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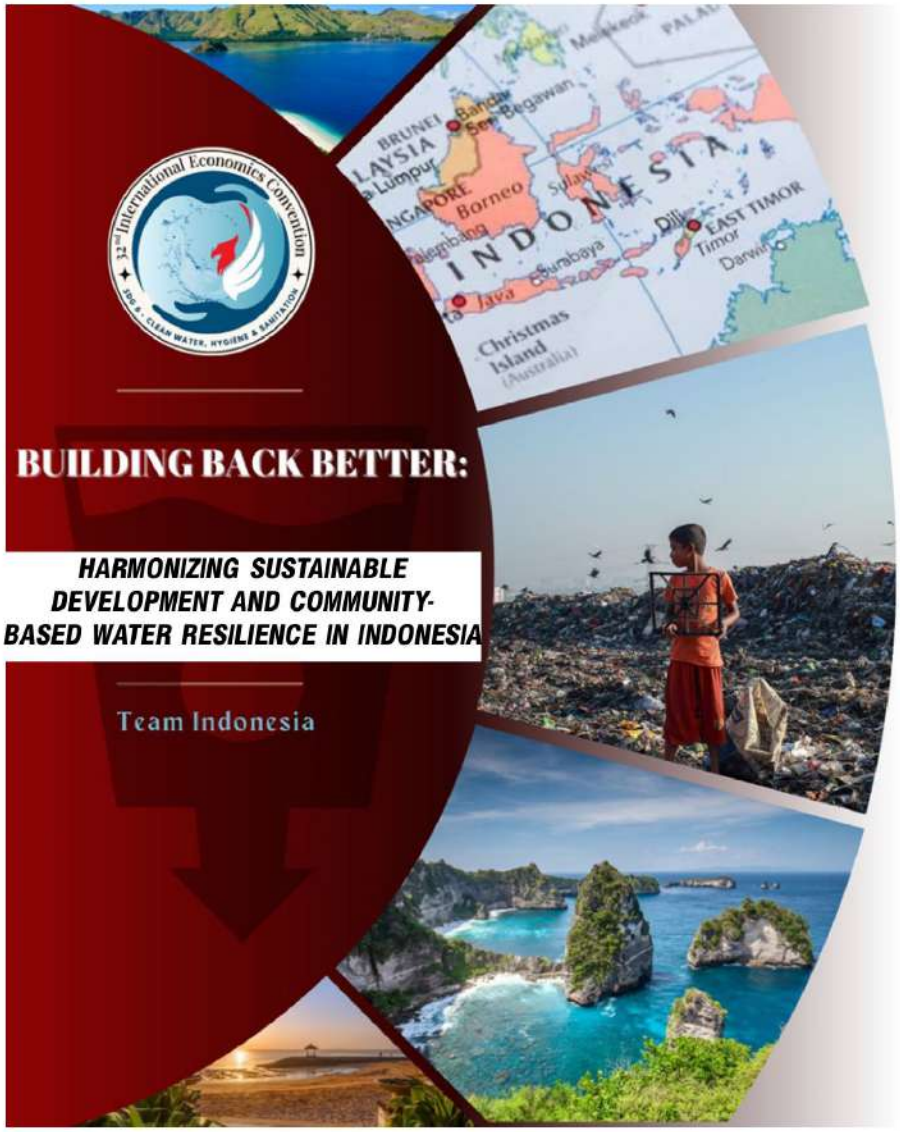
TEAM INDONESIA



CREDITS

Faculty Co-ordinators

Dr. Chandra Iyer
Dr. Mahadeo Yadav

Student Contributors

Shalini Singh
Kumkum Shrivastav
Himanshu Gupta
Nikita Mohansingh Jalal
Ayush Jaganathan
Jatin Punjabi

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LIST OF ABBREVIATIONS USED

1. G20 - Group of Twenty
2. ASEAN - Association of Southeast Asian Nations
3. SDG - Sustainable Development Goal
4. WASH - Water, Sanitation, and Hygiene
5. HDI - Human Development Index
6. APEC - Asia-Pacific Economic Cooperation
7. ACBI - Anti-Corruption Behaviour Index
8. UNESCO - United Nations Educational, Scientific and Cultural Organization
9. UNICEF - United Nations International Children's Emergency Fund
10. GDP - Gross Domestic Product
11. CAGR - Compound Annual Growth Rate
12. WSPs - Water Safety Plans
13. MoPWH - Ministry of Public Works and Housing
14. MoH - Ministry of Health
15. UN - United Nations
16. 16.SDSN - Sustainable Development Solutions Network
17. ODF - Open Defecation Free
18. 18.CO, - Carbon Dioxide
19. PWDs - Persons with Disabilities
20. IUWASH - Indonesia Urban Water, Sanitation and Hygiene
21. B40 - Bottom 40% (referring to the lowest income segment in the population)
22. USAID - United States Agency for International Development
23. SECs - Socio-Economic Characteristics
24. HWT - Household Water Treatment
25. WASH - Water, Sanitation, and Hygiene
26. KAERI - Korea Atomic Energy Research Institute
27. RoK - Republic of Korea
28. OSS - One Stop Shop
29. LIXIL - LIXIL Corporation (a Japanese manufacturer of building materials and housing equipment)

30. UNICEF - United Nations International Children's Emergency Fund
31. MaS! - Make a Splash!
32. MHM - Menstrual Hygiene Management
33. WHO - World Health Organization
34. SIKELIM - System for Health Care Waste Management in Indonesia
35. COVID-19 - Coronavirus Disease 2019
36. Net Zero Emissions - A target for balancing emitted and absorbed greenhouse gases
37. FIETS - Financial, Institutional, Environmental, Technological, Social
38. P3 - Public-Private Partnership
39. GHG - Greenhouse Gases
40. CCDRR - Child-Centered Disaster Risk Reduction
41. CCA - Climate Change Adaptation
42. NGO - Non-Governmental Organization
43. ECOTON - Ecological Observation and Wetlands Conservation (an Indonesian NGO)
44. BRIN - Badan Riset dan Inovasi Nasional (Indonesian National Research and Innovation Agency)
45. SIDANAU - Sistem Informasi Danau Nasional (National Lake Information System, a lake management app in Indonesia)
46. SSC - South-South Cooperation
47. RG - Research gaps
48. TBL - Triple Bottom Line
49. VEB - Viability, Equitability, Bearability

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CHAPTER 1: THE NEED FOR SUSTAINABLE WASH SOLUTIONS IN INDONESIA

1.1 Introduction

Indonesia is a Southeast Asian country, the largest and one of the fastest-growing economies of its peer in Southeast Asia. Indonesia inherited the throne of G20 presidency in 2021 and took up chairmanship of ASEAN in 2023. Being the largest country of Southeast Asia and the fourth globally with about 284,221,556 people as of mid-2024, Indonesia consists of nearly 17,500 islands, out of which over 7,000 are uninhabited. Indonesian art and culture is an energetic mix of native, multiple traditions with influences from abroad because of its historical position beside important trade routes, including the Far East, South Asia, and the Middle East.

The expression in modern-day Indonesian art is continued with personal response to issues within the society, without compromising religious and spiritual themes. Likewise, in this very society of 700-plus ethnic groups, Indonesia has assimilated elements from religions such as Islam, Hinduism, Buddhism, and Christianity and created an extraordinary multiculture. Bahasa Indonesia, the official language: it comes from old Malay origins but has borrowed elements from Sanskrit, Arabic, and European sources. International and indigenous features reveal the complex heritage of Indonesia in modern architecture. Often considered to be the country's most visited island, it is known for its dramatic rice terracing, pristine white sandy beaches, and ancient water temples.

This research paper will proceed to describe Indonesia's progress and the challenges facing the attainment of SDG 6-a goal focused on ensuring access and sustainability of clean water, sanitation, and hygiene facilities for all.

1.2 Profile of the country

Indonesia, a South-east Asian country, has improved remarkably in economic growth. Indonesia's economy has grown 5.05 percent in the second quarter of 2024. The head of state and government in Indonesia is elected as president and vice president for two five-year terms. Joko Widodo, better known as "Jokowi," is from the Indonesian Democratic Party of Struggle (PDI-P). The country is a developing nation with a mixed economy, blending private freedom with central planning and regulation. Indonesia is an essential member of the organizations APEC and ASEAN.

The poverty rate declined for the second consecutive quarter to 9.03 percent as of March 2024 from 9.36 percent in March 2023. However, The Indonesia Anti-Corruption Behaviour Index (ACBI) 2024 is 3.85 on a scale of 0 (zero) to 5 (five). A value close to five shows better behaviour against corruption and one near to zero suggests higher tolerant attitudes towards corruption.

Indonesia made remarkable strides in WASH services in 2023 with 91.72% of the households having a means of access to improved source drinking water and 82.36% to improved sanitation, showing a steady increase for ten years in succession. During the COVID-19 pandemic, Indonesia implemented

several measures in line with SDG 6 (Clean Water and Sanitation) by ensuring continuous access to clean water and building new infrastructure, installing public handwashing stations in schools and healthcare facilities, and promoting hygiene practices through the distribution of soap and sanitizers, alongside cleaning and disinfection campaigns.

As of 2024, Indonesia's population is as follows: 284 million and a density of 156 people per square kilometre. About 59% live in urban areas and 41% in rural regions. This again raises questions on WASH disparity and inequity. The HDI attained 74.39 points in 2023. It increased by 0.62 points, or 0.84 percent, from the level recorded last year at 73.77. Indonesia's HDI from 2020 to 2023 increased annually by 0.72 percent and more remarkably, showed steady progress in each of the three dimensions-life expectancy, knowledge, and living standards. Indonesia's GDP has increased from 1.04 trillion USD in 2018 to 1.12 trillion USD in 2019, decreased slightly to 1.06 trillion in 2020, then increased to 1.19 trillion USD in 2021, 1.32 trillion USD in 2022 and increased to 1.37 trillion USD in 2023. In the near future, Indonesia intends to integrate WASH in its climate adaptation plans. The National Planning Agency and UNICEF have designed a climate-risk assessment framework to build climate resilience in WASH services. This strategy is developed to help realize Indonesia's long-term goals and prepare the nation appropriately for future challenges with a view to achieving its goals by 2045. The largest economy in Southeast Asia, Indonesia continues to expand its global market presence.

Joko Widodo, better known as "Jokowi," is from the Indonesian Democratic Party of Struggle (PDI-P). The country is a developing nation with a mixed economy, blending private freedom with central planning and regulation. Indonesia is an essential member of the organizations APEC and ASEAN. Indonesia's trade surplus decreased to USD 3.26 billion in September 2024 from USD 3.40 billion a year earlier, but exceeded market forecasts. Exports grew by 6.44% as the country shipped more to the US, Japan, China, ASEAN, and the EU, while imports grew by 8.55%, below estimates. In the first nine months of 2024, the trade surplus was USD 27.72 billion, with exports growing by 0.32% and imports by 3.86%. Meanwhile, Indonesia's e-commerce industry is booming, supported by a growing digital population and mobile and cashless shopping. Challenges persist in terms of connectivity and logistics; however, the opportunities presented by rural, sustainable, and cross-border e-commerce drive innovation and growth.

1.3 Background of the research

In Indonesia, access to clean water and proper sanitation remains a significant challenge, particularly for low-income communities. In Pitusungu village, South Sulawesi, residents rely on rainwater during the wet season and brackish water in dry months, resulting in high rates of diarrhoea and typhoid, which are major health risks for children. Additionally, open defecation, practiced by around 25 million Indonesians, contributes to water contamination. Addressing water and sanitation issues is crucial not only for health but also for economic productivity, as achieving SDG 6 requires targeted efforts for marginalized populations.

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Rapid industrial growth, increasing demand, and pollution are intensifying water-related issues in Indonesia, with more than half of the country's rivers already polluted. The poor management of wastewater, especially in sectors like palm oil and data centers, is a key contributing factor. To address this, adopting advanced wastewater treatment technologies such as electrochemical solutions is necessary for improving water quality and sustainability. The Industrial Wastewater Treatment Service market is projected to grow at a 6.6% CAGR from 2024 to 2030, fueled by industrialization and petrochemical investments.

For many of the poorest households, time spent collecting water reduces opportunities for education and employment. Additionally, sanitation services are often inadequate, with a significant proportion of the poorest communities lacking proper facilities in both urban and rural areas. Improving access to water and sanitation is essential for enhancing public health and productivity, and SDG 6 requires focused efforts to support disadvantaged groups.

SDG 6 advocates for universal access to clean water, sanitation, and hygiene. With the help of UNICEF, Indonesia has made progress in improving sanitation and handwashing facilities, though challenges remain. As of now, only 91.08% of the population has access to safe drinking water, and only 11.8% enjoys secure drinking water. Presidential Instruction Number 1 of 2024 aims to strengthen water supply systems and ensure water quality. Continued collaboration between the UN and Indonesia is vital for fostering equitable communities and achieving sustainable development goals.

Educational initiatives, supported by government bodies, NGOs, and schools, are essential for raising awareness and driving action on SDG 6. Programs focusing on water conservation and sanitation practices play a crucial role in achieving these objectives, with youth involvement being key to reducing water scarcity and pollution.

1.4 Statement of Research Problem

(1). Key challenges hindering the achievement of SDG 6 in Indonesia the research problem focuses on identifying the key challenges hindering Indonesia's progress in achieving SDG 6, which ensures clean water and sanitation for all. These challenges span three dimensions: economic, environmental, and social. Addressing them is essential for the success of SDG 6 initiatives. (2). Improvement in sustainable practices for (WASH) management the research problem examines ways to improve sustainable practices in water management and sanitation in Indonesia, seeking to identify effective and actionable solutions that promote long-term sustainability throughout the country. (3). The potential economic benefits of achieving SDG6 target this issue connects the Triple Bottom Line to achieving SDG 6 targets in Indonesia, highlighting the importance of potential economic benefits in securing access to clean water and sanitation for all while underscoring the potential economic benefits.

1.5 Research Objectives

(1) To assess the environmental, social and economic impacts of SDG 6 initiatives in Indonesia this research objective aims to assess the environmental, social, and economic impacts of SDG 6 initiatives

in Indonesia, focusing on access to clean water and sanitation. It will evaluate effects on water quality, community health, and economic benefits, providing insights to inform SDG policies. (2) To identify the opportunities, to enhance sustainability in water management and sanitation this research objective seeks to identify opportunities for enhancing sustainability by exploring innovative strategies in water management and sanitation in Indonesia to improve resource efficiency. (3) To enhance decision making for balanced outcomes across triple bottom line (Viability Equability Bearability) this research objective aims to enhance decision-making processes to achieve balanced outcomes across the triple bottom line by viability equability Bearability assessing the impact of decisions on environmental sustainability, social fairness, and economic feasibility.

1.6 Significance of the study

In order to meet SDG 6, this research is crucial for understanding clean water, sanitation, and hygiene (WASH) in Indonesia. It offers vital insights into the possibilities and problems facing the industry, assisting development organizations and legislators in developing winning plans. The research takes into consideration the effects on the environment while highlighting the links between socioeconomic advantages including health, education, and economic growth with access to WASH. It promotes fair, sustainable solutions and helps Indonesia have a healthier, more secure future by encouraging focused investments.

CHAPTER 2: SDG 6 PRACTICES IN INDONESIA

The review of literature provides an in-depth analysis of SDG 6 within the framework of Indonesia, emphasizing the significant developments as well as the major social, economic, and environmental elements that are driving the country's progress toward accomplishing this crucial goal.

2.1 Key Challenges impeding the achievement of SDG6

Indonesia faces severe **marine plastic pollution,** from single-use plastics and abandoned fishing gear, impacting marine ecosystems and health; efforts to reduce this pollution are ongoing, but broader studies and policy evaluations are needed *(Zainal Arifin, 2023).* **Air pollution,** especially in Jakarta, has become a critical issue, catalyzing policy discussions and reforms. Effective policy solutions are hindered by a lack of evidence-based approaches; however, non-state actors like media advocates play a crucial role in bridging this gap and fostering regulatory adoption through strategic messaging *(Monash university, 2023).* Indonesia support **hand hygiene** for children with disabilities in Indonesia and benefits families and the wider community by promoting health and wellbeing, with inclusive WASH initiatives being fundamental to building community resilience against climate change *(waterforwomenfund.org , 2023)*

Inadequate sanitation in rural areas leads to severe health and environmental problems, worsened by infrastructure limitations and insufficient community engagement. Effective solutions require improved facilities and increase public awareness. *(M.Sidjabat, & Gunawan, 2020).* **Cultural sensitivity** highlights challenges in providing clean water and sanitation to native people, advocating for culturally sensitive

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approaches while identifying a research gap in evaluating their long-term effectiveness and scalability globally *(Hassan, 2023).* **Open defecation** in Indonesia harms child health due to poor sanitation. Community-Led Total Sanitation (CLTS) is a major initiative aimed at improving rural sanitation through community-led approaches *(Lisa Cameron, 2022).* **Regulatory challenges** stem from mismatched national laws and development plans, hindering universal sanitation goals. Limited policy coordination and regional expertise worsen the implementation *(Victor & Syaputri, 2019).* South-South cooperation is key for political and economic recovery post-COVID-19 and achieving SDGs but requires further study to enhance aid effectiveness and strategic outcomes, and **social practice effects.** *(Karnadibrata, 2022).* The WHO handwashing campaign, stresses government and community roles and suggests using new media to **boost public awareness** and reduce misinformation. Future studies should explore community culture's influence on behaviour change and campaign impact *(Djojosaputro, 2021).*

Partnerships between WASH and **gender equality** *and science inclusion* enhance WASH and capacity building, it create opportunities to engage directly with community members and reach marginalized groups more effectively *(Grant , Nguyen, Vieira, & Roche , 2023).* Climate-related hazards have highlighted the critical need for improvements in the WASH sector through **climate change response**, highlighting the issues of washing, sanitation, and hygiene, to effectively adapt cities to climate impacts. Starting from sustainability, planning, and water cycle management are essential *(Willetts, et al., 2022).* The **behavioural impact** of handwashing shows how media and interpersonal communication efforts positively influence WASH knowledge and behaviour among mothers with young children and how it increases understanding of proper defecation and handwashing practices, encourages timely handwashing, and improves hygiene behaviours in Indonesia *(Lubis, Amelia, Yulf, Panggabean, & Muhammad , 2020).* Abmas' 1000 Toilets program, led by ITS, aims to improve **community sanitation quality** in Surabaya by building healthy latrines for homes lacking restrooms. The initiative supports the city's goal of achieving Open Defecation Free (ODF) status by 2024, involving students and expanding efforts across Indonesia to address the global latrine problem *(Khofsoh, Zanubiya Arifah, 2022).* **CO2 emissions** is due to hydropower, it highlights the interaction between hydropower consumption and CO2 emissions, it also suggests that policymakers should prioritize sustainable hydropower investment and green initiatives in the labor sector to promote environmental sustainability and economic growth *(Putri Maulidar, 9-04-2024).*

Community participation in water and sanitation interventions impacts water availability, health outcomes, and infrastructure sustainability. It underscores the importance of varying levels of community involvement and the role of external monitoring and trust in maintaining behavioural changes and accountability, prompting further research into effective strategies for sustainable WASH initiatives *(Nelson, Drabarek , Jenkins, Negin, & Abimbola, 2021).*

Challenges faced by **vulnerable groups** Persons with Disabilities (PWDs) accessing inclusive sanitation, especially in rural and economically vulnerable contexts, focusing on the need for improved sanitation knowledge and further research on political influences and service verification. *(Daniel, Nastiti, Surbakti,*

& Dwipayanti, 2023). Gender disparities in water and energy access highlight the need for **equal access**, emphasizing the transformative potential of initiatives like Komodo Water's solar-powered pumps. However, there remains a critical research gap in understanding long-term gender dynamics in rural contexts. Addressing this gap is essential for ensuring sustainable and equitable development in these communities. *(Kurniawan, Nur Fadillah, & Milka, 2024)*.

Community engagement in hygiene and sanitation in Indonesia found that Despite women's greater awareness and proactive stance on sanitation, they often struggle to have their views and decisions accepted in the community. Although there is broad agreement that women should participate in sanitation and water decisions, their actual influence is limited compared to men *(Doma, et al., 2023)*.

There are difficulties in providing quality drinking water to low-income urban communities in Indonesia to address this problem, USAID is collaborating with local utilities in eight provinces to launch the IUWASH Plus Master Meter Program. The initiative aims to improve access to piped water for B40 households in informal settlements to address **affordable WASH** and access challenges identified in national surveys on water access. *(Bappenas , 2022)*.

Monitoring drinking water quality in Indonesia involves implementing Appropriate Technology in challenging access areas, overseen by a Drinking Water Safety Plan suggesting the critical need for research evaluating the efficacy and scalability of the monitoring strategies to ensure loyalty to health standards *(Dr. Maxi Rein Rondonuwu)*. **Water pollution** from domestic waste threatens economic growth. While technologies like electro-coagulation hold the potential for reducing pollutants, further research is needed to ensure their effective implementation for sustainable water management and economic stability *(Sherafatmand, 2023)*. The impact of over-urbanization in Indonesia has led to the development of slums and **environmental protection** degradation. It suggests land consolidation, vertical settlements, and community empowerment for sustainable management of slums, as well as the need for integrated efforts to improve infrastructure and reduce pollution *(Batara Surya, 2020)*. **Climate-resilience WASH** initiatives to safeguard public health and well-being in the face of climate change while facing a significant funding gap, with only 2% of WASH funding allocated to climate resilience, highlighting the urgent need for innovative financing solution *(Ihyani Malik and others, 2023)*. The COVID-19 pandemic has severely **impacts economic downturn** of Indonesia, with projections showing a GDP decline of 4–8% by 2021, especially in transportation and tourism. While emissions may decrease by up to 8% due to reduced activity, ongoing growth from industrial and waste sectors complicates efforts to meet emission mitigation targets *(Marissa Malahayati, Toshihiko Masui, Lukytawati Anggraeni, 2021)*.

"Indonesia's Green Powerhouse Promise" highlights the importance of **green financing** opportunities for sustainability in Indonesia although gaps exist in sustainable infrastructure financing models and identifying effective climate change mitigation strategies *(Hidayattullah, 2024)*. **Environmental challenges** in Indonesia navigates rapid development, it faces urgent environmental challenges such as deforestation, climate change, water pollution, and waste management. To tackle these issues effectively, the country needs improved data, stronger collaboration among stakeholders, and coordinated evidence-based solutions

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(Maria Sarah, 2022). **Climate funding** allocated to climate resilience, highlighting the urgent need for innovative financing solution *(Ihyani Malik and others, 2023).* Microplastic pollution in Indonesia reveals threats to **drinking water safety from contamination** in rivers emphasizing the urgency of enhancing solid waste management to safeguard environmental and public health *(Arlini Dyah Radityaningrum and others, 2021).*

The worst **funding shortfalls** in 20 years, hitting Jakarta's 35,000 small businesses and 117,000 employees, is worsened by water scarcity, requiring urgent measures like subsidized water and improved infrastructure *(Sahu, 2020).* **Socio-economic characteristics** (SECs) and psychological factors influencing household water treatment (HWT) practices in East Sumba, Indonesia. It cites better socio-economic conditions, such as higher education levels and easier water access, as a factor in increasing HWT use, and indigenous beliefs and socio-economic inequalities as barriers *(Daniel, 2021).*

2.2 Upgrading Sustainable practices for WASH management

Hand hygiene is crucial, with practices increasing during the COVID-19 pandemic. It's important to create community norms and overcome barriers to water access to sustain hygiene practices. Promoting hand hygiene behavior is vital not only during the pandemic but also for maintaining these practices post-pandemic, especially in developing countries *(Dwipayanti, 13-05-21).* **WASH** in Indonesia received from news articles, shows a focus on water and social themes, recommending future studies on finance, remote areas, schools, emergencies, healthcare, and menstrual hygiene *(Satriani, Saffana, & Daniel , 2022).* Recent developments in **water purification** technology highlight advancements such as the electron beam-based radiation fusion technology by KAERI, which efficiently treats non-degradable pollutants and pathogens in wastewater. *(RoK, Southeast Asian countries conduct joint research on wastewater treatment £nh 1, 2024).*

Initiatives for sanitation solution found The One Stop Shop (OSS) app, supported by(LIXIL) and UNICEF's Make a Splash (MaS!) partnership in Indonesia, introduces a transformative approach to sanitation access, emphasizing affordability and flexibility through digital solutions. but further research is crucial to evaluate its long-term effectiveness and socioeconomic implications (Unicef for every children, 2024). Critical role of **improving school sanitation facilities** and implementing regular maintenance fosters a healthier learning environment while Addressing infrastructure gaps, particularly in rural areas of Indonesia *(World Bank group, 2022).* **Digital solutions for sanitation**, such as the One Stop Shop OSS app supported by LIXIL and UNICEF's Make a Splash(MaS!) partnership in Indonesia, introduce a transformative approach to sanitation access by emphasizing affordability and flexibility. However, further research is crucial to evaluate its long-term effectiveness and socioeconomic implications to ensure sustainable improvements in sanitation for all *(Unicef for every children, 2024).* **Sanitation program** aims to boost demand by addressing affordability, perceived necessity, social norms, information access, and gender dynamics underscoring the need for implementation capacity *(VoxDev, 2022).*

In the remote highlands of Papua, **Menstrual Hygiene Management** (MHM) knowledge is moderate,

with cultural taboos limiting education efforts. Raising public awareness, promoting hygiene practices, and involving both women and men in MHM education can create a supportive environment, reducing stigmas around menstruation *(Satriani, Saffana, & Daniel , 2022). Indonesia's* ***demand for improved facilities*** underscores Indonesia's strong economic growth is hindered by rising income inequ-ality, exposure to external shocks, and heavy reliance on commodity exports. More research is needed to understand how income inequality affects stability and how wealth financial regulations manage risks *(VoxDev, 2022)*. ***Water security*** in Indonesia develops practical indices to ***assess*** *water security* at the river basin level; it also conducts a case study in West Java, which reveals an overall "capable" water security score with the Ciliwung-Cisaden and Citarum basins of Indonesia, highlighting environmental water security problems due to insufficient water allocation for environmental needs. *(Hatmoko, 2019).* ***Water access*** in Indonesia has shown that their rural communities use an average of 4 liters of clean water per person per day. It is found that there is need for region-specific strategies to tackle the problem of clean water *(Messakh, 2020)*. Abundant in ***natural water*** resources are unevenly distributed, leading to severe water stress in densely populated areas like Java, worsen by pollution and poor management. Effective integration and management of these resources are crucial for balancing supply and demand. (Usaid , 2022).

Water availability varies widely; densely populated areas like Java face severe shortages, containing only 4% of surface water while serving over 50% of the population. By 2045, demand is projected to exceed supply in 31 river basins, making it crucial to address these regional disparities to achieve Sustainable Development Goal 6 by 2030 (Strategy & Indonesia Global Water, 2022). ***Wash waste management*** In Indonesia explores poor WASH infrastructure and waste management in healthcare facilities, particularly in rural areas, exacerbate disease risks and inefficiencies. The WHO's SIKELIM system along with targeted training workshops for health officials, aims to improve waste management practices and reduce health disparities *(Erdani, 2023)*.

Indonesia's **sustainable eco-tourism** is expanding due to its natural beauty, cultural heritage, and commitment to eco-friendly practices. However, the sector faces challenges such as managing environmental impacts, ensuring fair community benefits, and addressing infrastructure limitations. Digital tools and community-based initiatives are helping to attract eco-conscious travellers and address these issues. *(saha, Indonesia Sustainable Tourism Industry Outlook for 2024 to 2034, 2024)*.

WASH initiatives being fundamental to **building community resilience** against climate change. of Indonesia support hand hygiene for children with disabilities in Indonesia and benefits families and the wider community by promoting health and wellbeing, with inclusive WASH initiatives being fundamental to building community resilience against climate change. *(waterforwomenfund.org,2023)*. The research highlights 73% access to basic sanitation in urban Indonesia, as well as significant river pollution, and states that a small percentage of wastewater and faecal sludge is safely treated, as unregulated settlements contribute heavily to pollution, effective **management of domestic wastewater** through off-site systems at an urban scale is essential for better environmental outcomes *(Harahap, 2021)*.

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Cimahi City, Indonesia, overcrowded cluster decentralized wastewater treatment systems struggle to meet safe sanitation standards. This study assesses their performance and highlights the need for improved design and treatment methods to comply with stricter ***wastewater quality regulations*** *(Rangga, 2023).* Indonesia has made significant progress in water access, with 90% of the population using improved sources**.** To **Improve water quality** in Indonesia have been significantly impacted by the COVID-19 pandemic, leading to changes in access to clean water. The government is struggling to meet the increased demand, with Jakarta achieving only 60% coverage and many other areas facing poor water quality. Despite efforts to improve access, economic stress from the pandemic has hindered progress. The government needs to enhance its strategies to effectively address WASH issues *(Astriani, 2021).* 10th World Water Forum in Bali from May 18 to 25, 2024, highlighting sustainable ***water savings*** and green energy for achieving Net Zero Emissions by 2060. The forum focus on initiatives like hydropower and waste-to-energy projects to enhance global collaboration on water challenges and climate change *(Setyowati D. L., 2020).* A marked increase in **packaged water** consumption globally and in Indonesia, driven by poor tap water quality and limited access to safe drinking water. There is need for improved water quality management and highlights the lack of effective management in ensuring safe drinking water sources to mitigate health risks *(Puspita, et al., 2023).*

2.3 Potential Economic benefits for achieving SDG 6 target

FIETS Framework (Financial, Institutional, Environmental, Technological, Social). It stresses the importance of complete policies that include financial, institutional, environmental, technological, and social factors to maintain water and sanitation services while tackling challenges such as institutional capacity and community engagement *(Dennis, et al., 2021)*. **Successful pilot WASH** (Water Sanitation Hygiene) projects demonstrate that community involvement and local resource utilization significantly enhance project sustainability and effectiveness, as evidenced by improved water access and management in Bali. *(Quinlan, surge, 2021).* **The social culture** in Langkat Regency, North Sumatra, Indonesia, this research highlights child stunting, particularly through factors such as environmental sanitation, parental education, family income, and mothers' knowledge about stunting. *(Nasution , Girsang, & Hariati , 2021)*. To address **limited financial resources for WASH**, integrating public-private financing, improving municipal budgeting, and fostering partnerships are essential to bridge funding gaps, especially in underserved areas. Strategic resource mobilization is key to achieving universal water and sanitation access (Usaid, 2022). Despite challenges like transparency issues, **public-private partnerships (P3)** offer significant potential for fostering economic growth. However, gaps persist in research concerning (p3) outcomes, alternative models, and integrating gender equality and environmental sustainability into these partnerships (Asian Development Bank., 2020). **Indonesia's renewable energy** shows that renewable energy is sustainable, affordable, and reliable for infrastructure development, and how the government supports renewable energy projects using hydro, geothermal, solar, bioenergy, and wind sources, and how Indonesia's renewable energy aims to restore economic activity and reduce GHG emissions post-COVID-19 *(Pambudi and others, 2023).* **Infrastructure investment** is essential for climate adaptation in WASH projects, yet civil society organizations face significant barriers like limited direct funding

access and misalignment with national climate frameworks *(Water for Women, 2023).*

Responsibility of the Indonesian government did not **expand clean water efforts during the COVID-19 pandemic**, despite the great need for it. It explains how economic constraints affected program implementation and recommends looking at other countries' approaches and seeking external assistance to expand clean water infrastructure. *(: Astriani, 26 October 2021).* Targeted WASH education effectively **enhances Indonesian farmers' understanding**, attitudes, and practices regarding hygiene and sanitation, crucially mitigating COVID-19 risks in rural areas. Promoting consistent WASH practices is vital for improving health outcomes and preventing virus transmission among these communities. *(Yarmaliza, et al., 2022).* Indonesia's role in **future water diplomacy** is pivotal, particularly through hosting the 10th World Water Forum. This platform allows Indonesia to showcase its water management experiences, foster international cooperation, and advance global water sustainability goals. *(Naldo, 2024)* The COVID-19 pandemic significantly **impacted health and productivity** by straining healthcare systems and causing economic disruptions. The crisis led to declines in economic growth and job losses, exacerbated by fluctuations in health outcomes and labour market participation. *(Nugrahadi & others, 2023).* Indonesia has a huge challenge in **cost of water and sanitation**, and it needs another $18.4 billion to achieve universal access by balancing such ambitious targets with budget constraints (Usaid, 2022). **Government and NGO initiatives** for child-centred disaster risk reduction (CCDRR) and climate change adaptation (CCA) have evolved from formal legislative reforms and rational planning to hybrid approaches combining local and international strategies. NGOs, particularly Plan International, have played a pivotal role in integrating CCDRR and CCA into local and national policies, often adapting their methods to align with broader developmental and educational frameworks. *(Lassa & others, 2023).* Water pollution in East Java's Brantas River significantly impacts women, highlighting the need for their active participation in environmental decision-making. ECOTON's approach **empowers women** by equipping them with skills to monitor water quality, advocate for their rights, and engage in legal actions to address pollution. (.bothends.org, 2019).

Environmental performance mentioned that Indonesian company evaluated environmental performance on a reasonable scale, promoted sustainability reporting and governance structure and also mentioned that better strategies and support are needed to achieve higher reasonable environmental and enhance global disclosure *(Kuat Waluyo Jati and others, 2023).* Steady **economic growth,** driven by domestic demand and infrastructure investment, faces issues like rising income inequality and reliance on commodity exports. Understanding income inequality's impact on stability and macroprudential policy effectiveness is needed *(Amro, 2024).* Indonesia's challenges and opportunities to achieve **net-zero emissions** by 2060 It highlights that regulatory frameworks, development of innovative financial products, and building institutional capacity are essential It also mentions that international support and collaboration will be crucial to mobilize resources and achieve sustainability goals of Indonesia *(Vishal, Agarwal and others, 2024).* The scarcity of available water on small islands emanates from the complex interplay among physical, social, and environmental factors, while most studies miss the holistic perspective regarding vulnerability. It cannot be simply reduced to disease burdens in already marginalized groups; targeted

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investments in infrastructure will save millions of lives while improving **(WASH services)** *(World Health Organisation, 2023).*

Access to sanitation is essential for tourism development, as inadequate facilities pose health risks that hinder economic growth. **The economic impact on health** is substantial, with improved sanitation reducing disease, boosting tourist satisfaction, and supporting revenue.*(Elysia & Wihadanto, The Impact of Poor Sanitation on Tourism Development: A Global Review, 2020).* Indonesia's BRIN is advancing **eco-friendly infrastructure** to address climate change and water crises, showcasing projects like flood warning systems, pollutant treatment in wetlands, and the SIDANAU lake management app at the 10th World Water Forum. These initiatives promote sustainable solutions for global water challenges. *(World Water Forum, 2024).* **Water scarcity** in small Indonesian islands threatens community water access. This research creates a vulnerability index focusing on adaptive capacity, sensitivity, and exposure, showing that communal water management strengthens social capital and reduces vulnerability to water scarcity. *(Rizal, 2019).*Article underlines Indonesia's south-south cooperation (SSC) as key for political and economic recovery post-Covid-19, crucial for achieving SDGs in global challenges although requiring deeper strategic outcomes to improve the effectiveness of **global aid support** and strategic outcomes. *(Karnadibrata, Achieving SDGs in a Decade of Indonesia South-South Cooperation, 2022).* Based on the review of literature 72 variables were identified and categorised as per the research problems.

CHAPTER 3: RESEARCH METHODOLOGY

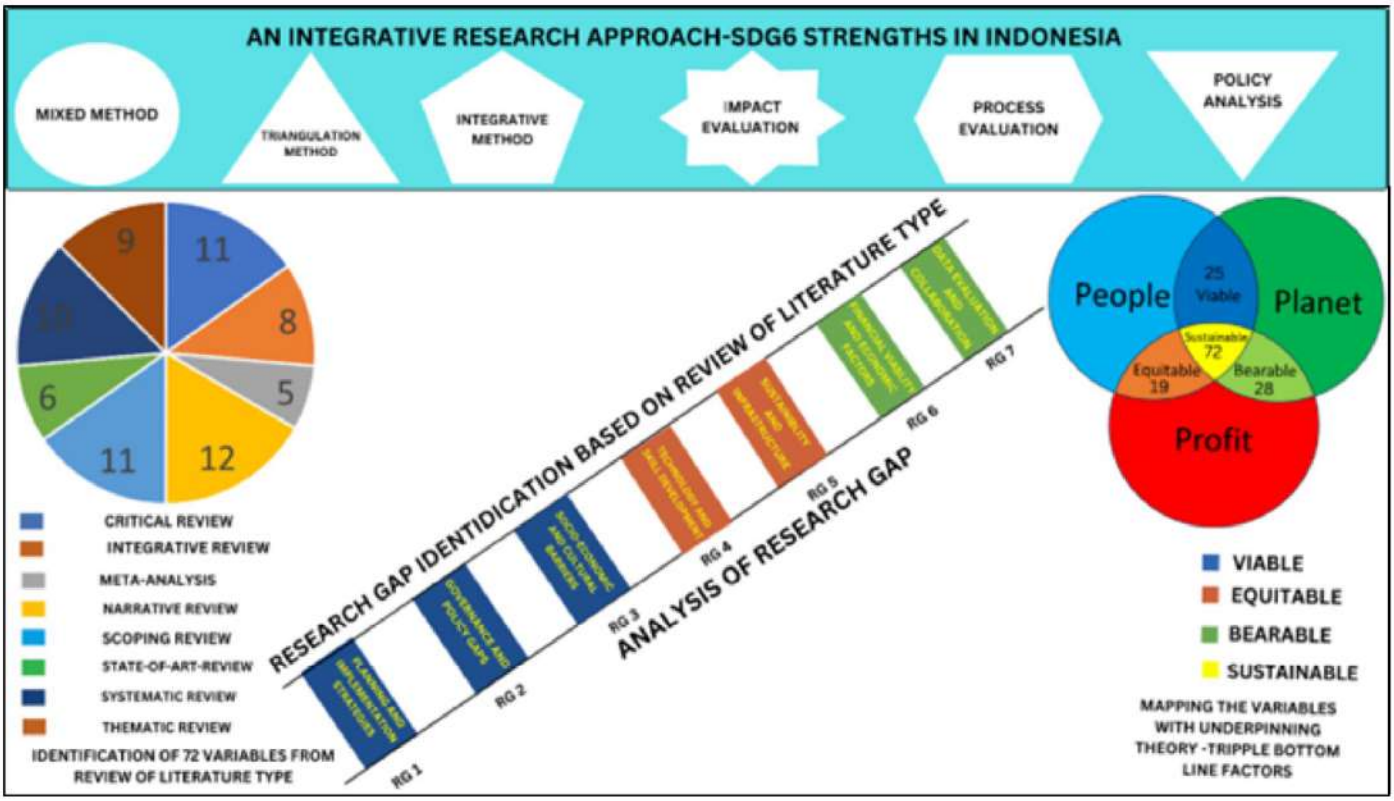
3.1 Research Methodology framework

The ontology of the research rests on pragmatism, a mixed approach in which both qualitative and quantitative methods are employed. Employing both quantitative and qualitative techniques of research, we sought to obtain an in-depth insight into the issue under consideration. Research Strategies which are present in this research project; mixed method, triangulation method, integrative method, impact evaluation, process evaluation and policy analysis. From the period 2018-2023 is where the quantitative data has been collected, and qualitative data is between 2019-2024. Research study is cross sectional in time scope. Primary data gathering was through interviews and focused group discussion. Secondary data gathering was through observation, news articles (http://surl.li/tqkpmb), research papers, journal articles, government and quasi-government reports, documents and various other articles.

3.2 Triangulation of research methodology

Approach to data analysis has employed a triangulation technique where quantitative, qualitative and descriptive analytical methods have been integrated. In terms of quantitative analysis, percentage analysis, mean scores and projections are included to enable concrete figures. Qualitatively, the study employs structural, inductive and contextual thematic analyses to explain the key issues and some related stories. In order to adequately justify the research issues, Force-field analysis, Barrier Analysis and sensitivity scenario analysis were utilized. The Diagram illustrates the triangulation of research methodology.

The research approach for assessing SDG6 strengths in Indonesia was developed after a comprehensive review of existing literature and analysis of research gaps. Various types of Literature review were thoroughly examined to identify the 72 variables influencing sustainability efforts. Further analysis revealed seven major **research gaps** (RG) as shown in research construct.



Source: Designed by Team Indonesia using Canva

Figure 1 Research Construct - An integrative Research approach

3.3 Underpinning theory - The Triple bottom Line

The VEB factors identified guided us to connect the underpinning theory Triple Bottom Line (TBL) into the SDG6 sustainable aspects. The Triple Bottom Line (TBL) framework enhances Sustainable Development Goal 6 (SDG 6) by integrating Bearability, equitability, and viability. Bearability emphasizes the social and environmental factors, promoting practices that ensure sustainable water management while safeguarding community well-being and ecosystem health. Equitability focuses on the economic and social dimensions, promoting fair access to water management and sanitation, which can drive improvements in sustainable practices. Viability highlights the environmental and economic dimensions, which helps for water conservation and ecosystem protection to support potential economic growth. The following Research Construct was designed:

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CHAPTER 4 : DATA ANALYSIS

By employing a combination of statistical and qualitative methods, we aim to deliver a clear examination of the findings.

4.1 Key Challenges hindering the achievement of SDG6

4.1.1 Water-related Challenges

Water-related metrics for SDG 6 were analysed and key challenge score were calculated:

Table 1 : Water Access Indicators-Population coverage Percentage overview

Year	BDWS (%)	AFWR (%)	WS-RWR(%)	WAC-Urban (%)	WAC-Rural (%)	WAC-AVG	WQ-Rural (%)	WQ-Urban (%)	WQ-AVG	KC Water-score	goal6	SDG Index Score
2018	85.07	80.34	96.80	73.63	60.71	67.17	23.09	34.05	28.57	61.05	67.77	67.00
2019	86.36	80.34	96.21	73.55	61.58	67.57	23.38	34.19	28.79	61.33	68.61	67.94
2020	87.65	80.34	96.11	73.86	62.34	68.10	23.67	34.34	29.01	61.71	69.36	68.44
2021	88.92	80.34	95.24	74.17	63.11	68.64	23.96	34.48	29.22	62.01	69.95	68.95
2022	90.18	80.34	95.12	74.48	63.88	63.88	24.26	34.63	29.45	61.80	70.50	69.24
2023	91.46	80.34	94.39	74.67	64.67	64.79	24.55	34.77	29.66	62.17	71.24	69.90
5 years average value(2018-2022)	87.63	80.34	95.90	73.94	62.32	67.07	23.67	34.34	29.01	61.58	69.24	68.32
Performance category	High	High	Very High	Medium	Low	Low	Very Low	Very Low	Very Low	Low	Low	Low
	↗	↗	↑	→	↘	↘	↓	↓	↓	↓	↘	↘

#BDWS-Basic Drinking Water Service; #AFWR-Available Fresh Water Resources; #WS-RWR - Water Scarcity To Renewable Water Resources; #WAC-Water Accessibility; #WQ-Water Quality; #KC-Key Challenges

Source: Secondary data (SDR Report, JMP Reports)

From the analysis we found that while there have been improvements in access to basic drinking water, especially in urban areas, water access in rural regions remains low, and water quality is consistently poor across the country. Although more people are gaining access to drinking water, significant challenges persist in rural access and water quality. Overall, the performance in meeting SDG 6 targets remains low, indicating the need for further investment and targeted interventions to improve water services and quality.

4.1.2 Sanitation-related challenges

The table provides an in-depth analysis of sanitation metrics for SDG 6 from 2018 to 2023.

The overall trend in Sanitation indicators shows positive progress in areas like- basic sanitation services and reducing open defecation. However, the performance in adequately improving sanitation facilities, especially at the household level, and achieving SDG 6 goals has been slower, with some scores still falling into the "Medium" and "Low" performance categories, The upward trends in key areas indicate improvements in infrastructure and policies, continued efforts are needed to address the sanitation challenges comprehensively and sustainably in order to achieve higher performance levels across all SDG 6 related indicators.

Table 2 : Sanitation-sustainable practices population coverage Percentage overview

Year	BSS (%)	ODR (%)	AISF (HH) (%)	KC Sanitation - Score	SDG 6 Index Score	SDG Index Score
2018	77.62%	91.34%	69.27%	69.27%	67.00%	67.77%
2019	80.15%	92.48%	77.39%	77.39%	67.94%	68.61%
2020	82.68%	93.61%	79.53%	79.53%	68.44%	69.36%
2021	85.22%	94.72%	80.29%	80.29%	68.95%	69.95%
2022	86.89%	95.81%	80.92%	80.92%	69.24%	70.50%
2023	86.89%	95.82%	81.97%	81.97%	69.43%	70.48%
5 years average value(2018-2022)	82.51%	93.59%	77.48%	77.48%	68.32%	69.24%
Performance category	High	Very High	Medium	Medium	Low	Low
	↗	↑	→	→	↘	↘
#BSS-Basic Sanitation Services; #ODR-Open Defecation Rate; #AISF-Access To Improved Sanitation Facilities; #KC-Key Challenges						

Source: Secondary data (SDR Report, JMP)

4.1.3 Hygiene-related challenges

The below table provides an overview of progress toward SDG 6 hygiene targets from 2018 to 2023. The SDG 6 Index Score indicating progress and the performance categories for hygiene highlighting ongoing challenges in achieving comprehensive improvements in sanitation and hygiene.

Table 3 : Hygiene Access Indicators-Population coverage Percentage overview

Year	HS&W-Availability (%)	HS&W-Rural (%)	HS&W-Urban (%)	HS&W-Avg	SC-Score	SDG 6 Index Score	SDG Index Score
2018	78.82	72.5	82.8	77.65	77.94	67.77	67.00
2019	73.30	73.31	82.43	77.87	76.73	68.61	67.94
2020	74.20	74.17	82.03	78.10	77.13	69.36	68.44
2021	75.00	75.02	81.64	78.33	77.50	69.95	68.95
2022	75.90	75.88	81.24	78.56	77.89	70.50	69.24
2023	74.85	76.72	80.85	78.79	77.80	70.48	69.43
5 years average value(2018-2022)	75.44	74.18	82.03	78.10	77.44	69.24	68.32
Performance category	Medium	Medium	High	Medium	Medium	Low	Low
	→	→	↗	→	→	↘	↘
#HS&W-Handwashing with Soap and Water; #SC-Sustainable							

Source: Secondary data (WHO, World Bank)

The above table shows, Indonesia's hygiene services under SDG 6 showed moderate progress, with the overall population using hygiene services declining. Rural areas saw a slight improvement, while urban

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areas experienced a small decrease. Despite some gains, the SDG 6 Index Score remains in the "Low" category, with a slight increase from 67.77% to 70.48%, averaging 69.24% over five years.

4.1.4 Structural Thematic Analysis - Key Challenges

Structural thematic analysis is a qualitative method that identifies and analyses patterns within data, focusing on how themes relate to each other and their context. It involves coding data, categorizing themes, and interpreting their significance in relation to the research question. Based on the 79 news (http://surl.li/ukinki) related to challenges, collected and analysed.

The analysis reflects the urging need for more equitable and sustainable interventions, especially in pollution and sanitation, while water and hygiene exhibit moderate yet uneven improvements.

Table 4: Structural Thematic Analysis - Key Challenges

Particulars	Very Low	Low	Medium	High	Very High	Grand Total
Key Challenge related to Pollution	11	6	2	2	0	21
Bearability	•••••••	•		••		↗
Equitability	••	•••	••			→
Viability	••	••				↓
Key Challenge related to Water	8	0	2	1	2	13
Bearability	•		•		•	↓
Equitability	•••		•	•		↘
Viability	••••				•	↘
Key challenges related to Hygiene	9	2	12	3	2	28
Bearability	•••	••	••••••••	•••		↑
Equitability	•••		•••••			→
Viability	•••				••	↘
Key challenges related to Sanitation	9	0	2	4	2	17
Bearability	••••••			•••		↗
Equitability	•		••	•		↓
Viability	••				••	↓
Overall	37	8	18	10	6	79
#Very Low-• ; #Low-• ; #Medium-• ; #High-• ; #Very High-•						

Source: Secondary Data qualitative frequency analysis using excel

4.1.5 SDG 6 Force-Field Analysis - Key Challenges

Force field analysis is a framework for analysing the forces that influence a change decision. It identifies and evaluates "driving forces" (factors that support change) and "restraining forces" (factors that oppose

change) to inform strategy development for successful implementation. Based on the structural analytical table above, the values assigned were analysed and categorises as driving and restraining.

The table depicted here gives an insight regarding Force Field Analysis of key challenges in achieving SDG 6 (clean water and sanitation). It highlights the balance between driving and restraining forces across three dimensions: Bearability, Equitability, and Viability.

Table 5 : SDG 6 Key Challenges-Force filed Analysis

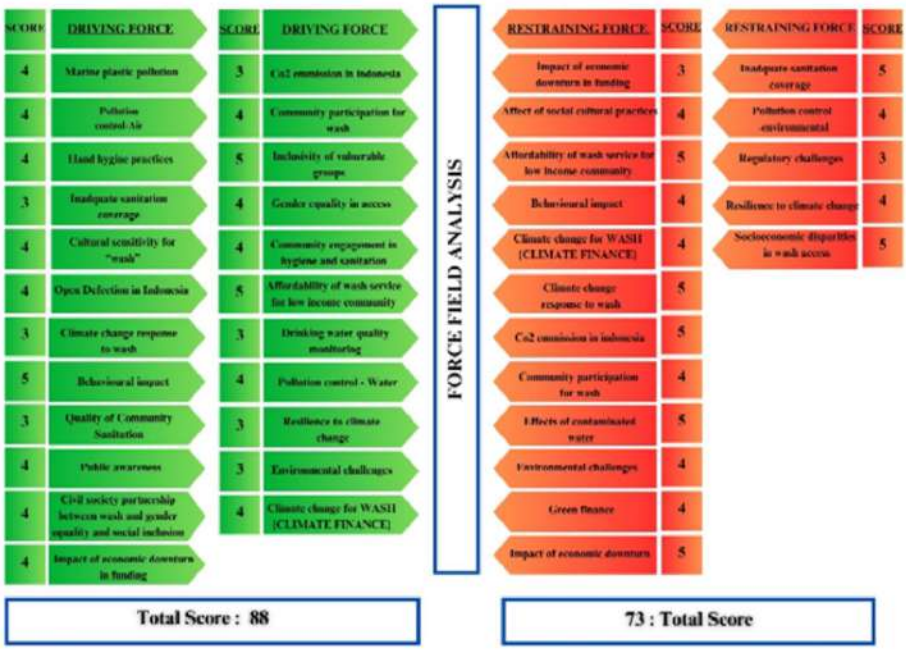
Particulars	Bearability	Equitability	Viability	Overall
Driving Force	30.38%	18.99%	5.06%	54.43%
Restraining Force	16.46%	11.39%	17.72%	45.57%
Overall	46.84%	30.38%	22.78%	100.00%

Source: Secondary Data

The Force Filed analysis shows that driving forces, which support progress, contribute more to sustainability, but both driving and restraining forces struggle with ensuring equitable access to water and sanitation services.

The biggest challenge lies in viability, where driving forces are weak, indicating that many proposed solutions are not practical, while restraining forces further hinder progress. Overall, despite some progress, significant barriers remain in making solutions both equitable and feasible for long-term success in achieving SDG 6.

Figure 2 Force Field Analysis - Driving and Restraining Forces



Source: Designed by Team Indonesia using Excel

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4.2 Improvement in Sustainable practices for WASH management

4.2.1 Water-related sustainable practices

The table depicts overall Sustainability Performance Score and SDG 6 Index Score:

Table 6 : Water- sustainable practices indicator population coverage % overview

Year	SMW-Rural (%)	SMW-Urban (%)	SMW-AVI	WI-Rural (%)	WI-Urban (%)	WI- AVG	WA-Rural (%)	WA-Urban (%)	WA-AVG	SP-Score	SDG 6 Index Score	SDG Index Score
2018	23.09	34.05	28.57	87.86	97.45	92.66	76.66	89.24	82.95	68.06	67.77	67.00
2019	23.38	34.19	28.79	88.75	97.84	93.30	77.63	89.62	83.63	68.57	68.61	67.94
2020	23.67	34.34	29.01	89.63	98.23	93.93	78.60	90.00	84.30	69.08	69.36	68.44
2021	23.96	34.48	29.22	90.52	98.61	94.57	79.57	90.38	84.98	69.59	69.95	68.95
2022	24.26	34.63	29.45	91.40	99.00	95.20	80.57	90.76	85.67	70.10	70.50	69.24
2023	24.55	34.77	29.66	92.29	99.39	95.84	81.54	91.14	86.34	70.61	70.48	69.43
5 years average value(2018-2022)	23.67	34.34	29.01	89.63	98.23	93.93	78.61	90.00	84.30	69.08	69.24	68.32
Performance category	Very Low	Very Low	Very Low	High	Very High	Very High	Medium	Very High	High	Low	Low	Low
	↓	↓	↓	↗	↑	↑	→	↑	↗	↘	↘	↘
#SMW-Safely Managed Water; #WI-Improved Water; #WA-Water Availibility; #SP-Sustainable Practice												

Source: Secondary data (JMP Reports)

The overall sanitation performance (SP-Score) and SDG 6 Index Score remain low, indicating that while some improvements have been made, significant challenges remain to meet SDG 6 goals.

4.2.2 Sanitation-related sustainable practices

The below table outlines the progress in sanitation practices: The Sustainability Performance Score (SP-Score), the SDG 6 Index Score and SDG Index Score highlights sanitation sustainability.

Table 7: Sanitation-sustainable practices population coverage % overview

Year	BSS-Rural (%)	BSS-Urban (%)	BSS-AVG	BSS-schools (%)	SP-Score	SDG 6 Index Score	SDG Index Score
2018	71.82	86.22	79.02	43.49	73.21	68	67.0
2019	74.90	87.71	81.31	48.92	73.21	68.61	67.94
2020	78.03	89.21	83.62	54.34	76.30	69.36	68.44
2021	81.20	90.72	85.96	59.72	79.40	69.95	68.95
2022	83.57	91.49	87.53	65.19	81.94	70.50	69.24
2023	86.76	91.71	89.23	65.15	83.21	70.48	69.43
5 years average value(2018-2022)	77.90	89.07	83.49	54.33	76.81	69.24	68.32
Performance category	Medium	High	High	Very Low	Medium	Low	Low
	→	↗	↗	↓	→	↘	↘
#BSS-Basic Sanitation Service; #SP-Sustainable Practice							

Source: Secondary data (JMP Reports)

Rural sanitation services improved steadily, while urban areas maintained high performance. The overall sanitation average also increased, reflecting positive trends. However, sanitation in schools remains very low, despite some improvement. The Sanitation Performance Score is categorized as medium, while both the SDG 6 Index Score and the broader SDG Index Score remain in the low category, indicating slow overall progress.

4.2.3 Hygiene-related sustainable practices

The table analyses hygiene-related sustainable practices for SDG 6 from 2018 to 2023, It highlights trends in Population lacking basic hygiene service in Rural Areas (%) (LHS-Rural %), Population lacking basic hygiene service in urban Area (%) LHS-Urban (%), clean water access (CWA %) and also the average of lack of access to hygiene (LHS-AVG). The Sustainability Performance Score (SP Score) and Performance category reflect sustainable hygiene practices.

Table 8 : Hygiene - sustainable practices population coverage % overview

Year	LHS-Rural (%)	LHS-Urban (%)	LHS-AVG	CWA (%)	SP Score	SDG 6 Index Score	SDG Index Score
2018	72.46	82.82	77.64	29.15	65.52	67.77	67.00
2019	73.31	82.43	77.87	29.43	65.76	68.61	67.94
2020	74.17	82.03	78.1	29.71	66.00	69.36	68.44
2021	75.02	81.64	78.33	20.99	64.00	69.95	68.95
2022	75.88	81.24	78.56	30.27	66.49	70.50	69.24
2023	76.73	80.85	78.79	20.55	64.23	70.48	69.43
5 years average value (2018-2022)	74.17	82.03	78.10	27.91	65.55	69.24	68.32
Performance category	Medium	High	Medium	Very Low	Low	Low	Low
	→	↗	→	↓	↘	↘	↘
#LHS-Lacking Hygiene Service; #cwa-Clean Water Access; #SP- Sustainable Practice							

Source: Secondary data - JMP Reports

Both the SDG 6 Index Score and the broader SDG Index Score remain low, indicating that although there are improvements in hygiene, the overall progress is slow and requires more attention, especially in clean water access.

4.2.4 Inductive Thematic Analysis - Assessment of Sustainable Practices

Inductive thematic analysis involves identifying, analysing and reporting themes or patterns with the qualitative data. The Inductive Thematic Analysis based on 110 related news (http://surl.li/lrwspv) for Enhancement of Sustainable Practices explores key barriers—financial, governance, infrastructure, and technological—through the lenses of Bearability, Equitability, and Viability.

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Table 9 : Inductive Thematic Analysis - Enhancement of Sustainable Practices

Particulars	Very Low	Medium	High	Very High	Overall
Financial Barriers	7	3	11	9	30
Bearability		*	*******	******	↗
Equitability	****	**	****		→
Viability	***			***	↘
Governance Barriers	13	5	18	6	42
Bearability		****	**********	**	↑
Equitability	*		***		↓
Viability	**********	*	***	****	↑
Infrastructure Barriers	4	2	7	5	18
Bearability			**	*	↓
Equitability		*	***		↘
Viability	****	*	**	****	→
Technological Barriers	7	1	4	8	20
Bearability			**	****	↘
Equitability	*	*			↓
Viability	******		**	****	↗
Overall	31	11	40	28	110
#Very Low-* ; #Low-* ; #Medium-* ; #High-* ; #Very High-*					

Source: Secondary Data qualitative frequency analysis using excel

Based on the analysis we found that the financial challenges show improvement in bearability but struggle with equitability and viability. Governance issues are widespread, with bearability improving, though equitability remains a major concern, while viability shows promise. Infrastructure barriers are somewhat manageable, but equitability and viability are inconsistent, indicating limited access and sustainability. Technological challenges are difficult to bear, with uneven access; however, the viability of solutions is improving. Overall, governance and financial barriers dominate, while infrastructure and technology require further efforts for equitable and sustainable solutions.

4.2.5 Barriers to SDG 6 Sustainable Practices

Using the scores attained in the inductive thematic table, Barrier analysis identifies obstacles that hinder goal achievement, enabling organizations to develop strategies to overcome these challenges.

The below analysis shows the different barriers to sustainable practices, categorized into Financial, Governance, Infrastructure, and Technological barriers. It shows how each type of barrier affects various areas, such as water efficiency, infrastructure improvement, hygiene education, and sanitation.

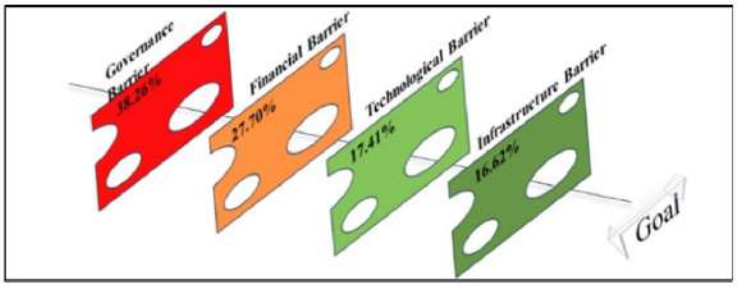

Figure 3 Barriers to SDG 6 Sustainable Practices

Table 10 : Barriers to SDG 6 Sustainable Practices

Factors	Financial Barriers	Governance Barriers	Infrastructure Barriers	Technological Barriers	Overall
Sustainable Practices by enhancing Sanitation and health	5.80%	12.14%	0.79%	1.58%	20.32%
Sustainable Practices by enhancing hygiene education and other practices	8.18%	10.03%	3.69%	2.64%	24.54%
Sustainable Practices by enhancing Infrastructure	7.92%	6.60%	10.29%	1.58%	26.39%
Sustainable Practices enhancing by water efficiency & management practices	5.80%	9.50%	1.85%	11.61%	28.76%
Grand Total	27.70%	38.26%	16.62%	17.41%	100.00%

Source: Secondary Data (Excel

From the above analysis we found that water efficiency and management face the most significant overall barriers, primarily due to technological challenges. While Infrastructure Improvement encounters major barriers, mainly from infrastructure issues. Hygiene Education struggles with financial barriers while Sanitation and Health have the fewest overall barriers primarily due to governance issues. This highlights the varying barriers faced by each sustainable practice.

4.3 Potential Economic benefits for achieving SDG 6 targets

4.3.1 Contextual Thematic Analysis - SDG 6 Target Outcome

Contextual thematic analysis is a qualitative method that examines themes within the specific context of data collection, highlighting how cultural, social, and situational factors influence meaning. This approach enriches data interpretation by situating themes within their broader environmental frameworks. The Contextual Thematic Analysis of SDG 6 using 72 news collected (http://surl.li/qmopwt). Target Achievement evaluates progress in five key areas: hygiene, water, international collaboration, sanitation, and project infrastructure. The table assesses these dimensions across five possible outcomes: worst, bad, moderate, good, and best cases, with 72 observations.

Table 11 : Scenario Based Contextual Thematic Analysis - SDG 6 Target Outcome

Factors-Enhancing Outcome	Worst case	Bad case	Moderate case	Good case	Best case	Overall
Hygiene	2	6	1	1		10
Bearability		•	•			↓
Equitability		••				↓
Viability	••	•••		•		↗
Water		1	7	10	2	20
Bearability			••	••	•	→
Equitability		•	••	•••	•	→
Viability			•••	•••••		↑

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International Collaboration	3	1	6	3		13
Bearability		•	•••	•		→
Equitability	•		••	••		→
Viability	••		•			↘
Sanitation	3		7	4	2	16
Bearability	•		••	••	••	↗
Equitability	•		••••	••		↗
Viability	•		•			↓
Project Infrastructure			8	5		13
Bearability			•			↓
Equitability			••	•		↘
Viability			•••••	••••		↑
Overall	8	8	29	23	4	72

Source: Secondary Data (Excel)

The Above table shows the hygiene is underperforming with notable deficits in accessibility and fairness, despite some advancements in viability. Water management shows robust enhancements in access and sustainability. International collaboration is moderately successful, though it struggles with effectiveness and diminishing progress. Sanitation sees incremental improvements in accessibility and fairness, but sustainability is problematic. Infrastructure projects excel in implementation effectiveness but lack equitable distribution. Collectively, while there is noteworthy advancement in water and infrastructure, hygiene and global cooperation require urgent attention to meet SDG 6 objectives.

4.3.2 Sensitivity Scenario Analysis – Achieving sdg6 targets

Sensitivity analysis means changes in input variables affect model outcomes, identifying which variables significantly impact results and enhancing understanding of uncertainty and risk in decision-making. Using the contextual thematic score, sensitivity scenario analysis were done:

Table 12 : Sensitivity Scenario Analysis – Achieving sdg6 targets

Factors-Enhanching Outcome	worst case	bad case	Moderate case	good case	best case	Overall
Hygiene	↓ 0.90%	↘ 5.38%	↓ 1.35%	↓ 1.79%	↓ 0.00%	↓ 9.42%
Water	↓ 0.00%	↓ 0.90%	→ 9.42%	↑ 17.94%	↘ 4.48%	↑ 32.74%
International Collaboration	↓ 1.35%	↓ 0.90%	→ 8.07%	↘ 5.38%	↓ 0.00%	↘ 15.70%
Sanitation	↓ 1.35%	↓ 0.00%	→ 9.42%	→ 7.17%	↘ 4.48%	→ 22.42%
Project Infrastructure	↓ 0.00%	↓ 0.00%	↗ 10.76%	→ 8.97%	↓ 0.00%	→ 19.73%
Overall	↓ 3.59%	↓ 7.17%	↑ 39.01%	↑ 41.26%	↓ 8.97%	100.00%

The above table presents a sensitivity analysis of SDG 6 target achievements across different scenarios. Water leads with the highest score, reflecting substantial progress, especially in favourable conditions. Sanitation follows showing notable improvements. Project Infrastructure scores indicate progress in

infrastructure development. International Collaboration has a score with moderate achievements. Hygiene lags behind with the lowest score revealing limited progress across all scenarios. Overall, water and sanitation show the most significant advancements, while hygiene and collaboration are less developed.

4.4 SDG6 and other SDGs – Impact analysis

Table 13 Impact of SDG6

Other SDGs	Direct Impact		Indirect Impact		Interconnected Impact		Grand Total	
SDG01(no poverty)		0%	2	1%		0%	2	1%
SDG02(zero hunger)		0%	3	1%		0%	3	1%
SDG03(good health and well being)	27	10%		0%		0%	27	10%
SDG04(quality education)	4	2%		0%		0%	4	2%
SDG05(gender equality)	10	4%		0%		0%	10	4%
SDG07(affordable and clean energy)	4	2%	9	3%	6	2%	19	7%
SDG08(decent work and economic growth)	3	1%	9	3%	14	5%	26	10%
SDG09(industry,innovation and infrastructure)	18	7%	8	3%	14	5%	40	15%
SDG10(reduced inequalities)		0%		0%	12	5%	12	5%
SDG11(sustainable cities and communities)	18	7%	10	4%	7	3%	35	13%
SDG12(responsible consumption and production)	6	2%		0%		0%	6	2%
SDG13(climate action)		0%	11	4%		0%	11	4%
SDG14(life below water)		0%		0%	6	2%	6	2%
SDG15(life on land)		0%		0%	10	4%	10	4%
SDG16(peace,justice and strong institutions)		0%		0%	8	3%	8	3%
SDG17(partnership for the goals)	34	13%		0%	8	3%	42	16%
Grand Total	124	48%	52	20%	85	33%	261	100%

(Source: Secondary data - News Articles)

The interconnections between Sustainable Development Goal 6 (SDG 6) and other Sustainable Development Goals (SDGs) were analysed. SDG 6 emphasizes clean water and sanitation as foundational for achieving various goals. Its interconnected nature shows that progress in SDG 6 is crucial for overall sustainable development. WASH experts highlight that without advancements in water and sanitation, achieving many other goals becomes significantly more challenging. Based on the observations of Qualitative samples (261 News Articles) collected, the following descriptive table is presented showing the Direct, Indirect and interconnected impact of SDG6 on other goals:

H0: SDG6 have no impact on other SDGs ; H1: SDG6 have significant impact on the other SSDGs

From the above analysis, we reject the null hypothesis and conclude that SDG6 have we found that sdg6 have significant impact on other SDGs. In conclusion, SDG 6 has a significant direct, interconnected, and indirect impact on various other SDGs, with the highest moderate and lowest influence. Ensuring progress in SDG 6 is crucial for achieving broader sustainable development goals across multiple sectors.

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4.5 SDG 6 Trend Analysis

The studied 72 variables were analysed in the light of qualitative data collected. Referring to news articles related to SDG 6 in Indonesia, we collected 261 News. Using excel, analysed the trend and assigned scores using observation.

Table 14 SDG6 Trends analysis

Variable	EcD	EnD	LgD	SoD	Overall	Variable	EcD	EnD	LgD	SoD	Overall
IA_01	↓		↓		↓	IA_16	St		St	St	St
IA_02		St	St		St	IA_17		St		St	St
IA_03			↑		↑	IA_18	↑			↑	↑
IA_04		↓	↓		↓	IA_19	↑			↑	↑
IA_05			↑	↑	↑	IA_20	St			St	St
IA_06		↓	↓		↓	IA_21		↓	↓	↓	↓
IA_07		↓	↓		↓	IA_22	St	St			St
IA_08			↑		↑	IA_23	↓			↓	↓
IA_09	↑		↑	↑	↑	IA_24	St		St		St
IA_10			↑	↑	↑	IA_25	St			St	St
IA_11		↓	↓		↓	IA_26		↓			↓
IA_12		St		St	St	IA_27	↓				↓
IA_13				↑	↑	IA_28		St		St	St
IA_14	St	St			St	IA_29	↑				↑
IA_15	St			St	St	IA_30	↓			↓	↓

#EcD-Economic Development ; #EnD-Environmental Development ; #LgD-Legislative Governance Development ; SoD-Social Development

(*Source: Secondary data - News Articles)*

Based on the analysis, we found that –

- Overall, the table reveals a broad range of challenges under SDG 6, with some issues being critical and others less emphasizing.
- Varying levels of success in implementing sustainable practices related to SDG 6, with some practices showing strong results and others indicating areas that need further development and attention.
- Some areas demonstrate significant progress and others revealing challenges that need addressing.

4.6 SDG6 and women Lens – Trend Analysis

The table provides a trend analysis of SDG 6 (Water, Sanitation, and Hygiene) from a women's perspective, focusing on key challenges, improvements in sustainable practices for WASH (Water, Sanitation, and Hygiene) management, and potential economic benefits. The study variables connected to women lens were used for analysis. The analysis presents a mixed picture of challenges and achievements regarding SDG 6. There is a particular focus on enhancing sustainable WASH practices such as school sanitation and menstrual hygiene management in order to realize all the targets of SDG 6.

Table 15: SDG 6 Trend Analysis-Women Lens

Variable	Variable Description	EcD	EnD	LgD	SoD	Overall
Sop1-Key Challenges hindering the achievement of SDG6						
IA 03	Hand Hygiene Practices			↑		↑
IA 04	Inadequate Sanitation		↓	↓		↓
IA 06	open defecation		↓	↓		↓
IA 13	Gender Equality Partnership				↑	↑
IA 15	Community Participation	↗			↗	↗
IA 16	Vulnerable Group Inclusivity	↗		↗	↗	↗
Sop2-Improvement in Sustainable practices for WASH management						
IO 05	improve school sanitation	→		↑	→	↑
IO 08	Menstural hygiene			↓	↑	→
IO 16	Build Resilenece			→	↓	↓
Sop3-Potential Economic benefits for achieving SDG 6 targets						
eo 03	Service Accessibility		↑		→	↑
eo 07	Public-Private Partnerships	→		↘	→	↗
eo 10	Economic Impact on He	↓				↓
eo 13	Green Funding Options		→	→		↑
eo 18	Health and Productivit	↘			↗	↗
eo 21	Women's Water Empowerment				→	↑

4.7 Analysis Government Policy related to SDG6

4.7.1 Corelation Analysis

Using correlation analysis, the impact of SDG 6 scores on achieving key challenges in WASH / Sustainable practices/Target achieved were analysed using the following data:

Table 16 SDG 6 Index and WASH indices

SDG6 Index and the WASH aspect calculated index Data										
Year	SDG 6	W-KCA	S-KCA	H-KCA	W-SPI	S-SPI	H-SPI	W-TAA	S-TAA	H-TAA
2018	67.77%	61.05%	69.27%	77.94%	68.06%	73.21%	65.52%	31.34%	73.13%	67.54%
2019	68.61%	61.33%	77.39%	76.73%	68.57%	73.21%	65.76%	31.60%	73.88%	68.90%
2020	69.36%	61.71%	79.53%	77.13%	69.08%	76.30%	66.00%	31.86%	74.61%	70.26%
2021	69.95%	62.01%	80.29%	77.50%	69.59%	79.40%	64.00%	32.13%	75.34%	71.61%
2022	70.50%	61.80%	80.92%	77.89%	70.10%	81.94%	66.49%	32.39%	76.07%	72.16%

Source: Secondary data (Excel)

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Hypothesis were drafted as below:

Ho- There is no correlation between SDG 6 scores and Key challenges achievement factors/Sustainable practices improvement factors/Target achievement factors of WASH

H1- There is correlation between SDG 6 scores and Key challenges achievement factors/Sustainable practices improvement factors/Target achievement factors of WASH

Table 17 Corelation Metrix - SDG 6 and WASH forces

	SDG 6	W-KCA	S-KCA	H-KCA	W-SPI	S-SPI	H-SPI	W-TAA	S-TAA	H-TAA
SDG 6	1									
W-KCA	0.9217	1								
S-KCA	0.9060	0.8980	1							
H-KCA	0.1280	-0.0062	-0.3016	1						
W-SPI	0.9957	0.8941	0.8663	0.2073	1					
S-SPI	0.9508	0.8408	0.7309	0.4272	0.9721	1				
H-SPI	0.0139	-0.2995	0.0017	0.0147	0.0317	-0.0060	1			
W-TAA	0.9959	0.8953	0.8669	0.2063	1.0000	0.9720	0.0294	1		
S-TAA	0.9962	0.8964	0.8688	0.2026	1.0000	0.9711	0.0288	1.0000	1	
H-TAA	0.9961	0.9469	0.9000	0.1360	0.9904	0.9514	-0.0725	0.9907	0.9911	1

Source: Secondary Data (Calculated using Data Analysis tool pack in Excel)

From the above analysis: (1) We reject the null hypothesis. We found that there is Very high positive corelation (0.90-1) is observed in seven cases out of nine aspects studied between the SDG 6 and WASH factors. (2) Very high positive correlation is observed in 19 cases (3) High positive corelation is observed in nine (4) Low positive corelation is observed in one cased (5) Negligible corelation is observed in 16 cases.

4.7.2 Forecasted and Projected Investment on WASH projects

The projected data from 2025 to 2030 shows a significant increase in investment and a corresponding rise in the Overall WASH Index scores, highlighting ambitious goals for WASH improvements.

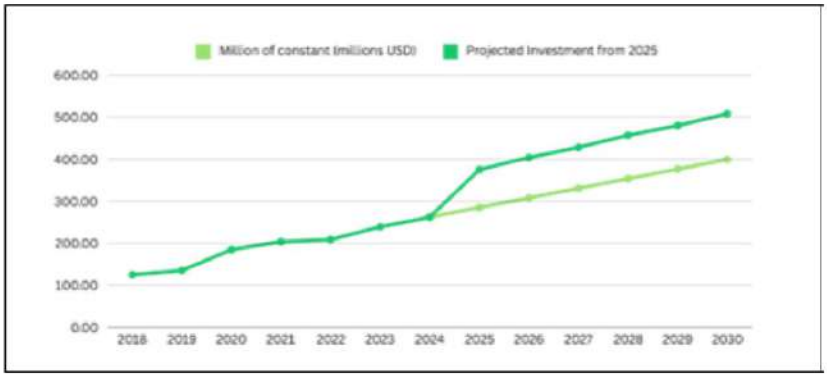

Figure 4 Forecasted & Projected Investment Amounts for Water and Sanitation

Table 18: Forecasted & Projected Investment Amounts for Water and Sanitation

Year	Million of constant (millions USD)	Water Index (Table 01)	Sanitation Index (Table 02)	Hygiene Index (Table 03)	Overall WASH Index Average score	Projected Investment from 2025	Investment Increase on forcasted and projected	WASH Index projected score as per increased Investment
2018	125	61.05	69.27	77.94	69.42	125.00	1.00	69.42
2019	135	61.33	77.39	76.73	71.82	135.00	1.00	71.82
2020	185	61.71	79.53	77.13	72.79	185.00	1.00	72.79
2021	204	62.01	80.29	77.50	73.27	204.00	1.00	73.27
2022	209	61.80	80.92	77.89	73.54	209.00	1.00	73.54
2023	239	62.17	84.46	77.80	74.81	239.34	1.00	74.81
2024	262	62.22	84.23	78.23	74.89	262.20	1.00	74.89
2025	285	62.48	87.08	78.34	75.97	375.26	1.32	100.00
2026	308	62.47	87.42	78.69	76.20	404.15	1.31	100.00
2027	331	62.69	90.24	78.76	77.23	428.35	1.29	100.00
2028	354	62.72	90.32	79.15	77.40	456.96	1.29	100.00
2029	377	62.93	93.23	79.22	78.46	479.92	1.27	100.00
2030	399	62.95	93.37	79.59	78.64	507.92	1.27	100.00

Source: Secondary Data (Excel)

It is found that increased investment is positively impacting WASH outcomes, with significant gains in sanitation and overall WASH performance. Investments are set to escalate sharply from $375.26 million in 2025 to $507.92 million by 2030. This marks a substantial commitment to enhancing WASH infrastructure and services. The projected achievement of a perfect Overall WASH Index score of 100 by 2025 aligns closely with Indonesia's commitment to Sustainable Development Goal (SDG) 6, which aims to ensure the availability and sustainable management of water and sanitation for all. It is concluded that the projected WASH improvements in Indonesia will not only aim to fulfil SDG 6 but also reflect a comprehensive approach to enhancing health, equity, and sustainability across the nation. Achieving these goals will position Indonesia as a leader in WASH efforts in the region.

4.7.3 ANOVA-Investment in WASH Infrastructure and key challenges

Based on the 4.7.2 Forecasted and Projected Investment on WASH projects, following table were made using excel which displays descriptive statistics and ANOVA results for investment levels in water and sanitation and their impact on WASH Index scores.

Table 19: ANOVA: Investment on Water and Sanitation and WASH Index Score

Groups	*Count*	*Sum*	*Average*	*Variance*
Million of constant (millions USD)	5	858	171.6	1534.8
Water Index (Table 01)	5	307.9	61.58011111	0.149265877
Sanitation Index (Table 02)	5	387.4	77.48	22.8361
Hygiene Index (Table 03)	5	387.19	77.43758311	0.267268702
Overall WASH Index Average score	5	360.83	72.16589807	2.786192349

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Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	40389.00864	4	10097.25216	32.34559516	1.79E-08	2.866081402
Within Groups	6243.355308	20	312.1677654			
Total	46632.36395	24				

Ho-Investment in WASH infrastructure does not significantly influence the key challenges

H1- Investment in WASH infrastructure significantly influences the key challenges associated with Water, Sanitation, and Hygiene.

The ANOVA results reveal that the null hypothesis is rejected, indicating significant differences among the groups. This suggests that investment levels in water and sanitation significantly affect the WASH Index scores. The analysis highlights the importance of investment levels in influencing WASH Index outcomes.

4.8 Four Pillars of SDG06 - Descriptive Analysis

Based on the qualitative data, the below table was drawn, (quantified based on frequency) scores assigned.

Table 20: Four Pillars of SDG 6-Percentage Analysis using excel

Factors-Key Challenges	EcD	EnD	LgD	SoD	Overall
Pollution	6.33%	8.86%	5.06%	6.33%	26.58%
Water	6.33%	3.80%	1.27%	5.06%	16.46%
Hygiene	8.86%	5.06%	15.19%	6.33%	35.44%
Sanitation	8.86%	2.53%	6.33%	3.80%	21.52%
Overall	**30.38%**	**20.25%**	**27.85%**	**21.52%**	**100.00%**
#EcD-Economic Development, #EnD-Environmental Development, #LgD-Legislative Governance Develop, #SoD-Social Development					

Factors-Sustainable Practices Enhancing	EcD	EnD	LgD	SoD	Overall
Sanitation and health	6.33%	8.44%	4.22%	1.32%	20.32%
Hygiene education and other practices	1.85%	1.06%	15.04%	6.60%	24.54%
Infrastructure	7.12%	4.75%	9.50%	5.01%	26.39%
Water efficiency & management practices	8.18%	9.76%	9.76%	1.06%	28.76%
Overall	**23.48%**	**24.01%**	**38.52%**	**13.98%**	**100.00%**
#EcD-Economic Development, #EnD-Environmental Development, #LgD-Legislative Governance Develop, #SoD-Social Development					

Factors-Enhancing Outcome	EcD	EnD	LgD	SoD	Overall
Hygiene	4.17%	1.39%	4.17%	4.17%	13.89%
Water	9.72%	6.94%	5.56%	5.56%	27.78%
International Collaboration	4.17%	6.94%	2.78%	4.17%	18.06%
Sanitation	5.56%	4.17%	1.39%	11.11%	22.22%
Project Infrastructure	5.56%	6.94%	2.78%	2.78%	18.06%
Overall	**29.17%**	**26.39%**	**16.67%**	**27.78%**	**100.00%**
#EcD-Economic Development, #EnD-Environmental Development, #LgD-Legislative Governance Develop, #SoD-Social Development					

From the analysis we found that –

- **Key challenges:** Hygiene is the most pressing issue in Legislative Governance, with pollution tackled by Environmental Development, sanitation emphasized by Economic Development, and water issues receiving less attention in governance.
- **Focus areas:** Water efficiency (28.76%) leads, with Legislative Governance and Environmental Development driving progress, followed by infrastructure (26.39%) and hygiene education (24.54%), while sanitation and health (20.32%) are less prioritized.
- **Impact:** Water management drives economic and environmental progress, sanitation and hygiene foster social development, and international collaboration strengthens environmental and governance outcomes, highlighting the need for a balanced, cross-sector approach to achieve SDG 6 targets.

4.9 TBL- SDG06 – Descriptive Analysis

Based on the qualitative data, the below table was drawn, (quantified based on frequency) scores assigned. The table presents the average percentage scores.

The table highlights pollution as a significant issue, particularly regarding bearability and equitability, while hygiene presents the greatest challenge, impacting bearability the most. Water and sanitation have a moderate influence, with their effects balanced across the triple bottom line. Bearability contribute most of the challenges.

Table 21: TBL SDG 6-Percentage analysis using Excel

Factors-Key Challenges	Bearability	Equitability	Viability	Overall
Pollution	12.66%	8.86%	5.06%	26.58%
Water	3.80%	6.33%	6.33%	16.46%
Hygiene	18.99%	10.13%	6.33%	35.44%
Sanitation	11.39%	5.06%	5.06%	21.52%
Overall	**46.84%**	**30.38%**	**22.78%**	**100.00%**

Factors-Sustainable Practices Enhancing	Bearability	Equitability	Viability	Overall
Sanitation and health	8.18%	5.01%	7.12%	20.32%
Hygiene education and other practices	10.55%	7.65%	6.33%	24.54%
Infrastructure	8.71%	6.60%	11.08%	26.39%
Water efficiency & management practices	8.71%	0.00%	20.05%	28.76%
Overall	**36.15%**	**19.26%**	**44.59%**	**100.00%**

Factors-Enhancing Outcome	Bearability	Equitability	Viability	Overall
Hygiene	2.78%	2.78%	8.33%	13.89%
Water	6.94%	9.72%	11.11%	27.78%
International Collaboration	6.94%	6.94%	4.17%	18.06%
Sanitation	9.72%	9.72%	2.78%	22.22%
Project Infrastructure	1.39%	4.17%	12.50%	18.06%
Overall	**27.78%**	**33.33%**	**38.89%**	**100.00%**

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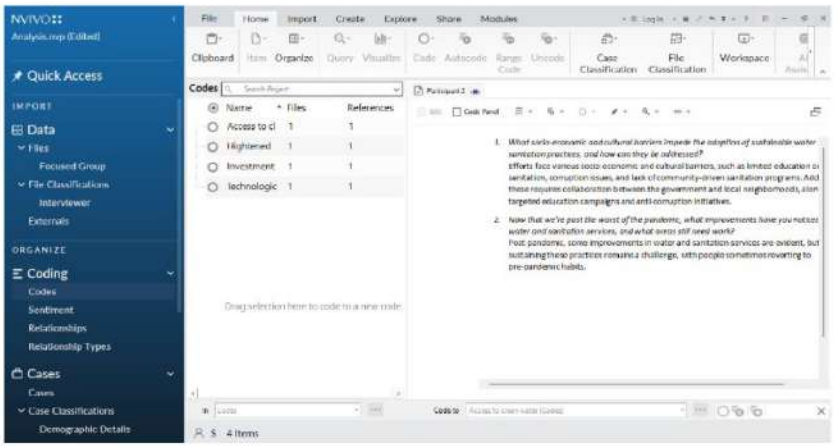
SDG 6 practices show a balanced impact across sanitation, health, and hygiene education, with infrastructure improvements emphasizing viability. Water management has the greatest influence on viability but less on equitability. Achieving SDG 6 targets requires balancing immediate needs with long-term sustainability, focusing on fair, sustainable resource access, public health, and infrastructure improvements.

4.10 Data Analysis: Focused Group Discussion.

A focus group discussion was conducted. Based on the responses of participant residents of Indonesia, narrative analysis were done using the online software NVivo 15. The coded output were further assigned as positive and negative sentiments using excel.

Figure 5: Narrative Analysis: Print Screen of NVivo 15



H0: WASH resilience in Indonesia does not improve the socio-economic outcome ; *H1*: WASH resilience significantly improve the socio-economic outcome.

Figure 6: Positive and Negative Factor related to WASH resilience in Indonesia

(Source: Primary data FGD)

The positive and negative aspects related to achieving SDG 6, as discussed in a focus group discussion (FGD). These strengths and challenges highlight areas that need to be addressed to ensure access to clean water, sanitation, and hygiene.

From the above analysis, we reject the null hypothesis. WASH resilience significantly improve the socio-economic outcome. The higher number of positive factor highlights progress in areas like community engagement, education, and technological innovation. However, persistent negative factors, such as limited access to clean water, inadequate sanitation facilities, and financial constraints, indicate substantial barriers. Addressing these critical challenges is essential to enhancing WASH accessibility and sustainability in Indonesia.

CHAPTER 5 - SUMMARY OF FINDINGS

The following diagram provides an overview of key findings indicators related to Safe Drinking Water, Sanitation, Hygiene, Water Quality, and Water Efficiency, highlighting varying levels of access and performance across rural, urban, and average metrics.

Safe Drinking Water services show moderate to low access, with significant challenges in rural areas. Ecosystems indicators like Available Freshwater Resources and Drinking Water Limited Services also settings, but open defecation and access to improved facilities still pose challenges in rural regions. face low accessibility in rural areas. Sanitation services have seen improvements, especially in urban Hygiene and handwashing facilities show moderate progress, particularly in schools and urban areas. Water Quality is generally low across both rural and urban settings, while Water Efficiency shows moderate accessibility to water resources. The color-coded arrows indicate mixed performance, with rural areas typically facing greater difficulties than urban ones.

5.1 Summary of findings based on Quantitative Analysis:

1) The key focus of quantitative analysis includes the aspects relating to access to clean water, sanitation, hygiene practices, and water management challenges.
   a. Improved access to clean water and sanitation reduces poverty and enhances living standards, particularly in urban vs. rural disparities. Hence SDG 6 supports improving SDG 1(No Poverty).
   b. Access to clean water and sanitation is crucial in preventing water-borne diseases, directly linked to public health outcomes, which will help to improve SDG 3 (Good Health and Well-being)

2) The key Challenges Identified include inadequate sanitation and hygiene practices, funding constraints, disparities between rural and urban areas, and ineffective policy frameworks.
   a. Poor sanitation in schools affects attendance and educational outcomes, linking hygiene practices with education quality. Hence SDG 6 supports improving SDG 4 (Quality Education).
   b. Women and girls often bear the burden of collecting water; improving sanitation can promote gender equality by reducing this burden, which will help to improve SDG 5 (Gender Equality).

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Figure 7: Key Indicators of WASH

(Source: Designed by Team Indonesia using Canva)

3) Some Opportunities were identified too, which highlights potential for improvement in hygiene practices and sustainable water management.
   a. Infrastructure investment in water and sanitation creates jobs and supports economic growth, directly addressing funding barriers. Hence SDG 6 supports improving SDG 8 (Decent Work and Economic Growth).

4) With respect to Progress Achieved, we found some improvements in access to clean water and sanitation, yet overall progress remains modest with notable disparities across locations.
   a. Addressing disparities in access to clean water and sanitation promotes social justice and equality. Hence SDG 6 supports improving SDG 10 (Reduced Inequalities)

5) The Key Areas for Improvement we identified highlights emphasis on improving hygiene education and awareness, addressing policy shortcomings, and balancing immediate WASH needs with long-term sustainability.
   a. Improved urban water management leads to more sustainable cities, aligning with the potential for enhanced hygiene practices and water management. Hence SDG 6 will help to improve SDG 11 (Sustainable Cities and Communities).

A holistic approach is essential, balancing immediate needs in water and sanitation with long-term sustainability goals for effectively address challenges in WASH practices.

5.2 Summary of findings based on Qualitative Analysis:

6) The key focus of Qualitative analysis findings ascertains relationships between SDG 6 and governance dimensions (environmental, economic, social, and legislative).
   a. Effective legislative and governance frameworks are crucial for water management, enhancing social stability and justice. Hence SDG 6 will help to improve SDG 16 (Peace, Justice, and Strong Institutions).
   b. Coordinated efforts across governance dimensions emphasize the importance of partnerships in achieving SDG 6, which will support to improve SDG 17 (Partnerships for the Goals).

7) The key Challenges Identified include Legislative governance issues, economic and environmental barriers, social development barriers, insufficient technological maintenance, and pollution.
   a. Effective governance can enhance water resource management, supporting biodiversity and ecosystem conservation. Hence SDG 6 will help to improve SDG 15 (Life on Land).

8) We found Opportunities, which highlights the necessity for equitable approaches and coordinated efforts across governance dimensions.
   a. Addressing environmental challenges through effective governance and policy can improve climate resilience in water management, which will help to improve SDG 13 (Climate Action).

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9) With respect to Progress Achieved, we found significant advancements in sanitation and infrastructure, but major gaps in water management and hygiene education remain.
   a. Ensuring equitable access to clean water supports agricultural productivity and food security, highlighting the relationship between social development and hunger. Hence SDG 6 will help to improve SDG 2 (Zero Hunger).

10) The Key Areas for Improvement we identified highlights that Economic development must address funding barriers; environmental initiatives should focus on pollution; social development needs enhanced community access; and legislative support is crucial.
   a. Technological advancement in water management can drive infrastructure development and innovation, which will help to improve SDG 9 (Industry, Innovation, and Infrastructure).

   A consistent strategy integrating economic, environmental, social, and legislative efforts is crucial for advancing SDG 6 in Indonesia.

5.3 Summary of Findings based on Focused Group Discussion

11) Indonesia's SDG 6 initiatives focus on clean water, sanitation, and women's community engagement. President Joko Widodo's anti-corruption efforts are crucial for sustainable governance. Effective water management depends on strong social, legislative, and economic frameworks.

12) Socio-economic barriers, corruption, and limited hygiene education hinder progress. Corruption affects amenities like pay-per-use toilets, causing inequitable access and poor maintenance. Infrastructure and pollution issues obstruct improvements, especially in underserved areas.

13) Strengthening government-community collaboration can drive gender-sensitive, community-led sanitation programs. Hygiene education and water purification innovations can significantly improve underserved regions.

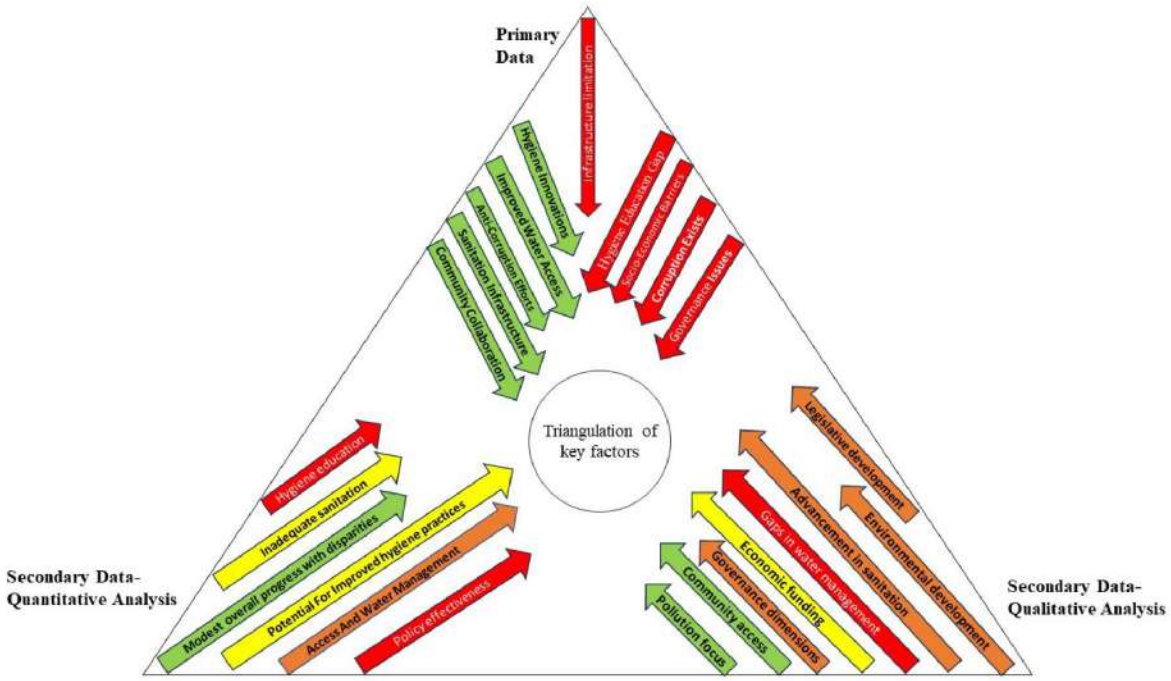
14) Sanitation infrastructure has improved, but water management and hygiene education still face gaps. Pre-pandemic, water facilities were reliable, but sanitation lagged. The pandemic raised hygiene awareness, and urban areas like Jakarta show high awareness and well-maintained public facilities.

15) Economic development needs to address funding barriers, while environmental efforts should focus on pollution. Social development requires better community access, and legislative support is crucial. Post-pandemic, maintaining hygiene practices is challenging and requires ongoing education, monitoring, and enhanced funding and legislative support.

5.4 Triangulation of Research findings

Triangulation of research findings is presented below:

Figure 8 : Data Triangulation of Key Research Findings



Designed by Team Indonesia

5.5 Discussion on Findings

- A hybrid approach that integrates strategic planning with quick funding resolves the gaps in infrastructure in sanitation effectively in Indonesia.
- Holistic management will have a significant impact on social, economic, and environmental sustainability while feeding into the success of WASH initiatives.
- A lack of finances had to be overcome to implement innovative technologies that enhance water efficiency, thereby feeding into SDG 6, SDG 8, and SDG 13, which drive the economic growth of a country and its resilience toward climate change.
- Investing more in WASH can ensure Indonesia long-term sustainable infrastructure in rural areas for equitable access and economic development.
- A community is sustainable only when there is an integration of economic and environmental considerations to bring change through resource strategic allocation and program design to meet the essential requirements of hygiene access across different communities.
- Involving the locals ensures that interventions are culturally relevant and overcome disparities in access to hygiene facilities towards improved health outcomes, both in cities and rural areas.
- Bringing communities into maintenance enhances ownership and accountability towards ending, and prevents practices such as open defecation.

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- ❖ Hygiene education and regular maintenance of facilities are crucial advocacy campaigns for public health that also support other goals on gender equality and educational advancement.
- ❖ Resource conservation and sustainable WASH management involve efficient use of water, together with integrated pollution management.
- ❖ A balanced approach promotes SDG 6 and resilient water resources while the collaborative policymaking for fair WASH solutions and optimally allocated resources drives the solutions.
- ❖ Governance is one basic requirement for sound financial management as well as for policy implementation.
- ❖ Sanitation and governance challenges addressed in Indonesia advance the SDG 6 but present a far broader variety of social, economic, and environmental benefits ultimately leading to better health, protection of ecosystems, and sustainability across the country.

CHAPTER 6 - SUGGESTION AND CONCLUSION

Based on the research findings, the suggestions are proposed:

(1) Integrate pollution management strategies with hygiene initiatives to adopt a holistic approach to public health.

(2) Combine effective planning with social engagement to improve water conditions and achieve SDG 6 objectives.

(3) Enhance governance and transparency in WASH initiatives to ensure effective financial management and resource utilization.

(4) Engage in collaborative policymaking to develop equitable and sustainable WASH solutions, ensuring that all voices are considered.

(5) Allocate resources effectively to enhance the effectiveness of policies governing water, sanitation, and hygiene.

(6) Actively involve communities in decision-making processes to foster ownership and accountability in WASH programs.

(7) Focus investments on water, sanitation, and hygiene infrastructure to promote sustainable development and enhance overall service delivery.

(8) Encourage community engagement in maintaining WASH infrastructure to promote sustainability and local ownership.

(9) Advocate for a balanced approach to water management, supported by a national water agency, to meet SDG 6 targets effectively.

(10) Integrate economic and environmental factors in planning to achieve sustainable development goals in WASH.

(11) Implement strategic resource allocation alongside inclusive program design to address hygiene access challenges effectively.

(12) Emphasize the adoption of new technologies in rural areas to improve sanitation service delivery, facilitating better decision-making across the environment.

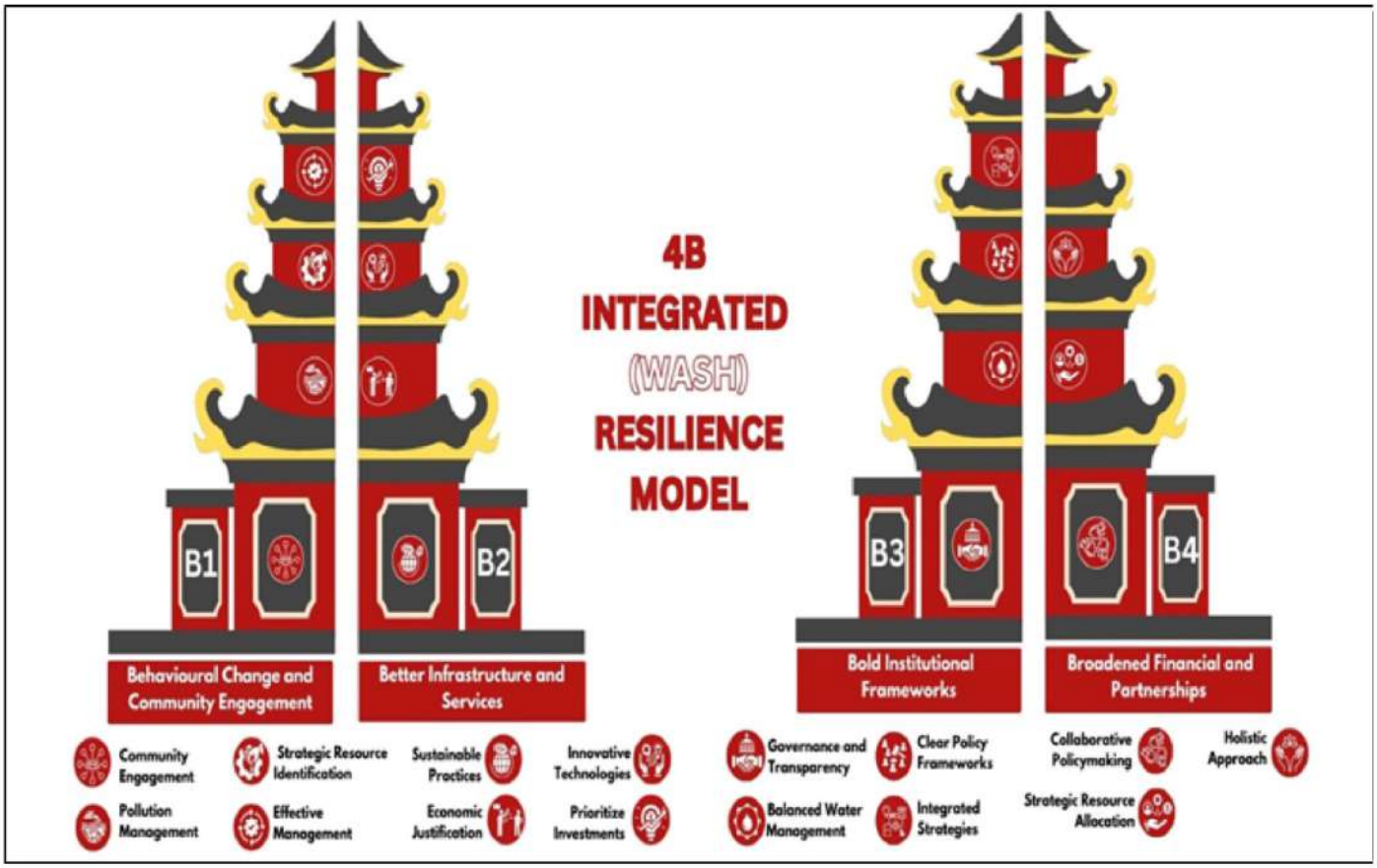
(13) Conduct thorough economic analyses to validate sanitation and hygiene investments, ensuring they align with sustainable development goals.

There is a dire necessity to focus on the following aspects for betterment of SDG 6 goals:

1) Behavioral change and community engagement
2) Better infrastructure and services
3) Bold Institutional frameworks
4) Broadened financial and partnerships.

Based on the findings, the 4B Integrated (WASH) Resilience model were designed and presented:

Figure 9.4B Integrated (WASH) Resilience Model



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In conclusion, achieving Indonesia's SDG 6 targets for water, sanitation, and hygiene (WASH) requires a comprehensive strategy that combines effective pollution control, careful planning, resource management, and strong governance with active community participation. Key actions include integrating pollution management into hygiene programs, encouraging behavioural change, improving governance and transparency, and prioritizing infrastructure development. Engaging local communities, building partnerships, and embracing technological innovations will foster ownership, sustainability, and equitable access to services. A well-comprehensive approach to water management, supported by solid institutional frameworks and economic analysis, is crucial to ensuring that Indonesia's WASH programs are both impactful and sustainable.

As Indonesia continues to prioritize WASH initiatives, it is not only addressing the fundamental human needs but also creating a foundation for sustainable development across the entire 2030 Agenda. Indonesia's efforts to achieve SDG 6 WASH initiatives have not only made significant strides in improving the quality of life for millions but have also created a ripple effect that supports advancements of other Sustainable Development Goals.

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