptions of the 4Ps framework—Prophet (6 items), Prosperity (10 items), People (7 items), and Planet (6 items)—informed by Chapra's *maqasid al-shari'a* elements as the independent variable. Sustainability (6 items) was identified as the dependent variable, designed according to the Sustainable Development Goals (SDGs).

To ensure content validity and contextual relevance, we conducted preliminary discussions with two sustainability experts (one from academia and one from a government body) and three senior mosque management officials. The research team analyzed and refined their feedback. The final refined questionnaire and measurement scale are provided in Appendix 1.

The second questionnaire aimed to evaluate the financial performance of the mosque (see Appendix 2). It was organized into two sections:

1. Demographic Data – Information collected about the respondents and the mosque.
2. Mosque Sustainability Assessment – Collected factual sustainability scores reported by principal mosque managers across four sustainability dimensions: Prophet, Prosperity, People, and Planet.

Unlike the first questionnaire, which collected data from attendees, the second targeted mosque managers or administrators, such as leaders, secretaries, or treasurers. Additionally, instead of using a Likert scale like the first, the second questionnaire utilized a binary scoring method, assigning a value of 1 for each specific item that was available or implemented and 0 for those that were not. This method made it easier to calculate a sustainability score for each mosque.

3.3. Research methodology

3.3.1. Structural equation modeling

Structural equation modeling (SEM) was employed to “provide estimates of the magnitude and significance of hypothesized causal

connections among sets of variables displayed through the use of path diagrams” ([54], p. 26). The calculations were performed using SmartPLS 3 software.

The structural model can be accepted if it establishes the reliability and validity of the latent variables. First, concerning the reliability indicator, Hulland [55] argued that in exploratory research, a loading of 0.4 is acceptable, while 0.7 is preferred. Second, for internal consistency reliability, Bagozzi and Yi [56] suggested that it should be 0.6 or higher in exploratory research.

Third, for convergent validity, each latent variable's average Variance Extracted (AVE) is assessed. According to Bagozzi and Yi [56], AVE should be at least 0.5 or higher. This method, was applied, and reliability and validity tests were conducted to measure convergent validity. Construct reliability was verified to estimate convergent validity. The construct is considered reliable if Cronbach's Alpha is 0.7 or greater at the alpha level of 0.05 [57].

3.3.2. Sustainability ranking

To measure and rank the mosque's sustainability performance, the scoring of the indicators is a quantitative approach based on the total 29 items from the four independent variables. Following Haniffa and Hudaib [58], we derived the ranking using the following formula:

$$MS = \frac{\sum_{i=1}^{n_j} X_{ij}}{n_j}$$

where, MS refers the mosque sustainability; n_j represents the number of items or indicators disclosed by j th mosque management or administrator, with $n_j = 29$, where $X_{ij} = 1$ if the i th indicator is implemented by mosque management, and $X_{ij} = 0$ if the indicator is not applied. The ranking of mosque sustainability is determined using a four-category rank scale: reactive, defensive, accommodative, and proactive (RDAP scale), introduced by Carroll [59], and Clarkson [60] and subsequently

Table 3
RDAP scale to rank mosque sustainability.

Achievement	Rating	Posture or strategy	Performance
0–40 %	Reactive	Deny responsibility	Doing less than required
41–60 %	Defensive	Admit responsibility but fight it	Doing the least that is required
61–80 %	Accommodative	Accept responsibility	Doing all that is required
81–100 %	Proactive	Anticipate responsibility	Doing more than is required

modified by Hamidi and Worthington [6,61], as identified in Table 3.

Ali [62] proposed a modified RDAP scale to more accurately reflect the spectrum of organizational responses to stakeholder issues. The RDAP scale has been applied in various academic contexts to evaluate organizational responses to social and environmental issues. For instance, Hamidi and Worthington [6] utilized the RDAP scale to assess the sustainability practices of Islamic banks, while Morais and Barbieri [63] applied it to examine focal firms' responses to social issues in supply chains. We argue that RDAP can be extended to nonprofit organizations as a behavioral assessment tool for sustainability. Given that many nonprofits focus on social impact and advocacy, which are often qualitative and difficult to measure using traditional SDG metrics, RDAP can serve as a valuable framework to assess how reactive or proactive an organization is in addressing sustainability concerns. While it may not measure quantitative sustainability impact, it provides important insights into an organization's strategic approach and commitment to sustainability.

4. Results and findings

4.1. Reliability and validity test

In terms of factor loading, Table 4 indicates that each variable contains at least 3 items with a loading factor above 0.7, except for the item Pros9 (loading factor 0.682). Some items have been removed, as this often happens when developing a new scale from scratch [55].

Internal consistency reliability can be established in exploratory research if the composite reliability score is 0.6 or higher [56]. As shown in Table 4, all the latent variables (*Prosperity*: 0.821; *People*: 0.843; *Planet*: 0.832; and *Prophet*: 0.821) exceed 0.6, thus satisfying the requirement.

The AVE score for all variables exceeds 0.5, confirming convergent validity. Regarding discriminant validity, Fornell and Larcker [64] indicated that this is established when the square root of the AVE of each latent variable is greater than the correlations among those variables. Table 5 presents the scores for *People* (0.758), *Planet* (0.790), *Prophet* (0.732), *Prosperity* (0.732), and *Sustainability* (0.809), all of which are higher than the off-diagonal correlation values between the variables; thus, discriminant validity is confirmed.

Another critical issue is examining collinearity problems. Hair et al. [65] argued that a model is considered to have no collinearity issues if the variance inflation factor (VIF) is five or lower. However, other experts suggest that collinearity may occur at lower VIF values ranging from three to five [66]. The VIF values displayed in Table 4 for each indicator are below three, indicating that the model is free of collinearity issues.

Table 4
Validity and reliability indicators.

Latent Variable	Indicators	Loading	VIF	Cronbach Alpha	Composite Reliability	AVE
Sustainability	SUS1	0.812	1.512	0.736	0.850	0.654
	SUS2	0.808	1.490			
	SUS3	0.806	1.390			
Prosperity	PROS1	0.780	1.474	0.710	0.821	0.535
	PROS2	0.733	1.419			
	PROS7	0.728	1.335			
	PROS9	0.682	1.256			
People	PEO2	0.768	1.429	0.755	0.843	0.574
	PEO4	0.782	1.440			
	PEO5	0.732	1.516			
	PEO7	0.747	1.392			
Planet	PLA1	0.824	1.436	0.701	0.832	0.624
	PLA2	0.712	1.306			
	PLA3	0.828	1.387			
Prophet	PRO2	0.722	1.312	0.711	0.821	0.536
	PRO4	0.670	1.419			
	PRO5	0.742	1.381			
	PRO6	0.788	1.487			

Table 5
Fornell-larcker criterion.

	People	Planet	Prophet	Prosperity	Sustainability
People	0.758				
Planet	0.585	0.790			
Prophet	0.560	0.501	0.732		
Prosperity	0.598	0.566	0.531	0.732	
Sustainability	0.584	0.611	0.516	0.680	0.809

4.2. PLS-SEM results

Fig. 2 illustrates the relationship between mosque sustainability and the independent 4P variables. The coefficient of determination, or $R^2 = 0.548$, indicates that the 4Ps moderately explain 55 % of the variance in mosque sustainability. However, the *Prophet* (0.125) and *People* (0.155) dimensions exhibit the lowest path coefficients for Sustainability, followed by *Planet* (0.268) and *Prosperity* (0.357).

Hair et al. [65] suggested a bootstrapping technique involving 5000 iterations to assess the statistical significance of the structural model. Consequently, the relationship between the model and the hypothesis concerning endogenous and exogenous constructs was examined using a standardized path coefficient (β) and *t*-statistics at the recommended significance level of $p < 0.01$. The critical *t*-value thresholds (two-tailed test) at significant levels of $\alpha = 0.01$, $\alpha = 0.05$, and $\alpha = 0.1$ were 1.96, 2.57, and 1.65, respectively [65]. Thus, Table 6 indicates that all hypotheses were supported at a significance level of $p < 0.01$.

4.3. Mosques sustainability performance ranking

In general, Table 7 illustrates the sustainability ranking of mosques in Jakarta, based on the estimation method mentioned above. As shown, out of 97 mosques, 4 mosques (4 %) are classified as reactive, 27 mosques (28 %) as defensive, 48 mosques (49 %) as accommodative, and 18 mosques (19 %) as proactive. In other words, 32 % of the sampled mosques (reactive and defensive levels) in Jakarta are unsustainable, while the remaining 68 % (accommodative and proactive levels) are sustainable. The data indicates that the West Jakarta District has the highest number of unsustainable mosques (12), while both Central Jakarta and North Jakarta have the lowest, with 3 mosques each.

Fig. 3 highlights the dimensions that require improvement for sustainability. The *Prophet* dimension (70.75 %) and *Prosperity* dimension (90 %) represent the most significant achievements to date, while the other two dimensions, *People* (39.75 %) and *Planet* (70 %), are the weakest aspects of mosque sustainability; therefore, enhancements should particularly focus on the *People* dimension.

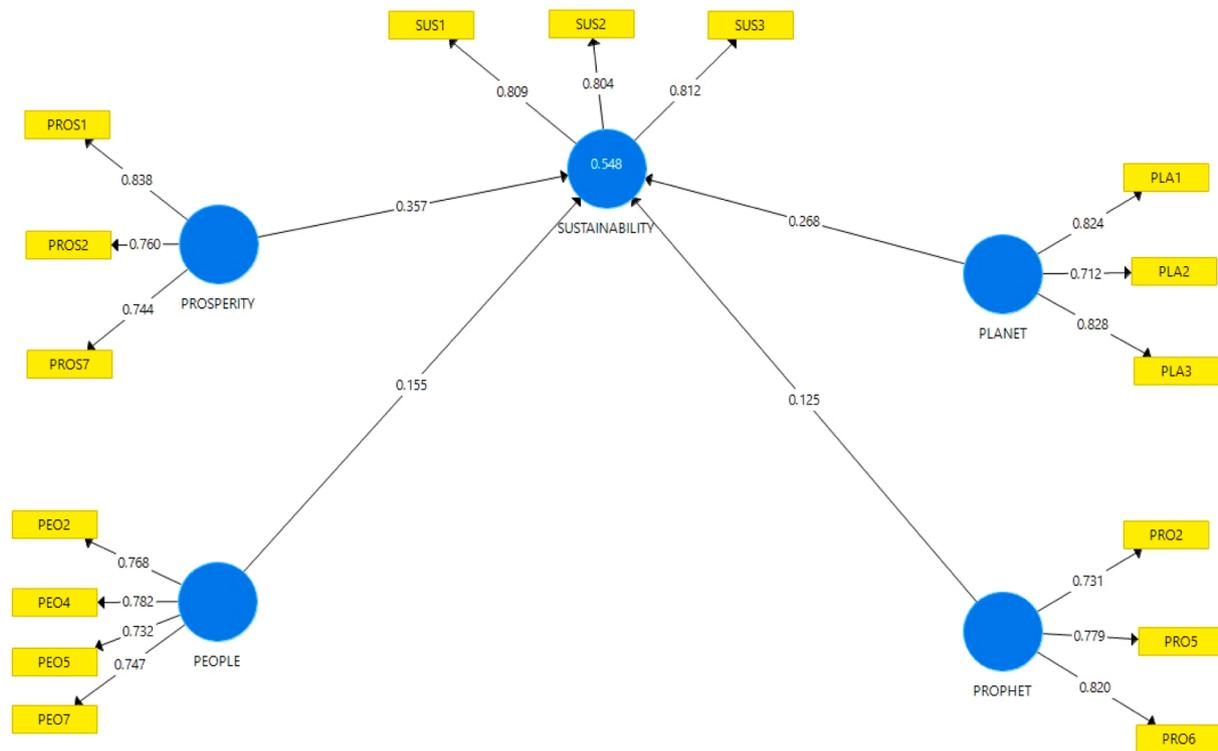


Fig. 2. Proposed and validated model.

Table 6

Structural estimation.

Hypothesis	Path Coefficients	SE	T	P	Decision
H1:Prosperity→Sustainability	0.400***	0.038	10.624	0.000	Supported
H2:People →Sustainability	0.142***	0.038	3.765	0.000	Supported
H3:Planet →Sustainability	0.253***	0.039	6.533	0.000	Supported
H4:Prophet → Sustainability	0.098**	0.041	2.376	0.018	Supported

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed) confidence interval testing.

Table 7

Ranking of mosque sustainability based on RDAP scale.

District	Reactive	Defensive	Accommodative	Proactive	Total
Central Jakarta	0	3	14	3	20
West Jakarta	2	10	8	5	25
South Jakarta	1	6	11	2	20
East Jakarta	1	5	7	3	16
North Jakarta	0	3	8	5	16
Total	4	27	48	18	97
Unsustainable (Reactive +Defensive)	32 %				
Sustainable (Accommodative +Proactive)			68 %		

5. Discussion

This section offers an analysis of the findings with the objective of engaging in a thorough discussion of the outcomes. The conversation will begin with an assessment of the hypotheses concerning the results. Next, we evaluate the model known as the Quadruple Bottom Line, or 4Ps, in the context of mosque sustainability. Subsequently, we will investigate the achievement of mosque sustainability rankings and strategies to improve their sustainability quotient. Finally, we examine the role of mosques in contributing to the SDGs.

5.1. Assessment of hypotheses

Our structural estimation indicates that all hypotheses are supported. While numerous studies examine the impact of sustainability on financial performance [67–69], this study finds that prosperity (financial performance) also positively influences sustainability (p-value < 0.01). This finding aligns with previous research [70,71], suggesting that strong financial performance drives economic growth, reduces poverty, and supports sustainable development. Specifically, for nonprofit organizations, integrating financial, social, and environmental value is essential for achieving long-term sustainability [72].

Our findings suggest that both the People and Planet dimensions positively influence the sustainability performance of mosques. These

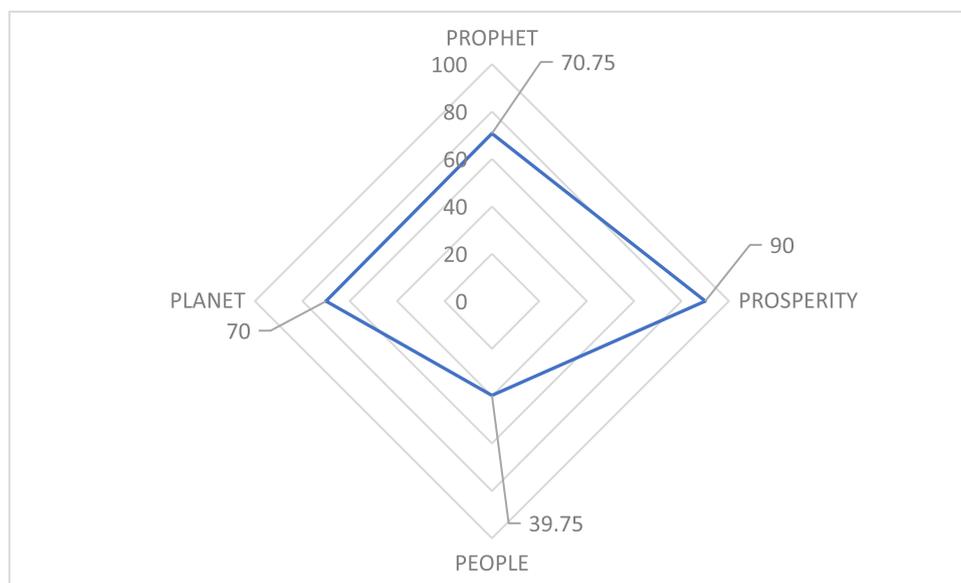


Fig. 3. Quadruple bottom line chart.

results indicate that neglecting these dimensions can lead to significant failures [73,74]. In other words, organizations must align their operational metrics with sustainable development goals, which includes environmental protection, social justice, and economic prosperity [75]. In the nonprofit sector, Wahid [76] emphasized that leveraging partnerships and community involvement (People dimension) enhances effectiveness in promoting social welfare while strengthening sustainable practices. Prioritizing social and environmental issues has a significant impact on the sustainability of nonprofit organizations by improving their organizational legitimacy, stakeholder trust, and long-term viability [77].

Lastly, our findings indicate that the Prophet dimension significantly influences mosque sustainability, aligning with previous studies. For instance, Zollo et al. [78] argued that volunteers motivated by religious beliefs exhibit stronger commitment and a positive attitude toward nonprofit activities. This sustained volunteerism is a crucial factor in the sustainability of nonprofit entities, including mosques. Similarly, Subedi and Liu [79] observed that vibrant religious communities foster a supportive ecosystem for nonprofit activities, thereby enhancing their sustainability. Riegel [80] stated that religious motives, combined with a positive ecological attitude, can guide nonprofit entities toward greater sustainability.

5.2. Application and evaluation of the QBL model

Table 6 illustrates the significant impact of *Prosperity*, *People*, *Planet*, and *Prophet* (referred to as QBL or 4Ps) on mosque sustainability. These findings align with previous investigations by Hamidi and Worthington [6,7] and Hamidi et al. [81], which examined the QBL in the context of Islamic banking. We contend that this model could serve as a potential framework for assessing the sustainability of mosques and other Islamic nonprofit entities, providing insights from multiple perspectives.

The model, firstly, originates from the evolving landscape of sustainability theory, incorporating insights from an Islamic perspective. Scholars have advocated for a holistic assessment of institutional performance, grounded in the foundational principles of Islamic law known as *maqashid al-shari'a* [24,25,81–85].

Secondly, previous researchers have examined various aspects of mosque sustainability. For instance, some propose adopting specific architectural styles to enhance mosque sustainability [86–90]. Others investigate social and community improvements related to mosques [91–93]. Additionally, several studies focus on conserving energy and

water, as well as incorporating environmentally friendly features within mosques, aligning with the *Planet* dimension [94–97]. This study synthesizes all dimensions that effectively encapsulate the measurement of sustainability, integrating both conventional and religious perspectives within the QBL approach.

Thirdly, the 4Ps elements further assist mosque management and regulators in assessing their sustainability ranking and performance concerning the achievement of the SDGs. This framework offers valuable support to mosque management and regulators in evaluating their sustainability status. As indicated by the data presented in Table 7, among a sample of 97 mosques in Jakarta, 32 % are categorized as unsustainable, while the remaining 68 % are deemed sustainable. These figures illustrate a positive trend toward sustainability for Jakarta's mosques, aligning with Indonesia's prior commitment to promoting eco-mosques nationwide [98].

Analyzing Fig. 3 reveals that mosques in Jakarta have shown commendable performance in economic prosperity, religious devotion (*Prophet* dimension), and environmental consciousness (*Planet* dimension), scoring 90, 70.75, and 70, respectively. However, the social impact (*People* dimension) significantly lags behind, with a score of 39.75. Consequently, both mosque management and regulators can utilize this information to explore the root causes behind these scores and take meaningful steps to address these issues in the future.

Fig. 4 highlights the achievements of each item. Three out of four items in the *People* dimension scored below 50 % (indicated by red bars), pointing to areas needing the most attention. The lowest score reflects the appreciation given by mosque management to their stakeholders, particularly frequent visitors (25 %). This evidence suggests that mosques in Jakarta can learn from other examples. For instance, the At-Taqwa Mosque in Semarang, Central Java, awards attendees who actively participate in sermons and lectures [99], while Jogokariyan Mosque in Yogyakarta offers small gifts, such as prayer equipment and free meal tickets, to active attendees [100]. Additionally, it is important to place more emphasis on staff, such as by developing a well-being program to demonstrate appreciation to internal stakeholders.

Furthermore, it is evident that mosques in Jakarta demonstrate a relatively modest level of engagement with social media platforms, scoring 47 %. This result diverges somewhat from the situation observed in The Netherlands. In their study, Van Tubergen et al. [101] examined 478 mosques and reported that 52 % of these mosques have websites, with 61 % actively engaging online through social media such as Facebook. In line with this, Briandana et al. [70] emphasize the

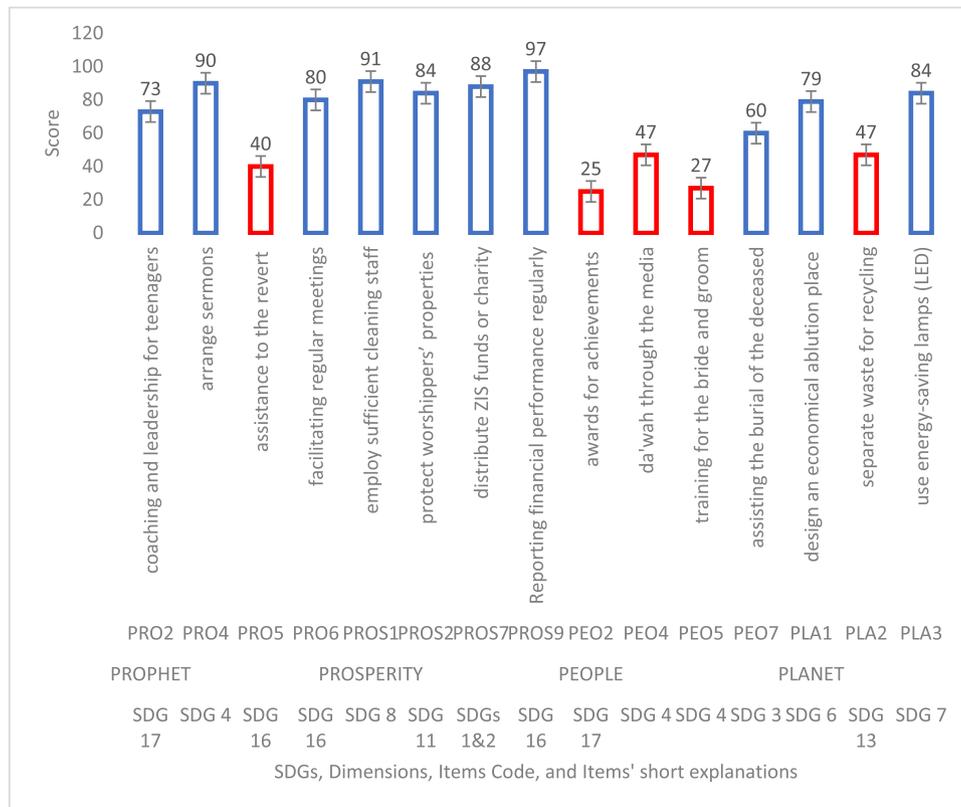


Fig. 4. Validated items' scores and SDGs' mapping in quadruple bottom line chart.

importance of utilizing social media, including platforms like YouTube, as a means to propagate *da'wah* (the call to Islam).

The results indicate a limited involvement of mosques in providing premarital training, with a score of 27 %. Importantly, such training significantly contributes to preparing prospective couples for married life, particularly in managing conflict and reducing the divorce rate [102]. This function has also garnered support from some mosques in the United States [103]. This can be accomplished by utilizing Islamic religious leaders or *Imams*, who are frequently regarded as opinion leaders and sources of guidance [104]. Additionally, mosques should take on further roles as centers of education and facilitators of conflict resolution among various social groups while promoting positive character development within the local community [105]. Therefore, enhancing conflict resolution among Muslims may serve as a potential agenda to bolster mosques' social contributions.

5.2. Mosques contribution on the SDGs

Our survey, which consists of 15 items (see Fig. 4), reveals that at least 11 of the 17 SDGs are addressed. Notably, within the *Prosperity* dimension, four items stand out as key examples: ensuring a professional cleaning staff maintains facilities at high hygiene standards (PROS1, reflecting SDG 8), safeguarding worshippers' belongings during prayers (PROS2, aligning with SDG 11), facilitating the distribution of charity or ZIS (PROS7, aligning with SDGs 1 and 2), and consistently reporting financial performance (PROS9, aligning with SDG 16). Impressively, PROS9, PROS1, and PROS7 demonstrate significant achievements, registering scores of 97, 91, and 88, respectively. These outcomes underscore the strong belief among survey respondents that mosques play a crucial role in advancing prosperity-related objectives through the QBL framework.

Financial constraints significantly influence the sustainability of nonprofit organizations [106]. This challenge is particularly pertinent for many mosques, which heavily depend on funding to support their

various activities [107,108]. Among the respondents in our survey, 29 % did not receive government subsidies and relied instead on donations from the congregation. For example, a mosque in Jakarta receives IDR 2000,000 (US\$128) each month, while a smaller *musholla* (a mosque not intended for the Jum'ah prayer) receives only IDR 1000,000 (US\$64) monthly [109]. Despite this relatively modest income, the mosques in our sample employ an average of 18 staff members. This underscores that, even in the worst-case scenario, mosques can sustain themselves through donation boxes and contributions from attendees. These findings support the conclusions of prior researchers [110–112].

In the context of the *Planet* dimension, our validated items address three distinct areas of achieving the SDGs: (1) designing an economical ablution facility to conserve water (PLA1 in our coding, aligning with SDG 6), (2) separating waste for recycling (PLA2, aligning with SDG 13), and (3) utilizing energy-saving lamps (PLA3, aligning with SDG 7). Both PLA1 and PLA3 have achieved relatively high scores of 79 and 84, respectively. However, PLA2 falls behind with a score of only 47, suggesting that mosques in Jakarta need to tackle this issue more seriously. In Malaysia, Eusof et al. [96] found that 65 % of mosques in their sample have no recycling bins. Nevertheless, 20 % of these bins mix recycled and non-recycled waste.

To enhance the sustainability performance of mosques and similar organizations, particularly regarding environmental issues, a proactive approach involves raising awareness among both mosque management teams and the general public. This can be accomplished by:

- (i) disseminating knowledge about the impacts of climate change and advocating for solutions. For instance, this could involve launching campaigns to reduce the use of plastic packaging in favor of reusable or biodegradable alternatives [95]. Before this can happen, it is essential for the mosque management to participate in accredited training for sustainable mosques. This paves the way for further collaborations with the government and international partnerships with mosques that have implemented

successful green initiatives, such as Cambridge Mosque, Glasgow Central Mosque, and Masjid al-Haram, as well as the Istiqlal Mosque in Jakarta [113].

- (ii) Integrating more environmentally friendly equipment, processes, and materials that can also result in cost savings. This includes the adoption of improved water and energy efficient systems or tools [88].
- (iii) Installing solar panels and transitioning to renewable energy to reduce Scope 2 emissions. In this context, it is essential to introduce the concepts of net zero and carbon neutrality to the mosques in Jakarta. Ultimately, mosques not only in Indonesia but worldwide will need to set carbon neutrality targets with specific timeframes (such as 2027 or 2030, depending on the mosque's size).

Considering that Indonesians hold religious leaders in high regard, often even more than political figures [98], these leaders serve as influential sources of information that guide decision-making [114]. Therefore, it is highly advisable for mosques and Islamic religious leaders (imams) to incorporate climate change discussions into their sermons. This strategic step is particularly significant due to the prominent role that religious groups play in managing mosques, underscoring the importance of religious leadership in shaping decision-making processes.

The results emphasize the *People* dimension as an area that needs significant improvement compared to the other dimensions (*Prophet, Prosperity, Planet*). This gap aligns with findings from the literature [5, 110] and indicates that mosque managers and regulators should prioritise initiatives aimed at enhancing the well-being and engagement of individuals and communities within the mosque's vicinity. Consequently, there is potential for collaborations, such as partnering with mental health professionals, schools, or universities, to improve contributions in this area.

6. Conclusion and limitations

The present research found that mosques play a significant role in achieving sustainable development, particularly through the lens of the quadruple bottom line (QBL), which encompasses dimensions of the Islamic religion. Therefore, mosques generally need to undergo a paradigm shift from being merely places of worship to facilities that can enhance global communities' contributions toward sustainable development while upholding their religious tenets. This research identifies at least 11 SDGs, namely SDG 1, 2, 3, 4, 6, 7, 8, 11, 13, 16, and 17- that have been implemented in the sampled mosques. Overall, while 68 % of the samples indicate a sustainable path, evidenced by their acceptance or anticipation of certain responsibilities, the remaining 32 % are unsustainable, characterized by their acknowledgment of responsibilities but incomplete implementation of tasks.

Among the four dimensions (*Prophet, Prosperity, Planet, People*) of the QBL, the *People* dimension requires significant improvement. Therefore, mosque administrators and regulators should focus more on the well-being of their stakeholders by recognizing staff and attendees with awards, implementing a staff well-being program, enhancing engagement with local communities through social media, and participating in conflict resolution among groups and individuals within the Muslim community. To maximize contributions to this dimension, multi-level collaborations with mental health professionals, schools, and universities are encouraged. This approach could also apply to other places of worship across different religions.

Our findings also suggest that, similar to other NPOs, a mosque's biggest challenge is funding. Given financial limitations, mosques need to maintain their primary traditional income stream from donation boxes. However, they must also actively explore new income-generating avenues by utilizing social media and religious influencers. Therefore, a mosque, or religious worship facilities in general, should develop a

method to finance themselves, which may involve creating strategic business units and fostering community involvement while considering the environmental impact of their activities. This can also be achieved through collaboration with local or federal governments to secure funding or by connecting with venture philanthropy.

The current research presents several limitations that may lead to future research opportunities. First, the scale used in this study might not capture all aspects of sustainable development, such as women's empowerment. Some dimensions, including good governance and social solidarity aimed at reducing inequality, may need to be expanded to include more items that reflect these factors. Therefore, future research could incorporate additional social indicators to enhance the development of this study. Lastly, future studies should seek to assess the impact of QBL across different religions, based on their places of worship, which will enable religious nonprofit organizations to learn from each other.

CRediT authorship contribution statement

M. Luthfi Hamidi: Writing – original draft, Validation, Software, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Gunaro Setiawan:** Writing – review & editing, Writing – original draft, Supervision, Funding acquisition, Formal analysis, Conceptualization. **Mehmet Asutay:** Writing – review & editing, Validation, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no conflicts of interest to disclose. All authors have seen and agree with the contents of the manuscript and there is no financial interest to report. We certify that the submission is original work and is not under review at any other publication.

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Supplementary materials

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Data availability

<https://doi.org/10.6084/m9.figshare.24624849.v1> Refined Data PLS and data for Mosque Performance (Original data) (Figshare).

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