

Research Paper

The clean plan: analysing sanitation planning in India using the CWIS planning framework

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ABSTRACT

Sanitation in India has received national attention for over a decade, especially with the Swachh Bharat Mission (SBM) making it a political priority. However, due to the lack of appropriate sanitation planning practices, there have been little long-term gains made in urban sanitation beyond the ending of open defaecation. In this paper, we analyse the key barriers to sanitation planning, in India, in the context of the emerging paradigm of Citywide Inclusive Sanitation (CWIS). A mixed method approach of shit flow diagrams, social network analysis, policy analysis, interviews and workshops at the national, state (2) and city (4) levels was conducted. Eight factors were identified as important barriers for planning including inadequate planning capacities, lack of ownership of city sanitation plans among city governments, poor community involvement, absence of a uniform planning framework, unreliable political and financial support, overlapping jurisdictions, and scheme-based funding. The paper also proposes the CWIS Planning Framework which offers a perspective at overcoming these barriers with the recommendation of bridging top-down and bottom-up planning approaches. While there is increasingly more clarity on what CWIS means, there is little understanding on how to plan for it. Therefore, this framework provides the theoretical basis for planning with the CWIS approach.

Key words: Citywide Inclusive Sanitation, CWIS planning framework, India, sanitation planning, Swachh Bharat Mission

HIGHLIGHTS

- This is the first comprehensive study of sanitation planning practices in India with a CWIS lens.
- In-depth methodology drawing from 60 interviews, 4 workshops, 4 Shit Flow Diagrams (SFDs) and Social Network Analyses (SNA) for the 4 cities, document and policy analyses.
- Identifies the barriers for planning CWIS in Indian cities and makes overarching recommendations on ways to overcome these barriers based on the '4S' pillars.
- CWIS Planning Framework based on the Manila Principles on CWIS includes operational outcomes, functional linkages and '4S' pillars of comprehensive sanitation planning.

1. INTRODUCTION

Over the last decade, the sanitation landscape of India has been rapidly changing, with progressive laws, programmes and policies (Wankhade 2015; TERI University 2017). The most notable among them is the Swachh Bharat Abhiyan (SBM) or Clean India Mission, which helped the country declare itself open defaecation free in 2019. The success of this mission, as the world's largest sanitation campaign, has prompted it to be replicated in other countries; for example the Clean Nigeria Campaign (GoN 2019). However, the plans of SBM did not go beyond the latrine, leaving the rest of sanitation service chain unattended and the sustainability of the outcomes in significant uncertainty (Kumar 2017; Gupta *et al.* 2019).

In India, 32% of the urban households are connected to sewers, of which only 30% of the sewage generated is treated, leaving over 43,000 million litres of untreated sewage into the environment every day and 30 million households (not including the newly added latrines of the SBM) relying on septic tanks with no proper disposal strategy (WaterAid 2016). The aspirational centralised sewer-based sanitation systems are resource and time-intensive (GoI 2008; Gambrell *et al.* 2020). This

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prompted the National Government to embrace non-conventional solutions such as Faecal Sludge Management (FSM) by introducing specific funding schemes and policies to meet the rising sustainable sanitation demands (GoI 2017). Similarly, small-scale sanitation (SSS) systems are steadily gaining prominence in complementing centralised treatment plants in large Indian cities (Klinger *et al.* 2020; Narayan *et al.* 2020). However, the systematic uptake of both these alternative non-sewered sanitation systems (FSM and SSS) in India has been challenging their implementation, an operational and governance struggle (Reymond *et al.* 2020; Devaraj *et al.* 2021).

This struggle to provide safe sanitation can also be observed in other cities globally due to the complexity of population density, migration, urbanisation, slum expansion, settlement heterogeneity, tenure security and sheer urban poverty (Chaplin 1999; Scott *et al.* 2015). Despite the overall sanitation service levels being higher in cities than in rural areas, its implementation progress has been slower; between 2000 and 2017, the access to improved sanitation in rural areas has increased by 23%, while in urban contexts the increase has been a meagre 6% (UNICEF and WHO 2019).

One of the key reasons for failure in provision of sustainable sanitation, especially in complex settings such as cities in low- and middle-income countries (LMICs), is the lack of adequate sanitation planning (Kennedy-Walker *et al.* 2015). While the technologies and policies for sanitation, especially in India, have advanced to accommodate contextual needs, planning practices have largely remained conventional and dominated by expert driven rational-comprehensive approaches, in places where they are not most appropriate (McConville *et al.* 2011). Although top-down technocratic planning has been successful in the Global North, these planning approaches struggle to handle the complexity of sanitation provision in the Global South where urban demographics, socio-cultural factors and equity criteria vary significantly (Hawkins *et al.* 2013). This complexity of urban sanitation in LMICs demands borrowing solutions from all different technical and non-technical sources (Schertenleib *et al.* 2021).

Good sanitation planning practices allow for a systematic evaluation of solutions based on a holistic understanding of contextual demands that lead to community acceptance, long-term sustenance and leveraging synergies with other urban development goals (McGranahan & Mitlin 2016; Narayan *et al.* 2021). Benjamin Franklin's words 'failing to plan is planning to fail' are relevant in the case of India, where sanitation is often an *ad hoc* activity and city governments do not adequately spend time and effort in planning sanitation. This results in poorly managed urban sanitation and even visible pollution of urban water bodies (TERI University 2017; Sharada Prasad & Ray 2019). The existing capacities and attitudes of local planners, consultants and decision-makers in most city governments across LMICs including India still follow a one-size-fits-all top-down approach and are therefore yet to meet the standards of the emerging concept of Citywide Inclusive Sanitation (CWIS).

CWIS is a paradigm shift from the conventional approach to urban sanitation that can be characterised as technocratic, infrastructure focused, sewer aspirational and context-insensitive (Schrecongost *et al.* 2020). Instead, CWIS places equity and service-based safe management of entire sanitation value chain at the forefront while encouraging a mix of technological solutions and business models (Narayan & Luthi 2020). It brings multi-sectoral and multi-level stakeholders involved in sanitation provision together, an action often neglected in past planning practices. CWIS is gaining traction across international development agencies, governments, academia and NGOs (Gambrill *et al.* 2020), and even in India, it is being piloted across eight cities.

Therefore, the dual aims of this paper are to (i) analyse sanitation planning practices in India at the national, state and city levels and (ii) introduce the theoretical basis for a new CWIS Planning Framework, through which we can indicate possible ways forward to operationalise the CWIS approach in cities across India, thereby accelerating progress towards sustainable and equitable urban sanitation in the country.

2. RESEARCH DESIGN AND METHODS

This research followed a case study approach and used a mix of qualitative and quantitative research methods. The fieldwork and data collection spanned a total of 6 months between 2018 and 2020. The methods used include key informant interviews, participant observations, expert workshops, social network analysis, shit flow diagrams (SFDs), and policy and document analyses (Bryman 2012).

The initial sampling for experts was purposeful through stakeholder mapping and then complemented with snowball sampling and networking at major sector conferences. The use of the innovative social network analysis (Narayan *et al.* 2020) allowed for the identification of key actors within the sanitation landscape.¹ Eighty-four repeated in-depth interviews

¹ See Narayan *et al.* (2020) for the social network analysis components. This paper builds on the previously published work exploring aspects of sanitation governance in the same case studies.

were conducted with 60 experts for an average of 45 min, while some extended up to 3 h. The interviews were mostly in English; however, around 20% of the interviews were in the local languages of Tamil and Hindi.

Furthermore, four workshops were organised with national and international sanitation experts from international development agencies, NGOs, academia and public sector to analyse sanitation planning practices and past implementation experiences in India (Table 1). These workshops often happened in conference and training settings, such as the World Toilet Summit, Mumbai in 2018 and Eawag-ConCaD Training Bangalore in 2019, which provided easy access to expert participants.

Participant observations of sanitation service provision, policy interpretation, infrastructure decision-making and stakeholder engagement were carried out wherever possible at the national and city levels. Document analysis through the procurement of publicly listed and unlisted or undisclosed documents helped triangulate data through additional independent sources.

Qualitative data were mostly analysed through thematic content analysis coded in nVivo software following standard case study research protocols (Bryman 2012). Further in-depth information including interview and workshop guides, anonymised interviewee list and thematic analyses codes are provided in the Supplementary Material to make this research as reproducible as possible. There may be inherent research biases in data interpretation during the analysis, but preventive steps were undertaken such as a multi-perspective approach, corroboration and triangulation. According to Eawag Ethical Review of Projects involving human subjects (PD-16-09), this was deemed minimal risk. All participatory data were obtained after verbal consent and fully anonymised.²

3. STUDY LOCATION

The spotlight on India's sanitation sector in the last decade, right from adopting one of the most comprehensive sanitation planning policies (GoI 2008) to solving the world's largest open defaecation challenge (even having dedicated Bollywood movies on it), makes it a worthwhile case to explore how urban sanitation is being planned. This has to be done at the levels of national, state and city, to unpack the intricacies of policies, mandates, planning and implementation.

The primary study sites for the study were located in two comparable Southern states of Tamil Nadu and Karnataka, which have two of the most progressive sanitation policies. The four cities within these states were Chennai, Coimbatore, Bangalore and Mysore. While the site selection was partly based on the purposive sampling technique due to the availability and accessibility of data, it was also due to their comparable size, demography and sanitation statuses. Chennai and Bangalore are capital and mega cities in the respective states, while Coimbatore and Mysore are secondary cities with populations of approximately 1.5 million. They are also the cleanest cities in their respective states according to the Swachh Survekshan national sanitation survey (MoHUA 2019). Table 2 summarises key information about the cities based on the individual SFDs and their accompanying reports prepared as part of this research (see Supplementary Material for SFD graphics).³

Table 1 | Type of key informants participated in interviews and workshops

Type of stakeholder	Number of stakeholders interviewed	Total number of workshop participants in four workshops
National Government (NGV)	5	3
State/City Government (SGV)	13	7
Academia (ACD)	15	9
Private Sector (PVT)	8	4
NGOs and Resident Welfare Organizations (NRW)	11	10
International Development Agencies (IDA)	8	9
Total	60	42

There is a 50% overlap between the experts interviewed and experts who participated in the workshops. Disaggregated information on this provided in the Supplementary Material.

² The stakeholders are referred using codes given in Table 1 and the anonymised interview list in the Supplementary Material.

³ The expert-reviewed SFD reports for the cities are available for free in the SFD portal at www.sfd.susana.org.

It is useful to note that these cities are representative of ‘Class IA with population over one million’, which account for a third of the urban population in India. However, there are several cities and small towns in India that are smaller than these four cities, in terms of area and population, where certain aspects of the CWIS approach would still be applicable depending on their specific contexts. The four cities chosen here provide a wider scope to explore various aspects of CWIS, such as the co-existence of a mix of technologies and service models, due to their size and history.

4. RESULTS AND DISCUSSION

4.1. Analysis of current sanitation planning practices⁴

Urban sanitation planning in India has largely gained prominence only since the introduction of the National Urban Sanitation Policy (NUSP) in 2008, which specifically highlighted the use of the City Sanitation Plan (CSP) process (GoI 2008). This CSP process is a comprehensive planning approach that is cross-sectoral and aims to be a key document for city managers in all aspects covering environmental sanitation (including water supply, solid waste and storm water drainage) (GIZ 2016). In many ways, the NUSP and the CSP have been forward-looking and are well aligned with most of the CWIS principles (Workshop 4). Despite this, over 80% of the interviewees agree that the policy has fallen short in delivering the impact it promised.

Based on the responses mentioned by the interviewees and workshop participants, the major themes were grouped, and the top eight are highlighted in Figure 1. See Supplementary Material for all the 27 identified themes with their detailed meaning. These themes are highly interrelated and have direct influences between each other. 1. For example, lack of political and financial support are critical reasons for poor planning capacities and dependency on sanitation-related schemes. Similarly, the lack of coordination and community involvement could have a significant effect on ownership.

4.1.1. Lack of planning capacity (35 respondents)

‘Most cities in India have limited capacities to plan for safe sanitation’ is a statement that was often heard throughout most interviews (ACD14, NGV06, SGV17, NRW05, IDA05). Since city governments do not have the adequate human capacity themselves to systematically plan sanitation, this work is outsourced to external consultants. Often, these consultants themselves lack technical capacities for comprehensive CWIS planning, which not only includes engineering skills including estimating quantities and qualities of faecal sludge to design collection systems and treatment plants, but also social science skills such as community engagement and gender-sensitive planning (NRW11, PVT04). The consultants to whom the entire mandate is shifted onto are given little time and resources to understand the context, which leads them reproduce ‘template solutions’ from other cities (IDA05, Workshop 4). New capacity building initiatives geared towards CWIS have started with national and international support (Dash & Kapur 2021).

Table 2 | Key facts regarding the case study locations and their sanitation status

City	State	Population (in millions)	Swachh Survekshan Rank 2019	% of population using Safely Managed Sanitation	% of population using Sewered Sanitation	No. of interviewees
Chennai	Tamil Nadu	10.5	61	62	42	14
Coimbatore	Tamil Nadu	1.6	40	76	34	12
Bangalore	Karnataka	12	194	52	84	10
Mysore	Karnataka	1.5	3	72	82	8

⁴ All results obtained from interviews, workshops, document analysis and scholarly literature are clearly cited as such. The results from interviews are corroborated in at least three instances before being picked or come from highly reliable sources. Those results that are not cited are to be seen as inferences from the aforementioned sources.

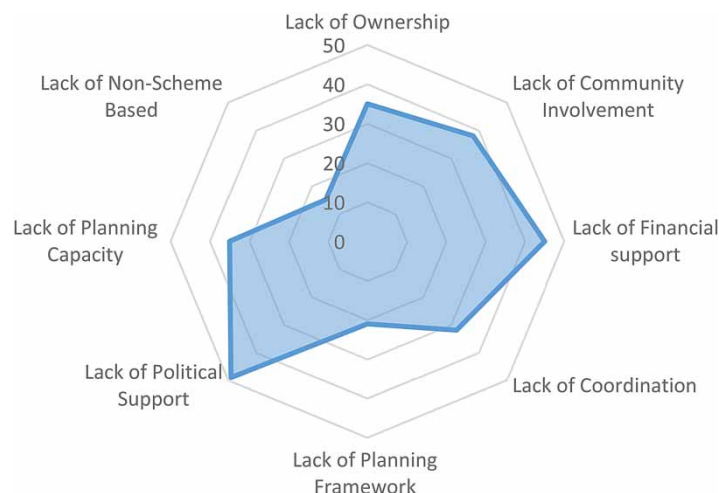


Figure 1 | Key barriers to sanitation planning in India as stated in interviews are depicted in no particular order. The radial axis indicates the number of experts who mentioned the respective factors in the interviews.

4.1.2. Lack of non-scheme-based approach (15 respondents)

‘CSPs were scheme based; with the introduction of new national urban schemes (called “AMRUT” and “Smart Cities Mission”), we moved to a different template’ (SGV13). Sanitation is tied closely to the interests of the national schemes which are pegged onto changing political priorities, rather than the actual needs of the cities (ACD12, Chaplin 1999; Jain *et al.* 2020). With the advent of the SBM and AMRUT schemes, the planning format was changed from CSPs to detailed project reports of sanitation infrastructure (GoTN 2017). This meant that key aspects of CWIS and the NUSP were diluted with the omission of equity, sustainability and accountability factors. The funding tied to other urban development schemes, including the Smart Cities Mission, did not request submission of the old format CSPs (Workshop 4).

4.1.3. Lack of planning framework (21 respondents)

‘There is no uniform framework to plan sanitation in India’ (NGV02). Although there was international support for the creation of the CSP process which led to the development of toolkits and guidance material (GIZ 2016), its uptake at the local level has been poor (Workshop 4). Different cities follow different sanitation planning methodologies or the lack thereof, which results in ineffective implementation and misinterpretation of sanitation targets set by the NUSP (ACD13, PVT06). Two-thirds of all national-level interviewees and 80% of all international development representatives agreed that this was of high importance. The lack of a targeted planning framework potentially has spill-over effects on other aspects such as ownership, coordination and community involvement (Workshop 4).

4.1.4. Lack of ownership (35 respondents)

‘How do you expect municipalities to have ownership of a checklist document that they did not prepare by themselves?’ (NRW05). Respondents mentioned that CSPs were widely regarded merely as the checklist document and that city governments are required to submit in order to apply for national funding schemes. Furthermore, CSPs were mandated as part of the NUSP by the national government and did not have the complete buy-in from cities and states (ACD13, IDA02). Constitutionally sanitation is a state subject (Cullet & Bhullar 2015), but the national government provides the majority of funding, announces sanitation schemes, drafts policies, sets standards and regulations, and controls the narrative, thereby preventing states to freely execute their own governance mechanisms (Workshop 1).⁵ This disconnect between national agenda, state’s mandate and the implementation at the city level, in addition to planning carried out by external consultants instead of local authorities, causes a lack of ownership at the local level.

⁵ The national benchmarking schemes and the Swachh Survekshan ranking systems are, however, reported to boost healthy competition, thereby creating a positive effect on the annual performance of cities in terms of provision of safely managed sanitation.

4.1.5. Lack of coordination (32 respondents)

'To build a sewer, we need to coordinate between 11 different governmental departments' (SGV11). Apart from the aforementioned disconnect in levels of the government, there is also the challenge of institutional coordination to plan and implement sanitation solutions. Previous research shows that there is inadequate flow of information between 10 relevant agencies for the governance of small-scale sanitation in the four selected Indian cities (Narayan *et al.* 2020). The overlapping jurisdictions of multiple agencies that are responsible for different aspects of the sanitation service chain create bureaucratic silos that present a barrier to implement solutions quickly and easily (Workshop 3). The regular transferring of bureaucrats between various governmental departments (outside of the water sector) leads to a lack of continuity and poor institutional memory (Raman 2020).

4.1.6. Lack of financial support (45 respondents)

'NUSP was not directly tied to any financial schemes' (PVT06). Although CSPs were required for the application of funding from national schemes, there were no exclusive financial resources for the sanitation planning process itself, leaving the cash-tight city governments to solely invest in the planning process (SGV15). Given that little time and money are available for the planning process even in mega cities, sanitation often fares low among competing urban priorities (Workshop 2). Adequate ring-fenced financial and human resources must be budgeted for the planning process, and this must be provided regardless of the schemes, in order for it to be comprehensive.

4.1.7. Lack of political support (49 respondents)

'Sanitation planning requires political support' (NRW01). Political will at all levels is required for effective sanitation planning, since the process is costly, time consuming and is asynchronous with the election cycles (Chaplin 1999; Hueso & Bell 2013). Competing priorities include solid waste management and water supply (SGV11). Even at the local level, the ward councillors rely on these competing priorities to sway the vote bank (NRW05).

4.1.8. Lack of community involvement (38 respondents)

'Swachh Bharat Mission is a jan andolan (people's movement)' (NGV06). Community involvement allows for the incorporation of local knowledge and increases the acceptance of the solutions from the beneficiaries, which is critical for long-term success, especially in low-income communities (McGranahan & Mitlin 2016). However, community consultation at the ward level is given little importance and often follows technocratic decisions which are based on limited criteria that are not validated by the local residents (ACD01, PVT06).

4.2. Analysing differences in responses

While there was large agreement in the results, a number of differences in the elicited response were identified between the key informants grouped by the type of stakeholder, where they were from and their affiliation level (national, state and city) (see Supplementary Material for details).

The mega cities – Chennai and Bangalore – have separate utilities that are mandated with sanitation provision and have at least 10 times more skilled labour in their force than their secondary city counterparts. They also follow a much more top-down approach with little community involvement (Workshop 2); this leads to increased reported ownership from the utility managers (SGV01, SGV02, SGV06 and SGV10). Furthermore, non-sewered solutions are seen as interim, and all state and city governmental stakeholders clearly indicated sewer-aspirations. 'Chennai will have 100% sewerage. FSM is only a stopgap measure for us' (SGV06). The state government's vision document and action plan for central funding corroborates this (GoTN 2017). In the case of the secondary cities, Coimbatore and Mysore, there is a more long-term vision of multiple solutions co-existing in these urbanising cities. The governmental stakeholders in these cities are cognizant of their limited planning capacities and rely on parastatal organisations for this purpose. Interestingly, community participation through direct consultations and the involvement of NGOs are reported to be better in these smaller cities (Narayan *et al.* 2020).

There is a clear difference in perception and vision for urban sanitation between the national-, state- and city-level stakeholders. National stakeholders strongly emphasise the importance of community participation and underscore the state's own financial contribution to the success of sanitation interventions (NGV05, NGV04). The state-level stakeholders on the other hand make little reference to community involvement and refer to national schemes as the main source of urban infrastructure funding (SGV17, NRW05). The city-level stakeholders report that community involvement is a tedious process for which they have little time, and most of their capacities are utilised in urgently fixing the broken pipes (SGV10, SGV14, ACD05).

The stakeholder types also reflect in the priority reasons highlighted for causing failure in sanitation planning. Academic stakeholders predominantly stated the lack of a uniform planning framework and community participation. NGOs and resident associations also agreed on the latter and added the need for financial support for sanitation planning. Stakeholders from private companies reported a lack of inter-agency coordination and a scheme-based approach as the main barriers. Inadequate community participation and a lack of planning frameworks were the main issues highlighted by international development agencies. Finally, all levels of government interviewees concurred that poor capacities and complexity in coordination within the governmental departments were their main hurdles for effective sanitation planning. Almost all interviews and workshops without prompting arrived at the conclusion that political and financial support is essential for comprehensive planning for CWIS.

5. FURTHER DISCUSSION USING THE CWIS PLANNING FRAMEWORK

The results clearly show systematic barriers to sanitation planning in India, among which the lack of a planning framework is highlighted. This section justifies the need for a new approach and introduces the CWIS planning framework. Furthermore, a discussion of CWIS planning in India is made in light of the framework, where it offers a perspective to overcome the aforementioned barriers.

5.1. Introduction to the CWIS planning framework

With the advent of the CWIS approach, which views sanitation as a holistic service and puts equity, safety and sustainability in focus, planning sanitation interventions according to its principles need to be more comprehensive (Schrecongost *et al.* 2020). Currently, there are no planning frameworks that have been exclusively developed, or existing frameworks adapted to meet this promising yet, complex mandate. Several sanitation planning theories and frameworks have been developed in the past, right from the ‘Strategic Sanitation Approach’ (Kalbermatten *et al.* 1980) that led to top-down planning approaches such as ‘Sanitation 21’ (Parkinson *et al.* 2014) to bottom-up approaches such as ‘CLUES’ and ‘U-CLTS’ (Lüthi *et al.* 2011; Myers *et al.* 2018). While it would be useful to adapt existing planning frameworks for CWIS, a theoretical basis for CWIS planning is necessary to test their performance in terms of the outcome of the plans and the planning process itself.

Debates on the appropriate approach for planning urban sanitation in LMICs continue to exist between top-down technocratic planning (Schmitt *et al.* 2017; Mara 2018) and bottom-up communicative planning (McGranahan & Mitlin 2016; Narayanan *et al.* 2017). Since CWIS planning needs to be comprehensive, for example, it needs both community involvement (characteristic of bottom-up approaches) and inter-agency coordination (characteristic of top-down approach), it would benefit from the bridging of top-down and bottom-up planning approaches. But such a bridged approach is not available in the current sanitation planning landscape.

The proposed CWIS planning framework aims to set the theoretical basis for contextualised and procedural CWIS planning. It places the bridging of top-down and bottom-up approaches as a centre-piece. The framework is based on the largely agreed Manila principles (Narayan & Luthi 2020). Since the justification and explanation of the CWIS approach is already covered in detail in previous research (Lüthi & Narayan 2018; Gambrill *et al.* 2020; Schrecongost *et al.* 2020), this paper will directly use the elements of the principles in explaining the planning framework.

It is important to note that this planning framework does not prescribe any procedural steps at this stage, since such a generic methodology requires empirical evidence from various contexts. Therefore, this paper introduces the framework, which will then help further research on developing contextualised methodologies for CWIS planning, which has been identified as one of the key reasons for the failure of sanitation planning in India.

The CWIS Planning Framework (Figure 2) places comprehensive planning at the centre, surrounded by four operational outcomes that are directly borrowed from the Manila principles on CWIS: (i) Public Health, (ii) Environmental Health, (iii) Mix of Technologies and (iv) Mix of Business Models. The following functional linkages are seen to connect these outcomes appropriately:

1. Safety links (i) and (iii), since it is achieved only when the entire value chain is managed while ensuring public and environmental health.
2. Sustainability links (ii) and (iii), since sanitation systems must sustain from both the environmental and financial perspectives. Mix of technologies allows for contextual and incremental improvements offering financial viability. Environmental health outcomes directly impact environmental sustainability.

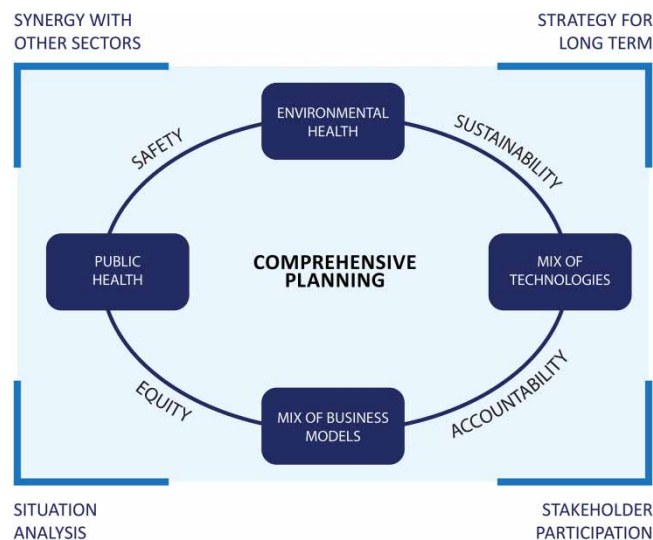


Figure 2 | CWIS planning framework.

3. Accountability links (iii) and (iv), since a mix of technologies and business models inherently increase operational and governance complexity. Therefore, clear accountability mechanisms enhance the long-term functionality of a mix of sanitation services.
4. Equity links (iv) and (i), since equitable sanitation means everyone in the city receives equal public health outcomes while enjoying equal quality and affordability of sanitation services from any operating business model.

These operational outcomes and functional linkages are supplemented with the conceptualised four ‘S’ pillars (4S) of comprehensive planning: (1) Situation analysis, (2) Stakeholder participation, (3) Synergies with other sectors and (4) Strategy for the long term. These 4S pillars emerged from the aim of bridging top-down and bottom-up approaches. While top-down approaches provide the advantages of exploring synergies with other public services and strategies for the long term, bottom-up approaches encourage detailed situational analysis through co-production of knowledge and meaningful stakeholder participation.

The CWIS planning framework is useful when designing CWIS projects, in order to highlight key aspects of the CWIS concept; the operational outcomes serve as the targets to operationalise, and the functional linkages serve as the essentials of the approach. The operationalisation of targets must be context-specific and incremental. The outcomes of environmental health and public health must follow the respective jurisdiction’s standards, and the mix of technologies and business models must be set according to the needs of the particular city/neighbourhood. The functional linkages on the other hand allow the design of the enabling environment of sanitation systems; for example, the tariff structure for the services are set equitably with subsidies for the poor, or that the institutional mandates are clarified so that there is clear accountability for service provision.

The 4S pillars serve as the cross-cutting steps to consider during the CWIS planning process. The process must begin bottom-up with (1) situational analysis, which helps set operational targets for CWIS and then (2) closely engage community and stakeholders throughout the planning process. The top-down approach ensures that there is strong will from the public sector which helps foster coordination between various institutions to (3) plan for the long term and (4) synergise with other related urban services such as water supply, solid waste management, stormwater drains and slum redevelopment.

In the CWIS Planning Framework, the operational outcomes and functional linkages are aspects that are to be used in prospective planning to set targets and outcomes. Whereas the 4S pillars of comprehensive planning could be used to (1) formulate planning methodologies and (2) analyse sanitation planning practices retrospectively and propose ways forward, such as in this paper for the Indian context.

The proposed planning framework clearly sets out the objectives of sanitation planning that is in line with the latest development in the urban sanitation sector, i.e., the CWIS principles. CSPs, on the other hand, lacked the full scope of CWIS and missed operationalising the principles of equity and mix of business models. CSPs were completely procedural and lacked a theoretical framework that could be customised to the contextual needs. The CWIS Planning Framework on the contrary begins with a theoretical backing based on which the procedural methodology could be developed.

5.2. Discussion of Indian case using the CWIS planning framework

Prime Minister Narendra Modi stated '*To reach India's sanitation goals, we need 4Ps – Political Leadership, Public Funding, Partnerships and People's Participation*'. There is a need for a fifth 'P' – Planning. In order to achieve the operational outcomes and functional linkages of CWIS in India, comprehensive planning is necessary. Based on the 4S pillars provided in the CWIS Planning Framework (Figure 2) and the qualitative analysis of this study (Results and Discussion), overarching ways forward to overcome these barriers are identified and provided below as recommendations.

5.2.1. Situational analysis

There is a lack of planning capacity in terms of human or financial resources allocated for analysing the local situation and its unique context. This requires a systematic methodology that places situational analysis as an initial step. Such detailed information helps create advocacy for political will and community acceptance. Tools that aid in analysing the local context greatly reduce the time and money otherwise spent at this stage, and support the existing capacities for planning (Schertenleib *et al.* 2021). Bottom-up sanitation planning practices, in particular, have been proven to generate detailed knowledge on the local context through co-production in India (Narayanan *et al.* 2017). Situational analysis also provides the data which forms the basis for setting targets for the operational outcomes for CWIS. However, in order to conduct detailed analysis, targeted capacity development programmes for public sector workers and private consultants are key (Dash & Kapur 2021). Overall, these steps help overcome the barriers of community participation, political will and planning capacities.

5.2.2. Stakeholder participation

Community and stakeholder participation were mentioned by more than half of the respondents as a crucial aspect of successful planning since it allows the incorporation of local knowledge and acceptance. However, most interviewed community-based organisations did not report meaningful participation as common practice. The few cases that reported close involvement in sanitation planning were NGOs in the secondary cities of Coimbatore and Mysore, where the sanitation situation is also seen to be faring better (Table 2). Sanitary workers, who are a primary stakeholder, are almost always excluded from planning, which leads to inequitable decisions having detrimental effects for social, public and environmental health (Sharada Prasad & Ray 2019).

Community-based organisations have already been recognised as a catalyst in bringing various stakeholders together and nationally recommended in India through policy documents (UMC 2019). However, a planning approach that clearly emphasises this, such as the CSP's city sanitation task force, needs to be implemented in spirit and not merely remain a checklist item. Furthermore, social specialists and institutional special purpose vehicles⁶ are required to coordinate and build consensus during such a stakeholder intensive planning process. This step helps enhance ownership, community involvement, and political will since it directly engages the public, thereby making sanitation a high visibility issue.

5.2.3. Synergy with other sectors

One of the reasons for poor coordination is the jurisdictional overlap between various agencies, which happens because of the cross-cutting nature of sanitation. Coordination is required horizontally; within the sanitation service chain, for example, training masons to use the standardised septic tank designs or planning monitoring mechanisms to ensure that the private vacuum truck operators dispose faecal waste only at the treatment sites (Sharada Prasad & Ray 2019; Dash & Kapur 2021). Coordination vertically with other basic services such as water supply, storm water and solid waste management would also be pertinent for achieving safe sanitation (Scott *et al.* 2019; Narayan *et al.* 2021). For example, planning flush toilets in areas with intermittent water supply or designing small-bore sewers in areas with poor solid waste management will hinder the functionality of the sanitation systems. The NUSP already highlights collaborative planning with the aforementioned sectors and should be brought to practice (GoI 2008). Stakeholders from the National Government reported that such an approach could benefit from lesser financial needs due to the gains of synergistic planning, opportunity to tap funds from varying sources and receive higher priority in fund allocation. However, further research is needed to provide evidence for the gains from such synergistic planning. While the planning process is encouraged to be integrated, the implementation could still function as per the existing institutional set-up as long as the coordination is strengthened. Integrated planning reduces the number of interfaces for the stakeholders, but increases the planning complexity and need for

⁶ A governmental multi-institution coordination agency working towards a specific, clearly defined purpose. This is popularly used in the Indian government.

policy changes geared towards planning CWIS. Through this step, the barriers of coordination and financial support could be overcome.

5.2.4. Strategy for the long term

Although political support was mentioned as a crucial factor, sanitation planning has to take a longer term view compared to the 5-year election cycles in India. Respondents who mentioned a scheme-based approach as a barrier pointed out to short-term political vision as a reason for a lack of planning incremental sanitation and a lack of institutional strengthening in the sector. Scheme-based setting of targets and financing could be beneficial for a mission mode of operation, such as the SBM which set the goal of eliminating open defaecation. However, schemes have tunnel vision, and in the past, total sanitation schemes in India have fizzled out at the onset of competing priorities (Hueso & Bell 2013). Even SBM fell short in managing the other parts of the sanitation service chain, since it focussed only on the construction of toilets (Kumar 2017). CWIS requires planning clear accountability mechanisms, a service model that considers an optimal mix of technologies, and private sector partnerships which, in turn, enhance financial sustainability. CWIS plans based on the above framework must be flexible to address emerging social and natural issues such as equity and climate change, in order to remain relevant despite changes in political priorities. By strategizing for the long term and being flexible, the barriers of a scheme-based approach could be overcome and potentially gain political support since planning traverses political timelines.

6. CONCLUSION

In the last decade, the Indian sanitation sector has witnessed an evolution with progressive policies, national-level funding, political support and the world's largest sanitation campaign. In spite of these and a national urban sanitation policy mandating local authorities to prepare city sanitation plan, urban sanitation systems are generally poorly planned. With the advent of CWIS, multiple targets are explicitly placed for operational outcomes and functional linkages, which require comprehensive planning that bridges top-down and bottom-up approaches. Although CWIS is widely accepted as the way forward towards achieving the urban sanitation SDGs, the complexity of planning CWIS in India remains to be a challenge.

This paper has identified several key barriers to sanitation planning in India that stem from a fundamental lack of priority given to it at the national, state and city levels. Through the case study approach, it is found that a lack of a framework among others impedes sanitation planning. Furthermore, the secondary cities where community involvement is higher have better sanitation outcomes than mega cities where this is absent. Political support for comprehensive planning and adequate ring-fenced financial and human resources for the planning process are major recommendations. Other reforms are the development of planning capacities in local governments through large-scale training programmes and improving inter-agency coordination through stronger institutional mechanisms.

The new CWIS Planning Framework brings together the Manila principles and provides a theoretical basis for planning CWIS. But, this needs to be followed with the development of a clear step-wise methodology that has scope to be contextualised to local needs, and yet serves as a generic CWIS planning approach. Further empirical research on diverse contexts is required for the conceptualisation of such a planning methodology. The 4S pillars of comprehensive planning propose the fundamental elements for the aforementioned approach towards planning CWIS.

DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

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