GOVERNANCE AS A STRUCTURING VARIABLE OF WATER- SANITATION-HYGIENE SECTOR PERFORMANCE: A SYSTEMIC AND MULTI-CRITERIA ANALYSIS

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ABSTRACT

The Water, Sanitation and Hygiene (WASH) sector continues to face persistent challenges related to service sustainability, equity of access, and overall system performance, despite substantial technical and financial investments made over recent decades. These recurring shortcomings highlight the limitations of fragmented, sector-based approaches and underline the need for integrated analytical frameworks capable of capturing the structural determinants of performance. This article analyzes the role of governance in shaping overall WASH system performance through a systemic approach based on the 5M framework (Manpower, Methods, Materials, Means, and Management/Governance) combined with a multi-criteria analysis encompassing sustainability, equity, resilience, coordination, and overall performance. The methodology relies on a qualitative and conceptual analysis of the WASH value chain, supported by a review of scientific and institutional literature. Governance is conceptualized as an endogenous and structuring variable organizing interactions among system components rather than a contextual or normative factor. Results show that WASH performance does not stem from isolated optimization of resources but from coherent interactions enabled by effective governance mechanisms. Coordination emerges as the central mediating mechanism through which governance influences sustainability, equity, resilience, and overall system performance. Overall performance thus appears as an emergent property of the WASH system, dependent on governance quality rather than resource availability alone.

Keywords: *Governance, Water Sanitation and Hygiene, Systemic approach, Overall performance, Coordination, Sustainability*

1. INTRODUCTION

Since the early 2000s, the Water–Sanitation–Hygiene (WASH) sector has benefited from an unprecedented volume of investments worldwide, driven by international development agendas and global water security concerns (UN-Water, 2013 [1]). Multilateral institutions, development banks, and international cooperation agencies have primarily directed their funding toward the construction and rehabilitation of water supply and sanitation infrastructure, which are widely considered direct levers for improving access indicators (World Bank, 2018 [2]).
In low- and middle-income countries, this dynamic has resulted in a rapid expansion of boreholes, water supply networks, improved sanitation facilities, and wastewater treatment systems, often supported by external financing mechanisms strongly conditioned by measurable physical outputs (WHO & UNICEF, 2021 [3]). At the national level, this logic has similarly structured public policies, where sectoral performance continues to be assessed predominantly through infrastructure coverage indicators and investment volumes (OECD, 2011 [4]).
Despite this intensification of investments, a growing body of literature converges on a troubling observation: a significant proportion of WASH infrastructure becomes partially or fully non-functional only a few years after commissioning (World Bank, 2018 [2]). Sectoral studies report high rates of system failure, limited service continuity, and pronounced territorial and socio-economic disparities in effective access to WASH services (WHO & UNICEF, 2021 [3]).
Moreover, improvements in "improved access" indicators do not systematically translate into sustained health outcomes, enhanced resilience to climate-related shocks, or reduced inequalities between urban and rural areas (UNESCO WWAP, 2020 [5]). This situation reveals a persistent disconnect between infrastructure delivery and the provision of reliable, inclusive, and sustainable public services.
This structural gap reflects what the literature increasingly describes as the WASH sector paradox: the expansion of material and financial resources does not mechanically lead to proportional improvements in overall system performance (Grindle, 2004 [6]). A growing number of studies suggest that observed failures are less attributable to technological limitations than to organizational, institutional, and managerial deficiencies (Lockwood, 2010 [7]).
Consequently, the relative failure of many WASH projects appears to be symptomatic of a governance crisis, characterized by weak actor coordination, limited accountability mechanisms, insufficient institutional capacity, and fragmented responsibilities across decision-making levels (OECD, 2015 [8]). This diagnosis calls for a shift in analytical focus, moving beyond strictly technical perspectives to examine the systemic foundations of sectoral performance.
WASH policy interventions remain largely dominated by techno-financial approaches, in which project success is equated with infrastructure delivery in compliance with technical specifications and budgetary constraints (World Bank, 2018 [2]). While historically justified by the urgency of addressing infrastructure deficits, this approach tends to reduce sectoral complexity to predominantly material variables.
Within this framework, institutional, social, and organizational dimensions are often treated as secondary or addressed marginally through weakly integrated cross-cutting components in monitoring and evaluation systems (UNDP, 2017 [9]). Numerous ex-post evaluations demonstrate that the absence of clear service management, maintenance, regulation, and financing mechanisms constitutes one of the main causes of medium- and long-term project failure (World Bank, 2018 [2]).
Deficits in local actor capacity, institutional instability, and weak accountability mechanisms significantly limit the ability of WASH systems to operate autonomously and resiliently (Ostrom, 2009 [10]). These shortcomings are particularly critical in decentralized governance contexts, where local authorities are increasingly entrusted with service responsibilities without commensurate organizational and managerial resources (OECD, 2011 [4]).
Furthermore, the proliferation of stakeholders—sectoral ministries, local governments, service operators, non-governmental organizations, donors—without robust coordination frameworks exacerbates fragmentation and resource dispersion (Ansell & Gash, 2008 [11]). This fragmentation results in strategic inconsistencies, overlapping mandates, and limited learning capitalization, ultimately undermining system coherence.
In this context, governance emerges not as one factor among others, but as a transversal variable conditioning the sector's capacity to transform available resources into sustainable services (Pahl-Wostl, 2015 [12]).
Against this background, the central research question guiding this study is as follows:
Why and how does governance condition the overall performance of Water–Sanitation–Hygiene systems, independently of material and financial investment levels?
The primary objective of this research is to demonstrate that governance constitutes a structuring variable of the WASH system, exerting a transversal influence on technical, human, financial, and organizational performance levers. The study seeks to establish that, in the absence of a coherent governance framework, other system components remain partially ineffective or even counterproductive.

This research is grounded in governance studies and draws on complex systems theory, conceptualizing the WASH sector as a dynamic socio-institutional system characterized by non-linear interactions and feedback loops (Meadows, 2008 [13])

2. MATERIALS AND METHODS

2.1 Theoretical Framework: The WASH Sector as a Complex Socio-Institutional System

1. Characterization of the WASH sector as a multi-actor socio-technical system

In this study, the Water–Sanitation–Hygiene (WASH) sector is conceptualized as a complex socio-institutional system in which technical, human, organizational, financial, and normative components interact simultaneously. This perspective aligns with research approaches that consider water and sanitation services not merely as technical infrastructures, but as collective action systems structured by institutions, rules, and power relations (Ostrom, 2009 [10]).

The WASH system is characterized by:

- a plurality of actors with differentiated interests and responsibilities, including central government, local authorities, service operators, users, donors, and civil society organizations (OECD, 2011 [4]);
- a multi-level organizational structure involving both vertical and horizontal interactions across governance levels (OECD, 2011 [4]);
- non-linear dynamics generating feedback loops that may amplify or attenuate the effects of sectoral interventions (Pahl-Wostl, 2015 [12]).

Within this framework, physical infrastructure constitutes a necessary but insufficient subsystem whose performance is highly dependent on the institutional mechanisms governing its management and regulation (Lockwood, 2010 [7]).

2. Relevance of the systemic approach for WASH sector analysis

The adoption of a systemic approach is justified by the inability of fragmented sectoral analyses to explain the persistent gaps between investment levels and observed performance outcomes (Grindle, 2004 [6]).

According to complex systems theory, the global properties of a system emerge from interactions among its components and cannot be reduced to the sum of individual effects (Meadows, 2008 [13]). Applied to the WASH sector, this approach makes it possible to:

- identify functional interdependencies between human resources, infrastructure, financial mechanisms, and institutional frameworks (Ostrom, 2009 [10]);
- understand the transversal effects of governance on system performance (Pahl-Wostl, 2015 [12]);
- analyze the conditions under which sectoral interventions achieve coherence or, conversely, become fragmented (OECD, 2015 [8]).

2.2. Adaptation of the 5M Framework to the Public WASH Sector

1. Conceptual foundations of the 5M analytical tool

The 5M framework, originating from quality management approaches, aims to analyze the structural causes of system performance or dysfunction through five interdependent categories: Manpower, Methods, Materials, Means, and Environment/Management (Ishikawa, 1986 [14]).

In this study, the 5M framework is mobilized as a structuring analytical tool adapted to the analysis of complex public systems. Its transposition to the Water, Sanitation and Hygiene sector allows the organization of analysis around the main functional levers of the system, while preserving an integrated and non-hierarchical reading of its components.

2. Operational definition of the 5M components in the WASH context

The five components are defined as follows:

- **Manpower**: institutional and operational actors of the WASH sector, including competencies, roles, management capacities, and accountability mechanisms;
- **Materials:** physical infrastructure and equipment required for WASH service delivery;
- **Methods:** procedures, technical standards, planning mechanisms, monitoring and evaluation systems, and maintenance processes;
- **Financial Means:** financial resources dedicated to investment, operation, and long-term service sustainability;

- **Management / Governance**: the governance framework encompassing regulation, actor coordination, accountability mechanisms, institutional arrangements, and normative frameworks.

This explicit redefinition of the fifth "M" enables the integration of governance as a central and transversal variable within the analytical framework.

3. Operational definition of governance in the WASH sector

Within this study, governance is defined as the set of institutional, organizational, and relational mechanisms through which WASH sector actors coordinate their actions, arbitrate resource allocation, exercise differentiated responsibilities, and ensure accountability for decisions made.

This definition goes beyond a normative conception of "good governance" and instead conceptualizes governance as a functional principle of the system, structuring interactions among human, technical, financial, and procedural components.

Governance is therefore considered a transversal and endogenous variable, integrated within the fifth "M" (Management and Institutional Environment), and analyzed through its influence on sustainability, equity, resilience, coordination, and overall system performance.

From this perspective, governance is neither an external contextual factor nor a mere regulatory framework, but a structuring element of systemic coherence, conditioning the sector's capacity to transform available resources into durable and equitable public services.

This conceptualization provides the foundation for the methodological approach adopted to analyze WASH system performance.

2.3. Methodological Approach and Multi-Criteria Analytical Framework

1. Research design and epistemological positioning

This research adopts a qualitative analytical and explanatory approach based on abductive reasoning. This posture enables the interpretation of a complex phenomenon—WASH sector performance—through the confrontation of theoretical frameworks with empirically documented observations, without seeking statistical generalization (Dubois & Gadde, 2002 [15]).

The epistemological positioning views the WASH system as an evolving socio-institutional construct shaped by interactions among actors, rules, and contextual dynamics.

2. Justification and definition of the multi-criteria evaluation framework

The analysis relies on a conceptual multi-criteria evaluation framework mobilizing five complementary performance criteria of the Water–Sanitation–Hygiene system:

- **Sustainability**, defined as the system's capacity to maintain functional service levels over time, independently of funding cycles and institutional changes;
- **Equity**, understood as the system's ability to ensure fair access to WASH services across territories, social groups, and user categories;
- **Resilience**, defined as the system's ability to absorb, adapt, and transform in response to climatic, economic, or institutional shocks (Folke et al., 2010 [4]);
- **Coordination**, considered a process criterion evaluating the coherence of interactions among actors, governance levels, and public policy instruments;
- **Overall performance**, conceptualized as an emergent property of the system resulting from interactions among sustainability, equity, resilience, and coordination.

This framework makes it possible to move beyond a strictly sectoral reading by analyzing governance not only as an explanatory factor, but as an organizing principle of systemic coherence.

3. Analytical strategy and sources mobilized

The analysis is based on the triangulation of secondary sources, including:

- international scientific literature on WASH governance;
- key institutional reports;
- experiential feedback derived from strategic steering and sector coordination functions.

This triangulation strengthens the robustness of the conceptual analysis by confronting theoretical frameworks with widely documented empirical findings in the WASH sector.

This methodological framework provides the basis for the subsequent Results section, which analyzes functional interactions between the 5M components and the five selected performance criteria, with the objective of highlighting the structuring role of governance in overall WASH system performance.

3. RESULTS

The results presented are analytical and conceptual, derived from a structured synthesis of empirical and institutional evidence.

3.1 Functional Analysis and Interdependencies among WASH System Components (5M Approach)

1. Specific role and intrinsic limitations of each system component

The functional analysis of the WASH system, structured according to the 5M framework, highlights that each component plays a necessary but insufficient role in overall sector performance when mobilized in isolation.

Manpower, understood as the set of institutional and operational human resources, constitutes the central vector for policy implementation and day-to-day service management. However, the analysis shows that the mere presence of human resources—even when technically qualified—does not guarantee service continuity or quality when responsibilities are poorly defined and accountability mechanisms remain weak. In such contexts, individual capacities tend to be underutilized or dispersed, limiting their collective effectiveness.

Materials, comprising physical infrastructure and equipment, represent the most visible and most heavily financed component of the system. Nevertheless, the analysis confirms that infrastructure, in the absence of adequate institutional and organizational arrangements, tends to deteriorate rapidly or operate intermittently. Material assets only generate value when embedded within a structured management framework that ensures their operational continuity.

Methods, including standards, procedures, planning mechanisms, and monitoring and evaluation systems, function as an interface between human resources and infrastructure. However, when these methods are not harmonized across governance levels or effectively appropriated by actors, they remain largely formal and weakly operational.

Financial Means determine the system's capacity for investment, operation, and maintenance. The analysis nevertheless demonstrates that increasing financial flows, in the absence of clear allocation, prioritization, and control mechanisms, does not necessarily translate into improved performance outcomes.

Finally, **Management and the Institutional Environment**, corresponding to sector governance, is distinguished by its transversal role. Unlike other components, governance does not directly produce services, but structures interactions among all functional levers of the system.

2. Ineffectiveness of sectoral interventions focused on a single lever

The cross-analysis of system components reveals that interventions concentrated on a single lever—particularly infrastructure or financial resources—produce limited and often unsustainable effects.

Massive infrastructure investments, when not accompanied by institutional and organizational capacity strengthening, generate short-term gains that are rapidly neutralized by failures in maintenance, management, or coordination. Similarly, manpower training programs, when not embedded within a stable institutional framework, struggle to generate systemic impacts.

This observation highlights a phenomenon of diminishing returns on sectoral investments in the absence of a governance framework capable of ensuring coherence among system components.

3. Feedback loops and systemic effects among system components

The systemic approach makes it possible to identify several feedback loops among the components of the WASH system structured around the 5M framework. Rather than acting on each component in isolation, governance exerts its influence through a set of distinct but interrelated mechanisms that shape how system components interact and reinforce one another over time.

The influence on manpower (human resources) is observed through the capacity of governance arrangements to transform dispersed competencies and weak accountability structures into clarified roles and responsibilities. By structuring institutional mandates and operational functions, governance acts as a capacity-building lever that enables individual skills to be mobilized collectively, thereby enhancing operational effectiveness across the system.

The influence on material components (infrastructure) manifests in the transition from rapid infrastructure degradation to planned maintenance and optimized operation. Infrastructure generates sustainable value only when embedded within governance frameworks that ensure continuity of management, allocation of maintenance responsibilities, and long-term operational planning.

The influence on methods (procedures) is reflected in the shift from formal but weakly applied standards toward effective appropriation of processes by system actors. Governance contributes to methodological harmonization across governance levels—local, regional, and national—thereby reducing fragmentation of interventions and improving consistency in implementation practices.

The influence on financial means appears in the system's capacity to move away from inefficient, short-term, and donor-dependent resource allocation toward structured mechanisms of arbitration, prioritization, and equalization. Functional governance arrangements enable financial flows to be aligned with strategic objectives and territorial needs, supporting more balanced and sustainable outcomes.

Table -1: Synthesizes the observed effects of governance on the different components of the WASH system.

5M Component	Observed effects without structured governance	Observed effects with functional governance	Impact on overall performance
Manpower	Dispersed competencies, weak accountability	Role clarification, targeted capacity building	Improved operational efficiency
Materials	Rapid infrastructure degradation, service discontinuity	Planned maintenance, optimized operation	Enhanced sustainability
Methods	Formal procedures weakly applied	Harmonized and appropriated processes	Intervention coherence
Financial Means	Inefficient allocation, donor dependency	Arbitration, prioritization, sustainable financing	Service stability
Management / Governance	Fragmentation, overlap, weak accountability	Coordination, regulation, strategic steering	Systemic coherence

These results confirm that sectoral performance does not result from isolated optimization of individual components, but from the quality of interactions linking them.

3. 2 Multi-Criteria Analysis of Governance Effects on WASH System Performance

1. Influence of Governance on WASH Service Sustainability

The analysis shows that WASH service sustainability depends less on initial investment levels than on the system's capacity to ensure long-term management, maintenance, and infrastructure renewal. In this respect, sustainability outcomes are closely associated with the existence of stable governance arrangements that structure responsibilities, planning processes, and recurrent financing mechanisms.

In contexts where governance frameworks fail to clarify roles or to organize maintenance and renewal processes, infrastructure deterioration occurs rapidly, regardless of initial technical quality. Conversely, systems characterized by structured governance arrangements display greater continuity of service provision over time, indicating that sustainability emerges from the coherent articulation of human capacities, management methods, and financial resources.

2. Governance and Equity of Access to WASH Services

The multi-criteria analysis reveals a strong association between governance arrangements and equity of access to WASH services, both across territories and among socio-economic groups. Observed disparities between urban and rural areas cannot be fully explained by geographic or financial constraints alone, but are closely linked to institutional and organizational configurations.

Where governance mechanisms do not adequately structure allocation, prioritization, and arbitration processes, resource distribution tends to favor areas with higher institutional visibility or capacity. In contrast, systems exhibiting structured governance arrangements display more balanced access patterns, suggesting that equity outcomes are primarily shaped by governance choices rather than by investment volume alone.

3. Role of Governance in System Resilience to Shocks

System resilience is assessed as the capacity to absorb, adapt to, and recover from climatic, institutional, or economic shocks. The results indicate that resilience is primarily associated with organizational flexibility and the capacity of governance arrangements to support adaptive responses, rather than with infrastructure robustness alone.

In systems characterized by fragmented governance, external shocks result in prolonged service disruptions due to limited capacity for rapid response and adjustment. Conversely, governance arrangements that support information sharing, role clarity, and adaptive decision-making are associated with faster recovery and, in some cases, with improvements in post-shock management practices.

4. Coordination as a Central Performance Criterion

Among the performance dimensions examined, the analysis reveals **coordination as the key mediating mechanism linking governance arrangements to sustainability, equity, and resilience outcomes**. Coordination emerges as a transversal criterion that conditions the effectiveness of all other performance dimensions, rather than as an isolated attribute.

In systems where coordination mechanisms are weak, the analysis highlights recurrent patterns of overlapping interventions, inconsistent strategies, and fragmented responsibilities, which limit the effectiveness of sectoral investments. Conversely, governance arrangements characterized by effective coordination are associated with more consistent actor interactions and improved alignment of actions across the system.

5. Overall Performance as an Emergent System Property

The analysis demonstrates that overall WASH system performance cannot be understood as the additive aggregation of individual performance dimensions. Instead, performance results from dynamic interactions among sustainability, equity, resilience, and coordination within the system.

Systems exhibiting high investment levels but weak governance arrangements tend to display unstable and heterogeneous performance outcomes. In contrast, systems characterized by structured governance arrangements—even under resource constraints—produce more coherent and stable performance patterns. Overall performance therefore emerges as a systemic property reflecting the degree of internal coherence achieved within the WASH sector.

Table 2: Multi-Criteria Analysis of Governance Effects

Criterion	Without structured governance	With structured governance	Nature of effect
Sustainability	Intermittent services, non-functional infrastructure	Service continuity, anticipatory maintenance	Systemic effect
Equity	Concentration of services in limited areas	Territorial and social rebalancing	Redistributive effect
Resilience	High vulnerability to shocks	Adaptive and learning capacity	Adaptive effect
Coordination	Fragmented interventions	Alignment of actors and governance levels	Mediating effect
Overall performance	Unstable and heterogeneous outcomes	System coherence and sustainability	Emergent property

3.3. Governance as the Gravitational Center of the WASH System

The results allow governance to be conceptualized as the gravitational center of the Water, Sanitation and Hygiene (WASH) system, around which interactions among human, technical, financial, and procedural components are organized. Unlike other system components, governance does not operate through linear causal relationships, but exerts a transversal and indirect influence that structures how decisions, resources, and responsibilities are articulated across the system.

This central position helps explain why purely technical or financial reforms frequently fail to generate durable transformations when they are not embedded within a coherent governance framework. In the absence of such a framework, sectoral interventions tend to remain fragmented, producing limited and unstable performance outcomes despite substantial investments.

When applied to the WASH value chain—from water resource abstraction to wastewater and sludge management—the model highlights that system performance depends on the consistency and alignment of decision-making processes across successive segments. Failures occurring at one stage of the value chain tend to propagate throughout the system when governance arrangements are weak, whereas integrated governance contributes to maintaining coherence among segments and stabilizing overall performance.

From this perspective, overall WASH system performance emerges from the degree of internal coherence achieved among system components, rather than from the optimization of any single functional lever. Governance does not substitute for human resources, infrastructure, or financial inputs, but conditions their capacity to interact effectively and to generate sustainable and equitable outcomes.

These results conceptually validate governance as a necessary condition for systemic coherence and performance in the WASH sector, thereby justifying its central integration within sectoral analytical and evaluation frameworks.

Table 3: Functional Position of Governance within the WASH System

Element	Status in analysis
Governance itself	Structuring variable
Nature	Transversal and endogenous
Level of action	Multi-actor and multi-level
Main role	Organization of interactions
Key effect	Transformation of resources into performance

Figure 1 illustrates the conceptualization of governance as the gravitational center of the WASH system, highlighting its transversal influence on human, technical, financial, and procedural components.

Fig. 1: Governance as the gravitational center of the WASH system.

Figure 2 presents a qualitative representation of the influence of governance on the main components of the WASH system, illustrating the systemic interactions and feedback loops structured around the 5M framework.

Fig. 2: Qualitative influence of governance on WASH system components.

4. DISCUSSION

4. 1 Theoretical contributions: Repositioning governance as a structuring variable of the WASH system

The results obtained confirm and extend studies that conceptualize the Water, Sanitation and Hygiene (WASH) sector as a complex socio-institutional system whose performance cannot be explained solely by technical or financial investments (Ostrom, 2009 [10]). This perspective is consistent with adaptive governance approaches that emphasize the dynamic, multi-level, and interactive nature of water systems (Pahl-Wostl, 2015 [12]).

The central theoretical contribution of this study lies in the requalification of governance not as a contextual or normative factor, but as a structuring and endogenous variable of the WASH system. Unlike strands of the literature that primarily address governance through general principles such as transparency, participation, or accountability, this analysis demonstrates that governance operates fundamentally as a functional principle, organizing interactions among human, technical, financial, and procedural components of the sector.

A central theoretical contribution of this study lies in the identification of coordination as the operational mechanism through which governance structures overall WASH system performance. While coordination is frequently mentioned in the literature as a desirable governance attribute, it is rarely conceptualized as a functional mediator explicitly linking governance arrangements to sustainability, equity, and resilience outcomes.

By positioning coordination as a system-level mechanism rather than an administrative function, this study contributes to governance theory by demonstrating how collective action, role alignment, and decision harmonization condition the emergence of coherent sectoral performance. In this sense, overall WASH system performance can be interpreted as an emergent property resulting from internally coherent governance arrangements, in line with theoretical frameworks on complex systems and socio-ecological resilience (Meadows, 2008 [13]; Folke et al., 2010 [4]).

4.2. Positioning the findings within the international literature

The findings of this study are broadly consistent with conclusions drawn by major international institutions, while providing an integrated analytical perspective that is rarely made explicit.

Table 4 Positioning of results in relation to existing literature

Theme	Dominant literature	Contribution of this study
Service sustainability	Focus on infrastructure maintenance and financial sustainability (World Bank, 2018 [2])	Demonstration of governance as the structuring factor of service continuity and durability
Equity of access	Analysis of territorial and socio-economic disparities (WHO & UNICEF, 2021 [3])	Explicit linkage between equity outcomes and sectoral governance choices
Resilience	Emphasis on adaptation to climate and environmental shocks (Folke et al., 2010 [4])	Resilience analyzed as an institutional and organizational system capacity
Coordination	Frequently mentioned but rarely operationalized (OECD, 2015 [8])	Coordination identified as the central mediating mechanism of system performance
Overall performance	Performance measured mainly through technical indicators	Performance interpreted as an emergent property of systemic coherence

This comparison highlights that the originality of the study does not lie in identifying new factors, but in the conceptual structuring of relationships among known determinants through a coherent systemic framework.

4.3. Strategic implications for public policy and WASH sector governance

The results discussed imply a paradigm shift in the design and evaluation of Water–Sanitation–Hygiene public policies.

They suggest that durable improvements in sector performance cannot be achieved through the accumulation of material investments or isolated institutional reforms, but rather through targeted strengthening of governance mechanisms**.**

Three major strategic implications emerge:

- ✓ Re-centering policies on coordination

Coordination should be considered a strategic objective in its own right, rather than a secondary administrative function. Strengthening coordination mechanisms can significantly enhance the coherence and efficiency of sectoral interventions.

- ✓ Moving beyond access-based performance indicators

Monitoring and evaluation frameworks would benefit from integrating governance-related indicators, particularly those linked to coordination, accountability, and institutional adaptive capacity, alongside traditional access and infrastructure metrics.

- ✓ Adopting a systemic approach to sectoral reforms

Any technical or financial reform should be explicitly designed in articulation with other system components to avoid the fragmentation effects observed in many WASH interventions.

4.4. Study limitations and directions for future research

Despite its conceptual contribution, this study presents several limitations that warrant acknowledgment.

First, the analysis relies primarily on secondary sources and a qualitative approach, which limits the potential for statistical generalization. Second, governance is analyzed at a systemic level, without conducting a fine-grained assessment of specific institutional mechanisms in individual national contexts.

These limitations nonetheless open promising research avenues, including:

- the development of empirical tools for assessing WASH governance;
- the quantification of relationships between coordination, sustainability, and overall performance;
- the application of the proposed framework to national or comparative case studies.

Overall, the discussion confirms that governance constitutes the invisible yet decisive foundation of WASH sector performance. By repositioning governance as a structuring variable of the system, this study contributes to enriching existing analytical frameworks and provides a robust conceptual basis for rethinking intervention strategies in the WASH sector.

5. CONCLUSIONS

This study aimed to analyze the role of governance in shaping the performance of the Water, Sanitation and Hygiene (WASH) sector by mobilizing a systemic approach combining the 5M framework with a multi-criteria analysis integrating sustainability, equity, resilience, and overall performance.

The results demonstrate that WASH system performance cannot be explained solely by the availability of human, material, or financial resources, but fundamentally depends on the coherence of their articulation within an appropriate governance framework. The central contribution of this article lies in establishing governance as a structuring and endogenous variable of the WASH system, rather than as a contextual or external factor.

By conceptualizing governance as the organizing center of the system, this study shows that interactions among actors, rules, resources, and processes determine the system's capacity to deliver sustainable, equitable, and resilient services. Overall performance therefore emerges as an emergent property resulting from systemic coherence, rather than from the isolated optimization of individual components.

From a policy perspective, these findings call for a repositioning of WASH public strategies, placing governance mechanisms alongside technical and financial investments as core determinants of sectoral performance. These findings highlight coordination as a strategic leverage point for strengthening WASH governance and achieving coherent and sustainable system performance.

Finally, although based on a qualitative and conceptual approach, this study opens important avenues for future research, particularly with regard to the operationalization and empirical assessment of WASH governance. Applying the proposed framework to national or comparative case studies could further refine the understanding of governance–performance relationships and support the design of more effective, context-adapted intervention strategies.

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