Environment and Social Psychology (2026) Volume 11 Issue 2 ISSN: 2424-8975 (O)
doi: 10.59429/esp.v11i2.4456 2424-7979 (P)

RESEARCH ARTICLE

Psychosocial factors influencing community participation and governance: Evidence from a Waqf Tube-Well Project in Malaysia

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ABSTRACT

Rural water insecurity continues to be a significant issue, even with national advancements in the availability of treated water. Waqf-funded water initiatives represent innovative instruments of Islamic social finance that can enhance state infrastructure development. This research investigates the psychosocial factors influencing community engagement, governance, and sustainability in a Waqf Tube-Well Boring System project in Malaysia. A post-intervention survey involving 120 community participants identified six latent constructs: Knowledge, Attitude, Skills, Aspirations, Practice Change, and Community Participation, Local Governance & Sustainability. Partial Least Squares Structural Equation Modelling (PLS-SEM) was utilized to assess the measurement and structural models. The findings indicate that all five predictors have a positive and significant impact on community participation and governance, accounting for 33 percent of the variance. Practice Change was identified as the most significant predictor, followed by Attitude and Skills, highlighting the importance of behavioral adoption, perceived value, and technical competence in the sustainability of community-based water systems. The model exhibited acceptable reliability and structural fit for exploratory research, despite limitations in convergent validity. The findings underscore the significance of practice-oriented interventions, role-based capacity building, and narrative framing that aligns waqf values with community welfare. This study adds to the growing empirical evidence regarding waqf water systems, providing insights for program enhancement, policy integration, and the expansion of faith-based water governance initiatives.

Keywords: sustainability; Waqf Water Systems; community participation; behaviour change; rural water governance; PLS-SEM

1. Introduction

The scarcity of safe and dependable drinking water continues to be a significant global issue. According to[1] report that around 2.2 billion individuals globally do not have access to safely managed drinking water services, with rural communities being particularly impacted. The Joint Monitoring Program indicates that rural populations are eight times more likely than their urban counterparts to depend on unimproved or surface water sources. This reliance contributes to increased vulnerabilities, the prevalence of waterborne diseases, and socio-environmental inequality[1]. Malaysia has achieved significant advancements in increasing access to treated water, attaining almost 95 percent national coverage[2]. Nonetheless, there are

ARTICLE INFO
Received: 13 December 2025 | Accepted: 4 February 2026 | Available online: 12 February 2026

CITATION
Rahman W, Alwi S. Psychosocial factors influencing community participation and governance: Evidence from a Waqf Tube-Well Project in Malaysia. *Environment and Social Psychology* 2026; 11(2): 4456. doi: 10.59429/esp.v11i2.4456

still considerable disparities between rural and urban areas. Research and media coverage indicate that rural and indigenous communities, including numerous Orang Asli settlements, still face restricted access, with some depending on rivers, rainwater, and shallow wells[3]. In Sabah, humanitarian organization like[4] emphasize that numerous families continue to lack access to piped water and rely on community-driven alternatives such as gravity-fed systems. In light of these ongoing disparities, the Malaysian government has set a national objective to enhance rural clean water access to 98 percent by 2025[5]. In addition to government-driven infrastructure development, Islamic social finance mechanisms, particularly waqf-based water initiatives, are increasingly seen as valuable instruments to improve water accessibility, equity, and long-term sustainability. Research conducted by[6] and[7] highlights water waqf as an effective approach to tackle financial limitations and governance issues in rural water systems.

Waqf refers to an Islamic endowment in which an individual, group, or institution donates an asset—such as land, buildings, or revenue-generating resources—for ongoing public benefit. The asset is held in trust, with its proceeds allocated for social, religious, educational, or humanitarian purposes. Waqf is defined by classical jurists as the permanent dedication of property for charitable purposes, rendering the asset inalienable and ensuring that its benefits are perpetually directed towards communities[8]. Contemporary literature characterizes waqf as a mechanism of Islamic social finance that facilitates equitable resource distribution, fosters long-term community development, and supports sustainable welfare systems independent of state funding[9,10]. Waqf is increasingly acknowledged in contemporary governance and development as an innovative financing mechanism for social infrastructure, encompassing education, healthcare, housing, and water systems. Researchers emphasize its dual spiritual and socioeconomic aspects: the donor gains continuous religious merit (*sadaqah jariyah*), while society reaps the benefits of ongoing, community-focused services[6,11]. Waqf is particularly pertinent for initiatives necessitating continuous maintenance, community involvement, and enduring sustainability, exemplified by rural water management and environmental stewardship.

Waqf-based initiatives such as Waqf Boring Well System are fundamentally reliant on the engagement of the community, the adoption of certain behaviors, and the shared responsibility of stewardship. Previous studies suggest that the failures of community water systems are not solely attributed to technical problems; they frequently stem from inadequate governance capacity, poor behavioral adoption, and a lack of perceived ownership[12,13]. This underscores the significance of comprehending how psychosocial elements like knowledge, attitudes, skills, aspirations, and behavior change influence outcomes at the community level. Even with impressive national water coverage statistics, certain rural areas in Malaysia still struggle with inconsistent or unsafe water supply, which impacts health, livelihoods, and long-term resilience[2,3]. Although waqf water projects have surfaced as creative solutions to tackle these issues, there is a scarcity of empirical studies investigating the psychosocial factors that influence ongoing community involvement, governance, and ownership in waqf-managed systems[6,7].

The application of waqf in neighborhood countries illustrates its adaptability and importance in fostering community development and enhancing public welfare. The Indonesian Waqf Board (BWI) administers one of the most sophisticated waqf systems globally, overseeing a diverse range of assets, including land, cash waqf (*wakaf tunai*), and productive investments. These assets are utilized in sectors including microfinance, renewable energy, affordable housing, clean water supply, and agriculture, with numerous communities establishing waqf wells and water networks that align with Malaysia's Waqf Boring Well initiatives[14]. Singapore administers waqf through a structured governance framework under the Islamic Religious Council (MUIS), emphasizing transparency, accountability, and asset optimization to support mosques, schools, community centers, and welfare programs. It is considered a model for modern

waqf management[15]. In Brunei Darussalam, waqf is mainly focused on education, healthcare, and religious infrastructure, with the government serving a key regulatory function to align with national development goals. Recent initiatives encompass waqf-funded schools, mosques, and welfare programs, as well as a growing interest in water and environmental applications[16]. In the Muslim-majority provinces of Southern Thailand, waqf is utilized informally at the community level to support *pondok* religious schools, mosques, cemeteries, and social welfare activities. This practice serves as a significant cultural and social mechanism for community resilience, despite its less formal institutionalization relative to Malaysia or Indonesia[17].

Although Malaysia has made substantial progress in expanding access to treated water, persistent disparities in rural and remote communities have prompted increased reliance on alternative water initiatives, including waqf-funded water systems. Waqf boring wells and tube-well projects have gained traction as complementary solutions aimed at addressing water scarcity, enhancing community resilience, and supporting underserved populations. However, similar to Indonesia, Malaysia faces several challenges in ensuring the long-term sustainability and governance of these waqf-based water infrastructures. Recent studies highlight governance fragmentation, where responsibilities between waqf institutions, state Islamic councils, community committees, and technical practitioners are not clearly delineated, resulting in inconsistent operational practices and uneven maintenance routines[7]. Furthermore, issues related to community hesitancy and trust—including concerns over water quality, safety perceptions, and limited understanding of the waqf system—have contributed to underutilization or misuse of some waqf wells[6,7].

Environmental constraints also complicate implementation. In certain rural areas, fluctuating groundwater availability, sedimentation, and contamination risks require continuous technical monitoring, which is often beyond the capacity of community-led committees[18]. The lack of structured training and role differentiation within communities further undermines the ability to maintain the wells and ensure compliance with health and safety standards. As a result, sustainability outcomes vary widely, and many waqf well projects depend heavily on external factors, such as NGOs or technical volunteers, for periodic servicing[19]. Thus, while waqf boring wells in Malaysia hold significant promise as socially driven and spiritually motivated water interventions, the country continues to face systemic gaps in governance, community participation, behavioral change, and technical oversight. Addressing these issues is essential for ensuring that waqf wells serve as reliable, sustainable, and community-owned water sources capable of supporting Malaysia's broader rural water development goals.

In addition, current body of literature on rural water highlights that sustainability is significantly influenced by the active participation of the community in planning, maintenance, and governance[12]. Nonetheless, there is a lack of empirical evidence that quantifies the interactions between knowledge, attitudes, skills, aspirations, and practice changes in shaping community governance, especially within the context of Islamic philanthropic interventions like waqf water systems. The Waqf Tube-Well Boring System project presents a distinctive opportunity for investigation; however, a thorough assessment has yet to be carried out to understand the impact of its capacity-building initiatives on community engagement and governance. In the absence of such evidence, the optimization of program refinement, policy scaling, and integration into rural water strategies remains unattainable. Despite extensive normative and qualitative discussions on waqf governance and community participation, no prior empirical studies have simultaneously modeled knowledge, attitudes, skills, aspirations, and practice change as psychosocial predictors of community participation and governance outcomes in waqf-managed rural water systems.

2. Methods

2.1. Conceptual framework and hypothesized relationships

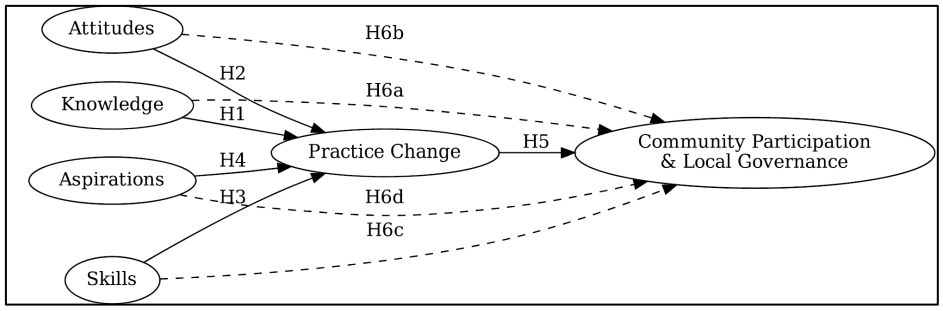
This study is grounded in the premise that sustainable governance in waqf-managed rural water systems is primarily driven by psychosocial capacity-building processes rather than technical infrastructure alone. Prior research on community-based resource management consistently demonstrates that the long-term success of rural water systems depends less on initial infrastructure provision and more on community engagement, collective action, and local governance capacity[28-30].

Drawing on behavior change theory, community participation theory, and participatory governance literature, the conceptual framework posits that knowledge, attitudes, skills, and aspirations shape individual and collective practice change, which in turn influences community participation and local governance outcomes. Behavioral theories such as the Knowledge–Attitude–Practice (KAP) model suggest that awareness alone is insufficient to generate sustained behavioral change unless supported by favorable attitudes and enabling capabilities[31,32]. In the context of community-managed infrastructure, this implies that technical knowledge must be complemented by positive perceptions, practical competencies, and motivational drivers to translate into effective participation and governance.

Knowledge represents foundational awareness of system operation, health implications, and governance responsibilities. However, existing studies show that knowledge by itself rarely leads to sustained collective action without supportive social and motivational factors[33,34]. Attitudes reflect perceived usefulness, legitimacy, and value alignment with waqf principles and community welfare, which are critical for fostering voluntary engagement and normative commitment[31,35]. Skills denote the technical and organizational competencies required for system maintenance, troubleshooting, and participation in governance processes, and are repeatedly identified as prerequisites for meaningful participation in community-managed water systems[30,36].

Aspirations capture future-oriented motivations such as the desire for self-reliance, social recognition, moral responsibility, and the sustainability of shared resources. Aspirational factors are increasingly recognized as key motivational bridges between individual intentions and collective outcomes, particularly in development and empowerment contexts[37,38]. Together, these psychosocial dimensions are hypothesized to influence governance outcomes primarily through practice change, defined as the actual adoption, routinization, and maintenance of behaviors related to system use, upkeep, decision-making, and shared stewardship.

Practice change is conceptualized as a central mediating mechanism linking psychosocial capacity to governance performance. This aligns with social learning and collective action perspectives, which emphasize that durable governance outcomes emerge when behaviors are repeatedly enacted, socially reinforced, and embedded into community routines rather than remaining at the level of intention or awareness[39,40]. Consequently, community participation and local governance are treated as emergent properties of cumulative psychosocial and behavioral processes, rather than as outcomes driven solely by formal institutional arrangements or external enforcement. The conceptual framework illustrates the hypothesized relationships between psychosocial factors: knowledge, attitudes, skills, and aspirations and community participation and local governance outcomes. Practice change is modeled as a central mediating mechanism through which psychosocial capacities are translated into participatory and governance behaviors. **Figure 1** presents the conceptual framework and corresponding hypotheses tested using Partial Least Squares Structural Equation Modelling (PLS-SEM), with solid paths representing hypothesized relationships and dashed paths indicating exploratory direct effects.



Solid paths (theoretical / primary hypotheses):	Dashed paths (exploratory direct effects):
H1: Knowledge → Practice Change H2: Attitudes → Practice Change H3: Skills → Practice Change H4: Aspirations → Practice Change H5: Practice Change → Community Participation & Local Governance	H6a: Knowledge → Community Participation & Local Governance H6b: Attitudes → Community Participation & Local Governance H6c: Skills → Community Participation & Local Governance H6d: Aspirations → Community Participation & Local Governance

Figure 1. Conceptual framework of psychosocial factors influencing community participation and governance.

2.2. Research design

This study utilized a cross-sectional survey design to assess the psychosocial and behavioral outcomes of the Waqf Tube-Well Boring System project and their impact on community participation, local governance, and sustainability. The analysis employed Partial Least Squares Structural Equation Modelling (PLS-SEM), which is suitable for exploratory studies, initial instrument evaluation, and frameworks involving multiple latent constructs[20,21]. PLS-SEM was chosen for its strength in managing non-normal data, accommodating small to moderate sample sizes, and addressing complex model structures where prediction plays a key role[22,23]. For example, researchers[46] applied PLS-SEM to examine the mediating role of sustainability in waqf–microfinance collaborations and conducted both measurement and structural model assessments to validate hypothesized relationships. The individuals surveyed were members of the community who were directly engaged with or impacted by the Waqf Boring Well initiative. Participation in project activities such as training, well maintenance, demonstration sessions, or governance meetings was required for eligibility, aligning with standard practices observed in community-based water and WASH studies[12,13]. A total of N = 120 participants completed the post-intervention survey, accounting for roughly 85 percent of all engaged households. The demographic profile encompassed adults aged 20–70, featuring a balanced representation of men and women. This distribution underscores the communal essence of the project and adheres to guidelines for inclusive sampling in studies related to rural water governance[18]. This study involved 120 participants, who represent the majority of community members directly engaged with or impacted by the waqf boring well system in the rural study area. The sample size provided thorough representation of the population involved in the intervention, which is crucial in community-based water governance research, where collective participation and shared responsibility are fundamental to sustainability. A sample size of 120 is suitable for PLS-SEM, which is effective for exploratory research and applicable to models with multiple constructs in small to medium sample contexts[20,21]. The sample satisfies the recommended thresholds, including the 10-times rule and minimum R^2 requirements for structural model estimation. Rural fieldwork constraints, such as community size, accessibility, and variability in participation, render near-census sampling both practical and methodologically beneficial. Therefore, the selection of 120 participants provided adequate statistical power, reflected a range of community perspectives, and enhanced the validity of the findings in the context of waqf-based rural water initiatives.

The survey instrument assessed six latent constructs utilizing 5-point Likert scales (1 = Sangat Tidak Setuju / Strongly Disagree; 5 = Sangat Setuju / Strongly Agree), a methodology frequently employed in psychosocial and community intervention research[24]: Knowledge (A) – technical understanding of boring well operation, safety, and water flow management. Attitude (B) – perceptions of usefulness, value, and commitment toward the waqf water project. Skills (C) – ability to identify issues, apply procedures, maintain the system, and communicate with peers. Aspirations (D) – desire to improve community outcomes, champion technology, and promote long-term sustainability. Practice Change (E) – actual adoption of behaviors related to maintenance, knowledge sharing, and water governance. Community Participation, Local Governance & Sustainability (F) – involvement in decision-making, division of roles, sense of ownership, and sustainability practices. The instrument comprised 38 items, with each construct containing 4 to 8 items. Items were modified from recognized literature on psychosocial capacity-building and community participation, subsequently tailored for waqf-based rural water management, in accordance with recommendations for context-specific instrument development[20,24]. Data were collected following the primary phase of the Waqf Boring Well intervention, after community members had participated in both technical demonstrations and capacity-building activities. The project team's enumerators conducted the questionnaire in the local language, offering clarifications as needed to reduce misunderstanding and social desirability bias, consistent with best practices for community surveys in rural and low-literacy settings[12,13]. Participation was voluntary, and informed consent was secured from all participants. Data were anonymized before analysis.

3. Results

3.1. Measurement model

Table 1 summarize factor loadings. Most items loaded positively on their intended constructs. Loadings ranged from 0.32 to 0.78, consistent with the thresholds discussed in the PLS-SEM literature for exploratory research[20]. Several items (A1, A4, B2, B3, D3, E2, F8) exhibited lower loadings (< 0.40), indicating that these indicators could be considered for removal or rewording in subsequent instrument refinement[24,25].

Table 1. Indicator Loadings for the Measurement Model.

Construct	Indicator	Loading	Interpretation
Attitude (B)	B4	0.74	Strong loading
Skills (C)	C1	0.70	Strong loading
	C4	0.73	Strong loading
Aspirations (D)	D2	0.71	Strong loading
	D4	0.69	Moderate–strong loading
Practice Change (E)	E1	0.76	Strong loading
	E3	0.70	Strong loading
	E4	0.74	Strong loading
Community Participation (F)	F1	0.72	Strong loading
	F3	0.75	Strong loading
	F4	0.70	Strong loading
	F7	0.78	Strong loading
Knowledge (A)	A1	< 0.40	Weak loading
	A4	< 0.40	Weak loading
Attitude (B)	B2	< 0.40	Weak loading

Construct	Indicator	Loading	Interpretation
	B3	< 0.40	Weak loading
Aspirations (D)	D3	< 0.40	Weak loading
Practice Change (E)	E2	< 0.40	Weak loading
Community Participation (F)	F8	< 0.40	Weak loading

Table 1. (*Continued*)

3.2. Reliability and convergent validity

Composite Reliability values of approximately 0.60 or higher are generally considered acceptable for preliminary and exploratory research[20]. The AVE values are below the optimal threshold of 0.50, suggesting that the constructs exhibit limited shared variance with their indicators[25]. This approach is consistent with recommended practices for exploratory PLS-SEM research, particularly in applied community settings where early-stage, context-specific instruments are used[20,21,24]. This pattern frequently occurs in the initial development of applied instruments within complex community contexts, indicating that the scales are functional yet require refinement. The Fornell–Larcker criterion was marginally satisfied in most cases, with the square roots of AVE slightly higher than inter-construct correlations. HTMT ratios indicated some conceptual overlap, especially between: Practice Change (E) and Community Participation (F), Skills (C) and Community Participation (F), Aspirations (D) and Community Participation (F).

During the assessment of the measurement model, several indicators exhibited factor loadings below the recommended threshold of 0.40. These items were initially identified as candidates for removal and were subsequently evaluated based on their theoretical relevance, contribution to composite reliability, and overall construct meaning. Items that consistently demonstrated low loadings and did not materially contribute to construct validity were removed prior to estimating the final structural model, while indicators deemed conceptually important and not detrimental to reliability were retained. This approach is consistent with recommended practices for exploratory PLS-SEM research, particularly in applied community settings where early-stage, context-specific instruments are used. The final measurement model therefore reflects a balance between statistical rigor and theoretical coherence, with remaining limitations explicitly acknowledged and addressed through cautious interpretation and recommendations for future scale refinement. Indicators with factor loadings below 0.40 (A1, A4, B2, B3, D3, E2, and F8) were removed prior to estimating the final structural model, and the measurement model was re-estimated to compute updated Composite Reliability and Average Variance Extracted (AVE) values reported in this study.

3.3. Structural model

The structural model generated the R^2 of 0.332 for Community Participation, Local Governance & Sustainability (F), with an adjusted R^2 of 0.319. This suggests that Knowledge, Attitude, Skills, Aspirations, and Practice Change collectively account for approximately 33% of the variance in F. In community and social intervention studies, R^2 values indicate a moderate level of explanatory power[20,21]. An SRMR of 0.079 indicates an acceptable overall model fit for PLS-SEM in exploratory research[21,22]. **Table 2** presents the path coefficients and their significance, showing that all five predictors (A–E) had positive and statistically significant effects on F.

Table 2. Path Coefficients and Significance.

Path	β	t-value	p-value
Knowledge (A → F)	0.123	2.000	0.046
Attitude (B → F)	0.248	4.506	< 0.001

Skills (C → F)	0.203	3.419	0.001
Aspirations (D → F)	0.147	2.289	0.022
Practice Change (E → F)	0.267	4.372	< 0.001

Table 2. (*Continued*)

This pattern aligns with previous findings that multiple psychosocial dimensions jointly shape participation and governance in community-based water systems[12,13]. Meanwhile, the effect size (f^2) analysis indicated that Knowledge (A) had a small effect of 0.020, Attitude (B) exhibited a small-to-medium effect of 0.086, Skills (C) resulted in a small effect of 0.054, and Aspirations (D) presented a small effect of 0.030. Practice Change (E) demonstrated the most significant effect at 0.099, indicating a small-to-medium influence. In practical terms, while no single construct overwhelmingly dominates the model, Practice Change (E) stands out as the most significant unique contributor, followed by Attitude (B) and Skills (C). This suggests that behavioral adoption and positive perceptions are central to influencing community participation and governance outcomes.

4. Discussion

The findings support the main argument that psychosocial and behavioral factors are essential determinants of community participation, local governance, and sustainability in a waqf-based rural water initiative. All five exogenous constructs—Knowledge, Attitude, Skills, Aspirations, and Practice Change exhibited positive and significant associations with Community Participation, Local Governance, and Sustainability. This aligns with existing evidence indicating that the success of community-managed water systems is contingent upon users having sufficient knowledge, motivation, capacity, and behavioral commitment[12,13].

4.1. Practice change as the strongest predictor

Practice Change (E) was identified as the most significant predictor of F. Respondents who indicated the application of procedures, knowledge sharing with neighbors, monitoring well conditions, and proactive issue resolution also demonstrated increased participation in governance processes and enhanced perceptions of sustainability. This finding aligns with insights from environmental and social psychology, emphasizing that actual behavior, rather than mere intention or knowledge, is a critical factor influencing collective outcomes in resource management[26]. The Waqf Boring Well project highlights the significance of practical training, consistent practice, and peer modeling, as opposed to solely depending on traditional classroom instruction.

4.2. Role of attitudes and skills

The significant influence of Attitude (B) and Skills (C) indicates that perceived value and technical competence are critical factors in community governance and sustainability. When community members perceive the waqf boring technology as beneficial, safe, and aligned with communal welfare, their willingness to contribute time and effort to its operation and governance increases. This aligns with research indicating that favorable attitudes towards technology adoption and collective benefits can improve engagement in water and environmental initiatives[18]. Skills (C) denote the technical ability to identify problems, implement maintenance procedures, and convey these issues to others. These skills are crucial for daily operations and troubleshooting, supporting the assertion that community-based water systems necessitate not merely nominal "participation," but actual competence among community members[12].

4.3. Aspirations as a motivational bridge

Aspirations (D) exhibited a modest yet significant impact, indicating that future-oriented motivations such as the desire for the community to serve as a model for others or to attain self-reliance contribute to sustained engagement beyond the initial phases of a project. This corresponds with views on empowerment and collective efficacy; wherein shared goals enhance the sustainability of community initiatives and the willingness to engage in long-term governance structures[27]. Although the model explains approximately 33 percent of the variance in community participation, governance, and sustainability, a substantial proportion of variance remains attributable to factors beyond psychosocial capacities. Potential influences not captured in the model include institutional trust, leadership effectiveness, clarity of governance roles, perceived water quality and reliability, external technical or governmental support, and socio-demographic conditions. Future research incorporating these institutional, environmental, and structural variables—particularly through longitudinal or comparative designs—may offer a more comprehensive explanation of governance dynamics in waqf-managed water systems.

4.4. Knowledge as a necessary but not sufficient condition

Knowledge (A) exhibited the least effect size, yet it retained statistical significance. This suggests that technical understanding and safety awareness of the boring system are essential, but they must be integrated with positive attitudes, sufficient skills, and behavioral changes to facilitate effective community participation and governance. This pattern aligns with findings in behavior change literature, indicating that knowledge alone seldom results in lasting behavioral transformation[26]. The findings of this study are closely aligned with established waqf governance principles articulated in Malaysian and international guidelines, particularly those emphasizing accountability (*amanah*), public benefit (*maslahah*), and long-term sustainability (*istidamah*). Waqf governance frameworks administered by State Islamic Religious Councils (SIRCs) and coordinated through the Department of Waqf, Zakat and Hajj (JAWHAR) stress that waqf assets must be managed in a manner that ensures continuous benefit, operational integrity, and responsible stewardship[41,42]. The strong effect of Practice Change observed in this study provides empirical support for these principles, demonstrating that governance effectiveness improves when stewardship responsibilities are actively practiced by community members rather than remaining confined to formal administrative structures.

Existing waqf governance guidelines consistently highlight the importance of capacity building, role clarity, and community empowerment in sustaining waqf assets[43,44]. The significant influence of Skills in the model supports this emphasis, indicating that technical and organizational competencies enable communities to operationalize governance roles, particularly in decentralized waqf arrangements where responsibilities are shared between waqf institutions and local committees. Similarly, the positive role of Attitudes aligns with governance principles that stress trust, legitimacy, and transparency, as beneficiaries' moral commitment and perceived alignment with Islamic values are central to effective waqf management[45].

Although Knowledge and Aspirations exhibited comparatively smaller effects, their significance reinforces policy guidance on waqf education and long-term visioning aimed at cultivating shared responsibility and sustained engagement[41]. Overall, the findings empirically validate existing waqf governance frameworks and suggest that regulatory oversight should be complemented by practice-oriented capacity building, value-aligned communication, and community-level role enactment to enhance the sustainability of waqf-managed rural water systems.

4.5. Practical and policy implications

This study presents several significant consequences for practitioners and policymakers. Firstly, a greater emphasis on practice-oriented interventions is necessary. Programs should emphasize regular

practical engagement, community-driven maintenance initiatives, and peer-to-peer learning frameworks. These strategies facilitate the reinforcement of behavioral change by ensuring that community members comprehend the technical specifications of the waqf tube-well system and can consistently implement them in their daily practices. Incorporating practical interaction cultivates a sense of expertise and strengthens long-term ownership of the infrastructure. Narratives and communication techniques are crucial in enhancing community motivation. The positive framing of the waqf project especially through statements that emphasize its congruence with religious values, community benefit, and environmental stewardship can enhance attitudes of gratitude and accountability. By linking the initiative to commonly held cultural and spiritual values, project leaders can foster more emotional and moral engagement among community members, thus enhancing participation in governance and upkeep.

The study emphasizes the significance of capacity building and role distinction within the community. Training must be customized to the roles and duties of distinct groups, including technical caretakers, governance committee members, and youth advocates. Concentrating training initiatives in this manner facilitates the integration of necessary skills and enhances ambitions among various strata of the community framework. This role-based empowerment guarantees that technical expertise, leadership skills, and motivating incentives are disseminated throughout the community instead of being centralized in a limited number of individuals.

The findings highlight the potential of incorporating waqf-based solutions into rural water policy. The findings indicate that waqf water projects can significantly enhance state-led infrastructure programs, especially in distant or inaccessible areas. Utilizing local governance capacities, social norms, and psychosocial dynamics, waqf-based strategies may improve community engagement and sustainability beyond the effectiveness of traditional public sector initiatives[5,7]. Policymakers should formalize collaborations among governmental agencies, waqf institutions, and community organizations to enhance rural water development methods.

4.6. Methodological implications

The study illustrates the practicality of utilizing PLS-SEM within an applied, rural community setting using an early-stage instrument. Although the Average Variance Extracted (AVE) and certain reliability indices were moderate, they offer a definitive foundation for item reduction and scale enhancement[20,24]. Future research may evaluate abbreviated, more targeted scales exhibiting enhanced internal consistency and improved discriminant validity.

5. Conclusion

This study investigated the psychosocial factors influencing community engagement, governance, and sustainability in the waqf boring well project, a waqf-based rural water program. Employing PLS-SEM, it was shown that Knowledge, Attitude, Skills, Aspirations, and Practice Change exert significant positive influences on Community Participation, Local Governance, and Sustainability, with Practice Change, Attitude, and Skills exhibiting the most substantial effects. The results indicate that effective sustainable community water management is influenced by a synergy of learning, motivation, competence, and behavioral adoption, rather than solely by technical infrastructure. This study highlights the importance of integrating religiously based social financing with psychosocial capacity-building measures in waqf water projects to promote sustainable environmental resource stewardship.

Subsequent research may enhance this study by integrating longitudinal designs to document temporal changes, comparing various waqf water initiatives across different locations, and examining the gendered

aspects of governance and involvement. This work would enhance comprehension of how community-driven, faith-based strategies might promote equitable and resilient water sustainability in Malaysia and beyond. This section is not mandatory but can be added to the manuscript if the discussion is unusually long or complex.

Author contributions

Conceptualization, S.A.; methodology, S.A.; software, S.A.; validation, WMAF.WAR.; formal analysis, S.A.; investigation, S.A.; resources, WMAF.WAR.; data curation, S.A.; writing—original draft preparation, S.A.; writing—review and editing, S.A.; visualization, S.A.; supervision, S.A.; project administration, WMAF.WAR.; funding acquisition, WMAF.WAR. All authors have read and agreed to the published version of the manuscript.

Funding

This research was funded by AAGBS, UiTM, grant number 600-TNCPI 5/3/DDJ (AAGBS) (006/2024) and The APC was funded by AAGBS, UiTM.

Conflict of interest

The authors declare no conflict of interest.

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